

# Medical Image Storage and Processing Software (Insight Vision Workstation Plus)

## User Manual

SinoVision Healthcare (Yangzhou) Co., Ltd.

## About this manual

### 1.Manual Description

This manual is the user manual for medical image storage and processing software (Insight Vision Workstation Plus).

This manual introduces the function, safety, and instructions of medical image browsing and processing system. Users must read all the chapters in this manual thoroughly before using the system. The manufacturer is not liable for any unauthorized part.

The copyright of this user manual (or short for manual) is reserved by SinoVision Healthcare (Yangzhou) Co., Ltd. Unauthorized copy or modification of the content in this manual is regarded as violating the law.

Manual Name: User Manual for Medical Image Storage and Processing Software (Insight Vision Workstation Plus).

Revised Date: Dec 31, 2021

Rev.: 01

Software Version: 1.0

### 2.Copyright

The copyright owner of this manual is SinoVision Healthcare (Yangzhou) Co., Ltd.

Unauthorized copy or modification of the content in this manual is regarded as violating the law. This manual can be printed for use.

### 3.Executive Standard

This manual is written according to Medical Instruments Instructions, Tags and Packaging Labeling Management Regulations.

### 4.How to Use This Manual

Users must read this manual thoroughly, especially the safety instructions in Chapter 1 to prevent potential losses and hazards.

It is recommended that operation staff should refer to this manual in their daily operation.

### 5.Patent

The patent right of Medical Image Storage and Processing Software is owned by SinoVision Healthcare (Yangzhou) Co., Ltd.

## Contetnt

Medical Image Storage and Processing Software.....	1
About this manual.....	2
1. Manual Description.....	2
2. Copyright.....	2
3. Executive Standard.....	2
4. How to Use This Manual.....	2
5. Patent.....	2
<b>Chapter 1 Safety Instructions.....</b>	<b>13</b>
1.1 Safety Prompt.....	13
1.2 System Use.....	13
1.3 General Notes.....	14
1.4 Safety Instructions.....	14
1.5 Installation and Maintenance.....	15
1.6 Restrictions on use.....	15
1.7 Efficiency.....	15
1.8 Data Interface.....	16
<b>Chapter 2 The Description of Products.....</b>	<b>17</b>
2.1 Product Name/Model.....	17
2.2 The Scope of Products.....	17
2.3 Intended patient population.....	18
2.4 Intended service conditions.....	18
2.5 Contraindication.....	18
2.6 About training.....	18
2.7 The Operating Environment of Products.....	18
1. Hardware Operating Environment.....	18
2. Software Operating Environment.....	19
2.8 Product Composition.....	19
<b>Chapter 3 Start and Login and Exit.....</b>	<b>20</b>
3.1 Start.....	20
3.2 Login.....	20
3.3 Exit.....	21
<b>Chapter 4 Workflow.....</b>	<b>22</b>
4.1 The Main Page of System.....	22
4.2 Navigation Bar.....	22
4.3 Work Area.....	23
<b>Chapter 5 Patient Information Management.....</b>	<b>25</b>
5.1 Patient Information Management.....	25
1. Description.....	25
2. Operation.....	26
5.2 Information Query.....	26
1. Description.....	26
2. Operation.....	26
5.3 Advanced Information Query.....	27
1. Description.....	27

2. Operation .....	27
5.4 Shortcut Query.....	27
1. Description.....	27
2. Operation .....	27
5.5 Other Function Buttons in the Information Retrieval Area.....	28
1. Description.....	28
5.6 Check out Data Representation.....	29
5.7 Check List.....	29
1. Description.....	29
2. Description.....	29
5.8 Series List .....	32
1. Description.....	32
2. Operation .....	32
5.9 Image List .....	34
1. Description.....	34
2. Operation .....	34
5.10 Bookmark list.....	35
1. Description.....	35
2. Operation .....	35
5.11 Thumbnail .....	36
3. Description.....	36
4. Operation .....	36
5.12 List size adjustment .....	36
1. Description.....	36
2. Operation .....	36
5.13 Database Tool .....	36
1. Description.....	36
2. Operation .....	37
<b>Chapter 6 Burning Function .....</b>	<b>39</b>
6.1 Burning Description.....	39
6.2 Burning operation .....	40
1. Title Area .....	40
2. Check List Area .....	40
3. List Button Area.....	40
4. Burning Operation Display .....	41
5. Progress Display Area.....	41
6. Disk Selection Area .....	41
7. Burning Area.....	41
<b>Chapter 7 RIS Information Modification .....</b>	<b>42</b>
7.1 RIS Information Entry .....	42
1. Description.....	42
2. Operation in Basic Information Area.....	43
3. Check the Information Area Operation.....	43
4. Read database data information .....	43
<b>Chapter 8 DICOM Sending and Receiving .....</b>	<b>44</b>
8.1 DICOM Data Acquisition .....	44

1. STORAGE SCP Setting.....	44
8.2 DICOM Data Transmission .....	46
1. Task List.....	47
2. Status List .....	48
3. Schedule.....	48
4. Operation Area.....	48
<b>Chapter 9 Image Browse .....</b>	<b>49</b>
9.1 2D Interface .....	49
9.2 Data Operation.....	51
1. Image Data Storage.....	51
2. Image Clearance .....	51
3. Send the Image to Film.....	51
4. Send Images to Report.....	52
5. Editing Image Report.....	52
6. View DICOM Information.....	52
9.3 Image Basic View .....	53
1. Series Layout .....	53
2. Image Layout.....	53
3. Overlay Display .....	54
4. Image Selection .....	54
5. Image Operation .....	54
6. Positioning Image Setting.....	57
7. Image Browsing.....	58
8. Measurement annotation.....	58
<b>Chapter 10 Film Layout .....</b>	<b>60</b>
10.1 Film Layout Function .....	60
10.2 Open Film Typesetting.....	60
10.3 Film Window Function Introduction .....	61
1. View Window of Film Layout .....	61
2. Tools Panel Window .....	62
10.4 Film Printing Task Manager .....	68
<b>Chapter 11 Report Edit.....</b>	<b>69</b>
11.1 General Report Editing Function.....	69
11.2 Open Reports .....	70
11.3 General Report Function Introduction .....	71
1. Report Editing Area .....	71
2. Image Area to be Selected .....	71
3. Template Operation.....	72
4. Quickly Input Template .....	72
5. Report Function Button .....	73
11.4 Senior Reporting Functions .....	74
1. Overall Description.....	74
2. Function Introduction in the Control Area.....	75
3. Report Content Introduction .....	75
11.5 Report Browsing .....	75
<b>Chapter 12 3D .....</b>	<b>77</b>

12.1 Start.....	77
12.2 3D Operation Interface Description.....	78
12.3 Function Operation Panel .....	80
4. General Function .....	81
5. Function Operation Panel .....	82
6. General Tools Panel .....	86
<b>Chapter 13 MPR.....</b>	<b>89</b>
13.1 Start.....	89
13.2 The Description of MPR Operation Interface.....	90
13.3 MPR View .....	91
1. MPR Overall View.....	91
2. Image Display View.....	91
13.4 Function Operation Panel .....	95
1. Curve Mode .....	96
2. Diagonal Line Mode.....	98
3. Batching Mode.....	100
4. Layer Thickness Mode.....	102
5. Layer Compare Mode .....	104
<b>Chapter 14 Setting Introduction .....</b>	<b>106</b>
14.1 Interface Information .....	106
<b>Chapter 15 Virtual Endoscope.....</b>	<b>117</b>
15.1 Start.....	117
15.2 The Description of VE Operation Interface.....	117
15.3 Control Panel .....	118
1. General tool .....	118
2. VE Tool.....	120
<b>Chapter 16 Brain Perfusion Analysis (Option).....</b>	<b>130</b>
16.1 Start.....	130
16.2 Image Optimization .....	130
1. Image Correction .....	131
2. Series Editing.....	132
3. Series Playing .....	132
4. Tissue Extraction .....	132
16.3 Vascular Definition .....	132
16.4 Perfusion Analysis .....	133
1. Perfusion Analysis Panel .....	133
2. Perfusion Parameter Maps.....	134
3. ROI Time Density Curve Graph.....	135
4. ROI Analysis Statistics Table.....	136
5. Low Perfusion Analysis Statistics Table .....	136
<b>Chapter 17 Lung Nodule Analysis (Option).....</b>	<b>138</b>
17.1 Start.....	138
17.2 Description of Operation Interface .....	139
17.3 View.....	140
1. LNA Holistic View .....	140
2. Image Display View.....	141

17.4 Function Operation Panel .....	142
1. Lung Nodule Extraction Function Panel.....	143
2. Lung Nodule Edit Function Panel.....	145
<b>Chapter 18 Lung Nodule Contrast (Option).....</b>	<b>147</b>
18.1 Start.....	147
18.2 The Description of Operation Interface .....	148
18.3 View.....	149
1. Lung Nodule Contrast the Whole View .....	149
2. Image Display View.....	150
18.4 Function Operation Panel .....	151
1. Lung Nodule Matching Function Panel.....	152
2. Lung Nodule Edit Function Panel.....	155
<b>Chapter 19 CT subtraction angiography (Option).....</b>	<b>158</b>
19.1 Start.....	158
19.2 Data Loading .....	159
19.3 Vascular subtraction.....	160
1. Interface .....	160
2. Function .....	160
19.4 Vascular Extraction.....	161
1. Interface .....	161
2. Function .....	161
19.5 Vessel Center Line Extraction.....	163
1. Interface .....	163
2. Function .....	164
19.6 Vascular Analysis.....	165
1. Measurement Analysis Panel.....	166
2. CPR Image Window .....	167
3. Quantitative Analysis Statistical Table.....	168
4. Cross Section View of Reference Point .....	168
5. Axial Plane View of Stenosis Reference Point .....	169
6. Vessel Straightening View .....	170
<b>Chapter 20 Advanced Vascular Analysis (Option).....</b>	<b>171</b>
20.1 Start.....	171
20.2 Data Loading .....	171
20.3 Description of Operation Interface .....	172
20.4 Automatic Analysis and Common Operation .....	172
20.5 Bone Remove.....	173
20.6 Vascular Analysis.....	174
1. View.....	175
2. Function .....	179
20.7 Stent Planning.....	182
1. Basic Concept.....	182
2. View.....	183
3. Function .....	185
20.8 Send to the Film.....	190
1. Measure Layout 1 .....	190

2. Measure Layout 2 .....	191
20.9 Send to the Report .....	192
<b>Chapter 21 Cardiac Coronary Artery Analysis (Option) .....</b>	<b>193</b>
21.1 Start.....	193
21.2 Data Loading .....	194
21.3 Automatic Analysis.....	194
1. Interface .....	194
2. Function .....	195
21.4 Segmentation Tools.....	195
1. Interface .....	195
2. Function .....	196
21.5 Analysis Tools.....	197
1. Interface .....	197
2. Function .....	198
21.6 Report Tools.....	202
1. Interface .....	202
2. Function .....	202
21.7 Major General Tools .....	204
1. Show/ hide tools of information .....	204
2. Drawing Mode Tool.....	204
3. Coronary angiography is commonly used for body position switch.....	205
<b>Chapter 22 Cardiac Calcium Score (Option).....</b>	<b>206</b>
22.1 Start.....	206
22.2 Image Description.....	206
22.3 Function Operation Panel .....	207
1. Series Selection Operation.....	209
2. Vessel List Operation .....	209
3. Vessel Tissue Mark .....	210
4. Score Value Calculation Display Operation.....	210
5. Common Operation .....	211
<b>Chapter 23 Colon Analysis (Option) .....</b>	<b>213</b>
23.1 Start.....	213
23.2 Colon Operation Interface Description.....	213
23.3 View.....	214
23.4 Control Panel .....	215
<b>Chapter 24 Dental Analysis (Option) .....</b>	<b>221</b>
24.1 Start.....	221
24.2 Operation Interface Description.....	222
1. Curve/Canal operation .....	222
2. Profile line operation .....	225
<b>Chapter 25 Tumor Analysis (Option) .....</b>	<b>228</b>
25.1 Start.....	228
25.2 Operationa Interface Overview.....	229
25.3 View.....	230
1. Overall View of Tumor Analysis .....	230
2. Image Display View.....	231



25.4 Function Operation Panel .....	232
1. Tumor Extraction Function Panel .....	233
2. Tumor Edit Function Panel .....	235
<b>Chapter 26 Cardiac Function Analysis (Option) .....</b>	<b>237</b>
26.1 Start .....	237
26.2 Operation Interface Overview .....	238
26.3 Image Display View .....	239
1. Overall View .....	239
26.4 Function Operation Panel .....	239
1. Introduction of the Overall Function Panel .....	239
2. CFA Function Panel .....	240
<b>Chapter 27 Liver Perfusion Analysis (Option) .....</b>	<b>243</b>
27.1 Start .....	243
27.2 Image Optimization .....	243
1. Image Correction .....	244
2. Series Editing .....	245
3. Series Playing .....	245
4. Tissue Extraction .....	245
27.3 Vascular Definition .....	245
27.4 Perfusion Analysis .....	246
1. Perfusion Analysis Panel .....	246
2. Perfusion Parameter Image .....	247
3. ROI Time Density Curve Image .....	248
4. ROI Analysis Statistics Table .....	248
<b>Chapter 28 Tumor Perfusion Analysis (Option) .....</b>	<b>250</b>
28.1 Start .....	250
28.2 Image Optimization .....	250
1. Image correction .....	251
2. Series Editing .....	252
3. Series Playing .....	252
4. Tissue extraction .....	252
28.3 Vascular Definition .....	252
28.4 Perfusion Analysis .....	253
1. Perfusion Analysis Panel .....	253
2. Perfusion Parameter Image .....	254
3. ROI Time Density Curve .....	255
4. ROI Analysis Statistical Table .....	255
<b>Chapter 29 Lung Function Analysis (Optional) .....</b>	<b>256</b>
29.1 Start .....	256
29.2 LFA Operating Interface Overview .....	257
29.3 View .....	257
29.4 Control Panel .....	258
1. General Tool .....	259
2. LFA tool .....	261
3. Lobes segmentation panel .....	265
<b>Chapter 30 Cardiac Viewer (Option) .....</b>	<b>271</b>

30.1 Start.....	271
30.2 The Description of Operation Interface .....	272
30.3 Image Display View.....	272
1. Holistic View .....	272
30.4 Function Operation Panel .....	273
1. Holistic Function Operation Panel.....	273
2. Cardiac View Function Panel.....	274
<b>Chapter 31</b> <b>Advanced Lung Nodule Analysis (Option)</b> .....	<b>276</b>
31.1 Start.....	276
31.2 The Description of Operation Interface .....	277
31.3 View .....	278
1. Lung Nodule Analysis Holistic View.....	278
2. Image Display View.....	279
31.4 Function Operation Panel .....	280
1. Lung Nodule Extraction Function Panel.....	281
2. Lung Nodule Edit Function Panel.....	283
<b>Chapter 32</b> <b>Bone Mineral Density (Option)</b> .....	<b>285</b>
32.1 Start.....	285
32.2 BMD Operation Description.....	286
32.3 Bone Density Analysis in Two-dimensional Model.....	286
1. Definition Operation Phase.....	286
2. Result Analysis Phase .....	289
32.4 Bone Density Analysis in Three-dimensional Model .....	291
1. Definition Operation Phase.....	291
2. Result Analysis Phase .....	292
<b>Chapter 33</b> <b>Printing Modeling (Option)</b> .....	<b>293</b>
33.1 Description.....	293
33.2 Function .....	294
1. Window Operation.....	294
2. Rendering Mode .....	294
3. Reset Center.....	295
4. Model Processing.....	295
<b>Chapter 34</b> <b>TAVI(Option)</b> .....	<b>297</b>
34.1 Start.....	297
34.2 Overview of Operation Interface .....	297
34.3 Image Display View.....	298
34.4 Functional operation panel.....	299
1. Overall Feature Panel Introduction.....	299
2. TAVI Function Panel.....	300
<b>Chapter 35</b> <b>Liver Analysis (Option)</b> .....	<b>303</b>
35.1 Start.....	303
35.2 Data Loading .....	304
35.3 Automatic Analysis.....	305
1. Interface .....	305
35.4 Liver Segmentation and Lesion Definition Tool.....	305
1. Interface .....	305

2. Function .....	306
35.5 Liver Segment Tool .....	308
1. Interface .....	308
2. Function .....	309
35.6 Virtual Surgical Plan Tools .....	310
1. Interface .....	310
2. Function .....	310
35.7 Main General Tools .....	310
1. Basic Operation .....	310
2. Parameter List Window Tool .....	312
<b>Chapter 36</b> <b>Fat Analysis (Option)</b> .....	314
36.1 Start.....	314
36.2 FAT Operation Overview .....	314
36.3 Fat Analysis in Single-layer Mode.....	315
1. View Area .....	315
2. Operation Panel .....	316
36.4 Fat Analysis in Multi-layer Model.....	319
1. View Area .....	319
2. Operation Panel .....	320
<b>Chapter 37</b> <b>Intelligent Pneumonia Analysis (Option)</b> .....	322
37.1 Start.....	322
37.2 Overview of Operation Interface .....	322
37.3 View .....	324
1. Overall View .....	324
2. Image Display View.....	324
37.4 Function Operation Panel .....	326
1. Function Panel .....	326
2. Edit Function Panel.....	328
<b>Chapter 38</b> <b>CT Fraction Flow Reserve Analysis (Option)</b> .....	330
38.1 Start.....	330
38.2 Data Loading .....	331
38.3 Operation Interface Overview .....	331
38.4 Automatic Analysis .....	332
38.5 Segmentation Tool .....	332
38.6 Analysis Tool .....	333
1.Interface .....	333
38.7 FFR .....	334
1. Interface .....	334
2. Function .....	335
38.8 Report tool .....	336
38.9 Main General Tool .....	336
<b>Chapter 39</b> <b>Epicardial Adipose Tissue(Option)</b> .....	337
39.1 Start.....	337
39.2 Data Loading .....	337
39.3 Operation Interface Overview .....	338
39.4 Automatic Analysis .....	339

39.5 Segmentation Tool .....	340
39.6 Analysis Tool .....	340
39.7 EAT Analysis .....	340
1. Interface .....	340
2. Function .....	341
39.8 Report Tool .....	345
39.9 Common tools.....	345
<b>Chapter 40</b> <b>Advanced Energy Spectrum Analysis (Option)</b> .....	<b>346</b>
40.1 Start.....	346
40.2 Data Loading .....	347
40.3 View .....	347
1.      Equivalent kVp view 1 .....	347
2.      Equivalent kVp View 2.....	347
3.      Equivalent kVp view 3 .....	348
4.      Monoenergetic View 1 .....	349
5.      Monoenergetic View 2.....	349
40.4 Function Operation Panel .....	350
1.      General Function Panel.....	350
2.      Image Quality Optimization Panel.....	351
3.      Gout Analysis Panel.....	351
<b>Chapter 41</b> <b>CT Myocardial Perfusion Analysis (Option)</b> .....	<b>353</b>
41.1 Start.....	353
<b>Chapter 42</b> <b>Remote Query</b> .....	<b>361</b>
42.1 Remote Query.....	361
1.      Description.....	361
2.      Operation .....	362
42.2 Information Query .....	362
1.      Description.....	362
2.      Operation .....	362
42.3 Remote Mainframe Information Setting .....	363
1.      Description.....	363
2.      Operation .....	363
42.4 Query .....	363
1.      Description.....	363
42.5 Retrieval Result Area.....	363
1.      Description.....	363
42.6 C-GET .....	364
1.      Description.....	364
2.      Operation .....	364
42.7 C-MOVE .....	364
1.      Description.....	364
2.      Operation .....	364
<b>Chapter 43</b> <b>Cloud Diagnosis (Option)</b> .....	<b>365</b>
43.1 Cloud Diagnosis Function .....	365
1.      Description.....	365

# Chapter 1 Safety Instructions

## 1.1 Safety Prompt

This manual is aimed at assisting users in operating the software system safely and effectively. Before using medical image processing and analysis of the company, it is necessary to familiarize yourself with the instructions of safety precautions related to the manual, and use the system in accordance with the correct operating procedures. Users must attach importance to the information provided by the manual. If you have any questions, you can call the company after-sales telephone for consultation.

## 1.2 System Use

Medical image storage and processing software (IVW for short) must be used in accordance with the safety procedures and operating instructions on the manual. It is necessary to use and operate the system in accordance with the local laws and regulations. Users and operators must use and operate the system without violating relevant laws or with legally binding regulations.

IVW is a software product used to browse medical images and process images. It can receive image data from a variety of multimodal devices (including but not limited to: CT, MR and other digital radiography equipment), and process, analyze, transmit and store image data. This product is used for daily imaging diagnosis of medical institutions and medical units.

IVW can store, transmit, process and display images in local disk, and can also perform the above operations on images stored in distributed mode in LAN. IVW provides the functions of patient information management, film printing and editing report, multiplanar reconstruction (MPR), image browse(2D), 3D, virtual endoscopy, brain perfusion analysis (option), lung nodule analysis (option), lung nodule contrast (option), CT subtraction angiography(option), advanced vascular analysis (option), cardiac coronary analysis(option), cardiac calcification score (option), colon analysis(option), dental analysis(option), tumor Analysis (option) , cardiac function analysis (option) , liver perfusion analysis(option), tumor perfusion analysis (option) ,lung function analysis(option),cardiac viewer(Option), advanced lung nodule analysis(Option), bone mineral density(Option), printing modeling (Option), preoperative analysis of transcatheter aortic valve implantation(TAVI Option), liver

analysis(Optional), fat analysis(Optional),intelligent pneumonia analysis(Optional), epicardial adipose tissue (option), CT fractional flow reserve (option), advanced energy spectrum analysis (option) , CT myocardial perfusion (option),cloud diagnosis (option), cloud diagnosis (option), remote query and so on. Meanwhile, the user operation supported by image browsing includes but not limited to the processing such as adjusting WL, annotation tool, interest area measurement, rotation, inverse color, zoom image and enhancement and so on.

## 1.3 General Notes

Note: other data operating software cannot be installed in this system, otherwise the system may not operate normally.

Note: the computer configuration purchased by users may differ from the description in this manual. Please consult the manufacturer for the applicability. During the daily operation, avoid throwing liquid on the machine and inside the machine.

Note: operate according to the operation manual and go on maintenance according to the service manual.

Note: always pay attention to safety problems. If any damage or abnormal function of the system is found at any time, do not use this system until maintenance staff have solved problems.

Note: The image transmission of this system depends on the network, please ensure that the network is unblocked during use. If the image transmission fails, first check if the network is connected.

## 1.4 Safety Instructions

The safety prompts for patient management module:

- Due to the function module of administering patient information provided by IVW, which only doctors can be available to visit.
- In order to prevent the unauthorized operation on patient's data, such as modification, deletion, and copying patient's data, it is suggested that IVW users should install the security Settings of IVW computer use, including but not limited to the safety notes: such as setting computer access permission, "locking" computer screen on leaving the computer and so on;
- The computer operating environment should be kept running well, such as assuring ventilation and avoiding moisture and so on.
- About IVW program Prompt:

All the files and folders related to IVW installation can't be moved, modified and created and so forth.

Otherwise, the IVW will not work properly.

## 1.5 Installation and Maintenance

### ➤Installation

The installation of the product should be completed by the company, not by users.

### ➤Support

The technical support for the product operation should be provided by the company, including the scene ,telephone and remote support.

### ➤Maintenance

The company shall provide the technical maintenance after the product delivery , the maintenance content includes corrective maintenance and improvement maintenance, and the maintenance methods include re installation, debugging and upgrading.

### ➤Notes

Users should be responsible for the problems caused by user's self-maintenance (reinstallation, debugging and upgrading); Users should not install any other software by themselves without the consent of the company. The company will not be liable for any failure of the system because of that.

The operating environment of our workstation products includes workstation hardware configuration, operating system and database, but we do not provide hardware, operating system and database.

## 1.6 Restrictions on use

➤User login requires correct user name and password

➤When using, you need to insert the hardware USB encryption lock

➤The user should be a doctor / technician with clinical knowledge or working experience in medical imaging

## 1.7 Efficiency

Under the configuration environment described in the software, the time from loading to display of CT image with 512 \* 512 \* 50 layer resolution is not more than 4 seconds (the time is the sum of image loading, 2d rendering and 3D rendering time).

## 1.8 Data Interface

- Equipment access interface: DICOM3.0;
- Transport protocol: DICOM3.0;
- Storage format: DICOM format;



## Chapter 2 The Description of Products

### 2.1 Product Name/Model

Product Name: Medical Image Storage and Processing Software

Model: Insight Vision Workstation Plus

Software Version: 1.0

### 2.2 The Scope of Products

Medical image storage and processing software (Insight Vision Workstation Plus, short for IVW below) is a software product for viewing medical images and processing images. It can receive digital images and data from a variety of multimodal devices (including but not limited to: CT, MR and other digital radiating devices. IVW can store, transmit, process, display images on a local disk, or perform the above operation on the stored images in distribution mode on a LAN. IVW workstation provides the functions of patient information management, film printing and editing report, multiplanar reconstruction (MPR), image browse(2D), 3D(VR), virtual endoscopy, brain perfusion analysis (option), lung nodule analysis (option), lung nodule contrast (option), CT subtraction angiography(option), advanced vascular analysis (option), cardiac coronary analysis(option), cardiac calcification score (option), colon analysis(option), dental analysis(option), tumor Analysis (option) , cardiac function analysis (option) , liver perfusion analysis(option), tumor perfusion analysis (option) ,lung function analysis(option),cardiac viewer(option), advanced lung nodule analysis(option), bone mineral density(option), printing modeling (Option), preoperative analysis of transcatheter aortic valve implantation(TAVI Option), liver analysis(option), fat analysis(option),intelligent pneumonia analysis(option), epicardial adipose tissue (option), CT fractional flow reserve (option), advanced energy spectrum analysis(option) ,CT myocardial perfusion (option),cloud diagnosis (option), and remote query and so on. Meanwhile, while browsing the image, the supported user operation includes but not limited to the processing, such as adjusting WL, annotation tool, the measurement of the interested area , rotation, inverse color, zoom image and enhancement and so on.

This software applies to the standard medical images with DICOM3.0 and local storage and management, remote sending, import and export, image processing (supporting 3D reconstruction of image data, etc.), and

diagnosis report writing of image data.

## 2.3 Intended patient population

Patients who need image-assisted diagnosis of diseases.

## 2.4 Intended service conditions

Provide image-assisted diagnosis of diseases for patients in medical institutions such as hospitals or physical examination centers.

## 2.5 Contraindication

It's temporarily not found.

## 2.6 About training

The manufacturer will conduct on-site or remote training for users after product delivery.

## 2.7 The Operating Environment of Products

### 1. Hardware Operating Environment

Hardware Name	Recommended Configuration
<b>CPU</b>	Intel Xeon 6 cores 12 threads, each core frequency is not less than 3.80Ghz
<b>Hard Disk</b>	256G SSD + 1T HDD
<b>Internal Storage</b>	32G ECC
<b>Displayer</b>	LED 24-inch display device, image resolution 1920x1200, screen ratio 16:10
<b>Graphics Card</b>	NVIDIA Geforce RTX 2060 SUPER or above, 8G video memory
<b>Network adapter</b>	Two network cards of 100M/1000M (one mainboard + one separate card) separate card : TP-link TG-3269E
<b>CD-ROM</b>	DVDRW
<b>Others</b>	Keyboard, Mouse

## 2. Software Operating Environment

Category	Description
System	Windows 10 en_US 64bit
Database	SQL2019 database

## 2.8 Product Composition

IVW supports the working mode with multiple clients. The client can accept the third-party equipment and the image data of software confirming to the format of DICOM3.0. And at the same time, the client can also send the image data to the specified third-party software according to the format of DICOM3.0. The image data received by the client will be stored in the local database and processed and analyzed by in IVW workstation. The main function modules of IVW workstations include: the management modules of patients' study information, browsing modules of 2D image, browsing modules of 3D image, report editing and output modules, film layout and printing modules, CD backup and burning modules, sending modules of DICOM files , receiving service modules of DICOM files , modules of system setting and modules of RIS information modification.

The product manual is delivered in CD-ROM.

## Chapter 3 Start and Login and Exit

### 3.1 Start

Double click on the shortcut of “IVW workstation” on the desktop and start IVW workstation.

### 3.2 Login

The software uses USB encryption lock for software encryption. When starting the software, if the encryption lock is not inserted, a prompt dialog box will pop up, as shown in Figure 3-1. Click OK to exit the software.

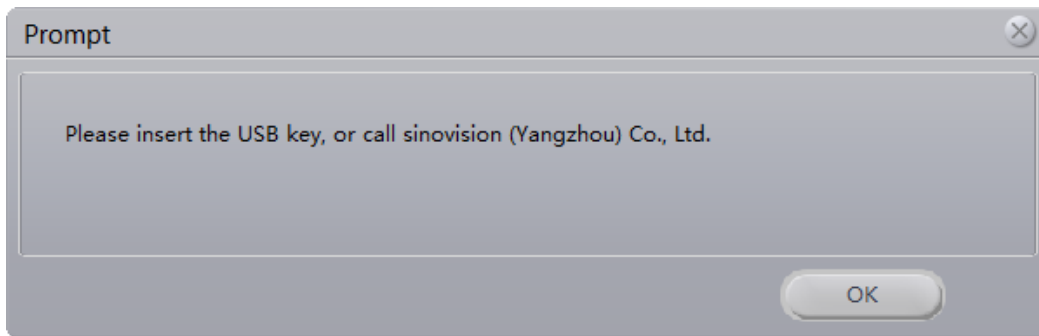


Figure 3-1 Study prompt dialog box

When a valid safety key is detected, the software will pop up the login dialog box showing the user name and the ciphertext password. The user clicks on login and the system will enter the software. The user clicks on cancel and the system will exit the software. The login interface is shown in figure 3-2.

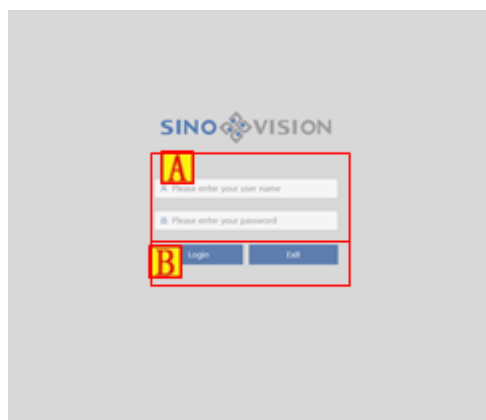


Figure 3-2 Workstation login interface

Area	Function	Description
------	----------	-------------

<b>A</b>	Information Input Area	Receive Input User Name and Password Information
<b>B</b>	Button Area	Login the Main Interface

### 3.3 Exit

Withdrawal of the workstation function, users can exit the workstation, lock screen workstation, shutdown workstation, restart workstation, detailed operation reference section 4.2 power button introduction.

## Chapter 4 Workflow

### 4.1 The Main Page of System

The main page is shown in figure 4-1 after the user logs in the system.



Figure 4-1 Login the main page

The layout of the main page is divided into two parts: The upper part of the status bar (A) and the central working area (B), the lower navigation bar. The different plug-ins can be switched by clicking on the navigation button in the navigation bar.

### 4.2 Navigation Bar

The navigation bar, shown in figure 4-2, has seven navigation buttons. The functions involved during the diagnosis process by the corresponding users are: PM、2D、FILM、Film、Report、Analysis and Q/R, the button among which in the dark background of the red box is the one in the currently selected work area.



Figure 4-2 Navigation bar

PM: provide patients with information retrieval and functions, such as opening the patient's study, loading

the patient's image, loading the report, loading the film layout, importing and exporting images and sending the burning,etc.;

2D: 2D radiograph reading function;


Film: provide the functions, such as film layout, film image setting and printing;

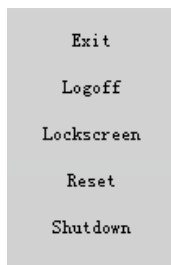
Analysis: advanced applications provide users with advanced post-processing applications for auxiliary diagnosis, containing the plug-ins, such as MPR and three dimensions, virtual endoscopy, lung nodule analysis (option) and cerebral perfusion analysis (option);

➤Report: edit report function;

➤Cloud (option): can send a difficult and complicated disease to other doctor team for diagnosis and get a diagnosis report;

Q/R: Query for image data from the other facilities of meeting the standard through the standard of DICOM .

The button on the left of the navigation bar is the exit button. Click on the  button, the system will pop



up the menu and the user can select the corresponding function to perform.

## 4.3 Work Area

Work area is the main area used by the user in the work, in which the contents of corresponding to navigation buttons are shown here. The work areas of 2D image browse, film printing, advanced application and report editing are empty or unclickable when the user doesn't load the study from the patient management. Only the study has been loaded, the user can operate in the above work area.

When the external displays are multiple, the work area can be set as dynamic filling to multiple screens. And its operation mode is consistent with the individual screen work area. For example, according to the computer configuration of general radiograph reading work, : desktop (including ordinary display) + professional gray-scale radiograph reading display, typically, the screen for patient management is served as the main work area. And 2D

image browse is set into the professional gray-scale radiograph reading display as the development radiograph reading work area.

***\* Attention: the user can arbitrarily set the content of the main work area and the development work area. But the advanced application is not allowed to set in the development work area.***



# Chapter 5 Patient Information Management

## 5.1 Patient Information Management

### 1. Description

Patient management functions mainly include: the retrieval browsing of patient data, browsing of study series, 2D image of showing loading the study, series thumbnails of showing loading the study and sending/printing report for the selected patient data,etc. , the main function of which is shown in figure 5-1.

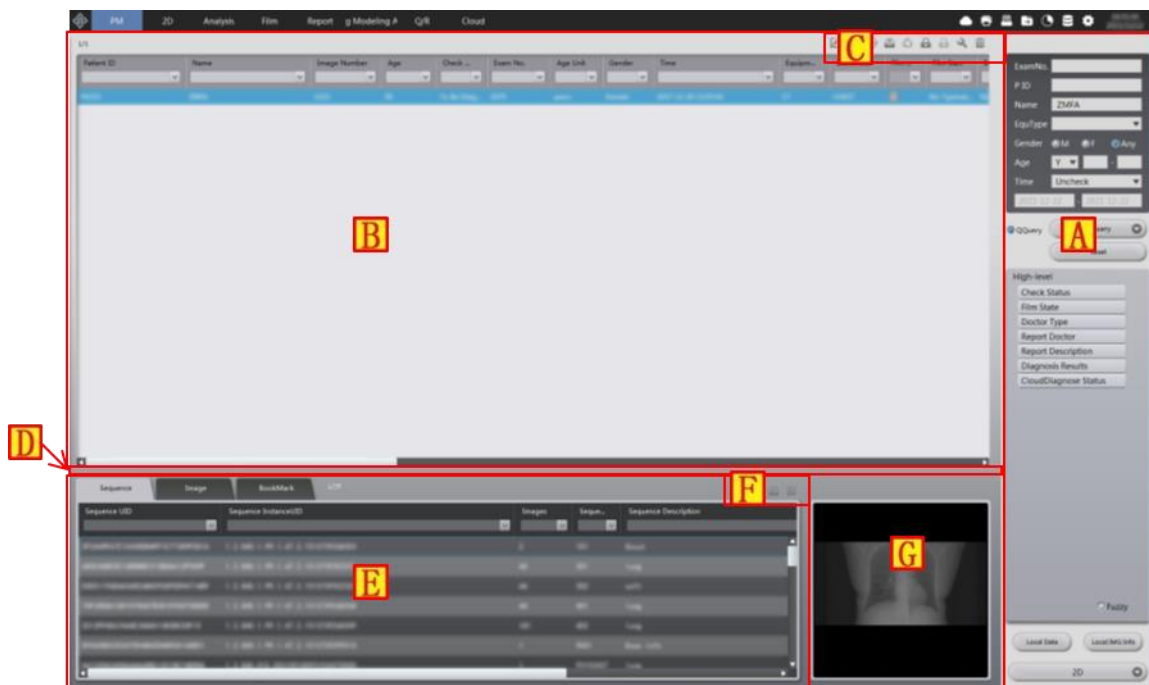


Figure 5-1 Patient management interface

Area	Function	Description
A	Information retrieval area	provides various kinds of query condition options. You can find the data you need through it. See 5.2 Basic Information Query and 5.3 Advanced Information Query.
B	Check List	The list shows the existing study of the system, showing the following information: status, patient identity, name, date of birth, the time of study, checking ID, images and the description of study,etc. You can sort the study by clicking on the list of column heading. You can also change the relative position of these columns by dragging and dropping them to another column. You can hide the columns by using the right-click menu in the header as well.
C	Check list button	include a number of function buttons.You use it to complete the

		corresponding operation.
D	List resizable area	You can resize the study list, series /my report list area and thumbnail by dragging it up and down with a mouse.
E	Series /my report list	You can choose display the series list or my report list. You can sort, change its column location, and hide the column as well.
F	Series /my report list button	include a number of function buttons, through which you can complete the corresponding operation.
G	Thumbnail	display the thumbnail of the selected image series .

## 2.Operation

After the program is started, the system will enter the patient management interface directly. Click on the "PM" button in the upper function switching area to enter the patient management interface on the other interface (see figure 5-2).

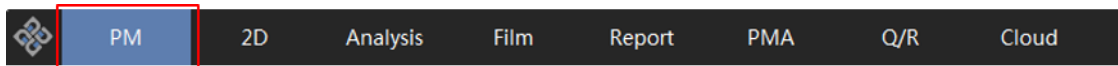


Figure 5-2 Functional Area

## 5.2 Information Query

### 1.Description

The function provides common query conditions. Retrieve the data in the retrieval database and display the retrieved data in the checklist, series list, image list and thumbnails.

### 2.Operation

The basic query condition area is above the upper left of the interface and you can modify the basic query condition. Click on the "Query" button to retrieve data. Clear the previous query condition, and you can click on the "Reset" button (see figure 5-3).

Figure 5-3 Query Interface

## 5.3 Advanced Information Query

### 1. Description

This function provides more query conditions. You can further narrow the retrieval scope by querying the conditions.

### 2. Operation

The advanced query condition area is below the buttons of Query and Reset. Click on each of these conditions, you can unfold \close the corresponding query option. Select and click on the "Query" button to retrieve data. You can empty the query condition by clicking on the "Reset" button (see figure 5-4).



Figure 5-4 Query Interface

## 5.4 Shortcut Query

### 1. Description

You can save and manage the common query condition combination with the function and further improve the speed of retrieval.

### 2. Operation

Select the **A** option, and the "Query" button changes into the **B** button, "QQuery". Click on the button and the system will pop up the condition list **C**, contain the "Storage" button **D** and "Manage" button **E** (see figure 5-5).

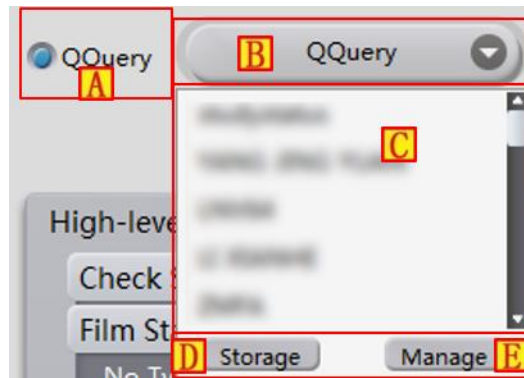


Figure 5-5 Shortcut Query Function

Click on the "Storage" button and the system will display the "Name Quick Query" window (see figure 5-6). You can save the current query condition, and then name and display it in the condition list. Click on the "Manage" button, the system will display the "Manage Quick Query" window (see figure 5-6). You can remove the unneeded shortcut query condition. Click on any one of options in the condition list, you can query and display data with the saved condition combination.

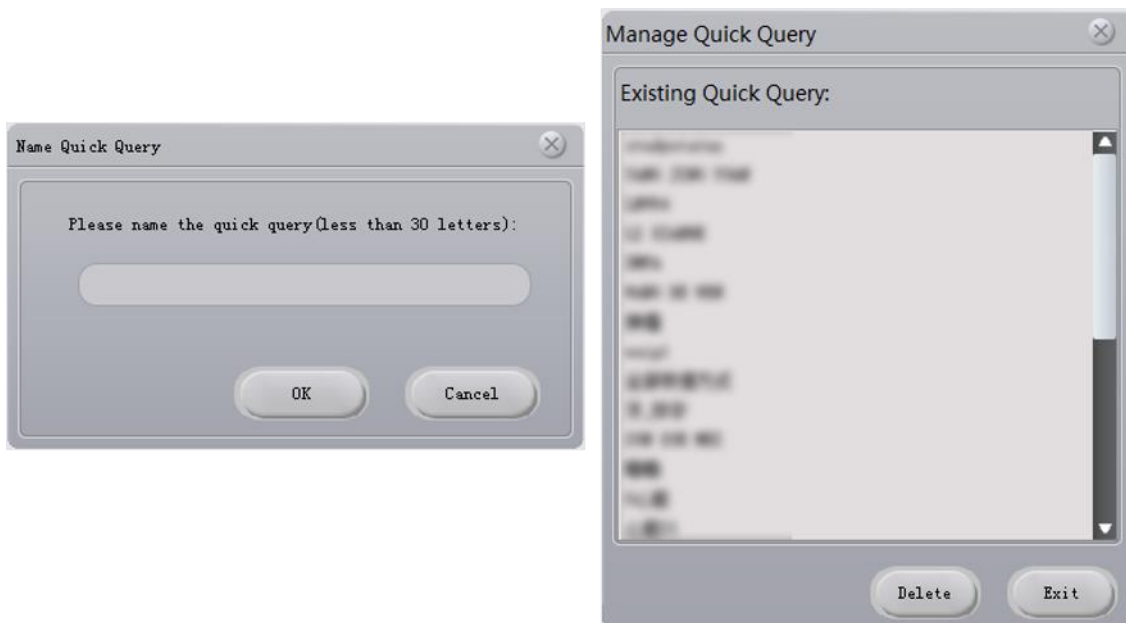


Figure 5-6 Quick Query Naming and Manage Shortcut Query Window

## 5.5 Other Function Buttons in the Information Retrieval Area

### 1. Description

Below the advanced query condition, the system includes the Local Data button, the Local IMG Info button, and the Change Plugin button (see figure 5-7).

### 1)Local Data

Button **A**, select local data, load data to the data center and jump to image browse interface.

### 2)Local IMG Info

Button **B**, parse the DICOM information of local data and display it in the check list, series list, and thumbnail.

### 3)Change Plugin (Default is 2D)

Button **C**, in the drop-down list, you can select to load the check data into the corresponding plug-in (image browse, advanced post-processing).

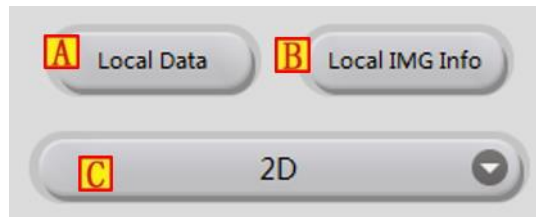


Figure 5-7 Other Function Button in the Information Retrieval Area

## 5.6 Check out Data Representation

See figure 5-1 in [5.1.1 description]. Checkout data representation is divided into three parts: checklist **B**, series list and image list **E** and thumbnails **G**.

## 5.7 Check List

### 1.Description

The checklist shows the retrieved patient information .

### 2.Description

#### 1) Displayed Data

Enter the patient administration interface for the first time, there are no displayed data, and the checklist only displays the table-head information. After clicking on the retrieval button, if no data are detected, only the table head information is displayed. If there are the detected data, the system will display the detected data and the first patient is selected by default.

#### 2) Mouse Operation

➤ Adjust column width: put the mouse between the two columns in the table head area, and when the mouse becomes left and right arrows, click on and drag them to adjust column width.

➤ Adjust column position: put the mouse on a column in the table head area. Click on the left mouse button and drag it. A translucent and selected table head option appears. with the mouse moving, mark the position of the

selected table head option. Lift the left mouse button and then adjust the column position where the selected table head option exists.

➤ Select data: select the row data that the mouse clicks on. Holding down the CTRL key, click on the mouse, you can multiselect options. Holding down the Shift key, click on the mouse, you can select two rows and all the data between two rows.

➤ Table head right click menu: click on the right mouse button on the table head, you can open the right click menu.

➤ Interlaced discoloration/cancel interlaced discoloration: select "interlaced discoloration" in the table head menu, the data in the list will be displayed in the form of interlaced discoloration. And at the same time, "interlaced discoloration" in the right click menu will turn into "cancel interlaced discoloration". Select the data of "cancel interlaced discoloration" in the table head menu to get the same background color display.

➤ Select table head font: click on the right mouse button in a column of table head and click on "select table head font". The window of "table head font" pops up, you can modify the font of table head text.

➤ Select display column: click on the right mouse button in a table head column and click on "select display column". The window of "select display column" window pops up, you can modify the column data display and hidden status in the list.

***\*Notes: the modification of adjusting column width, adjusting column position, hiding column will be saved. Next time the program is started, the result will be displayed according to the latest adjustment.***

➤ Click on table head sorting: Move the mouse to some column of table head. Click on the left mouse button, the data of list will be sorted in a ascending order. Do that again, the arrow goes down and the data will be sorted in a descending order. Click on other columns, the arrow of the original column table head disappears. The arrow of the clicked column appears and are sorted in a ascending order.

➤ Table head filtration: The edit box in the drop-down list of the table head can further the filtered and queried data. Enter data in the edit part, the system will be filtered according to the entered content. Click on the drop-down button, the field data in the column will be listed in the drop-down list. After being selected, only the field data in the column will be displayed and the data with the same content will be selected in the list.

➤ Right click menu in the data area: click on the right mouse button in the list data area. Select the data where the mouse exists, the right click menu will pop up.

➤ Interlaced discoloration/cancel interlaced discoloration: It is the same with the "interlaced discoloration/cancel interlaced discoloration" in the right click menu of table head.


➤ Select table body font: click on the right mouse button in the table body, and click "select table body font".

The window of "table body font" pops up and you can modify the font of table body text .

- Browse image: switch to the image browse interface. If the patient data selected with the right click button include image series data, load and display the patient image series data.
- Browse key image: switch to the image browse interface. If the patient data selected with the right click button include image series data, and there is a key image in the image series, load and display the key image.
- Open the study: switch to the image browse interface. If there are the corresponding data, open the image, application form and reports at the same time.
- Advanced application: Move the mouse here, and the secondary menu will appear. Click and enter into the corresponding advanced plug-in to open the selected study.
- Edit report: switch to the report editing interface. See Chapter 11 Report Editing.
- Browse report: report browsing window pops up and browse the patient report.
- Browse history report: history report browsing window pops up and select and browse the patient history report.
- Print report: print the selected report for study.
- Browse film typesetting: for the study data of film being typeset, switch to the film typesetting interface and display the film typesetting of study.
- Anonymity export study: the system pops up a folder to select the window. Export to the folder after deleting the current patient privacy information of the image data (such as, the name information in DICOM file).
- Export list: pop up a file and save the window. Save the data displayed in the current list into the excel file.
- Save and send: save Dicom data to the local or send to other Dicom devices according to the selected data source. See 8.2 Dicom Data Transmission in Chapter 8.
- Burn CD: save Dicom data to a recordable disk. See Burning Functionality in Chapter 6.
- Modify RIS information: display the dialog box of "new diagnostic information", and you can create and modify RIS information. See RIS Information Modification in chapter 7.
- Delete RIS information: delete a piece of the currently selected RIS information.
- Favorites: pop up the window of favorites, you can collect the selected study. Delete the contents of favorites and browse the study in favorites.
- Unlock report: unlock the study data that the report has locked.
- Cloud diagnosis: upload the study data to cloud diagnostic platform. (Hospital on the cloud platform is available)
- View cloud report: after cloud diagnosis is completed, you can view the study report provided on the cloud

- diagnosis platform. (Hospital on the cloud platform is available.)
- View cloud history report: view the history study report provided on the cloud diagnosis platform. (Hospital on the cloud platform is available.)
- Refresh list: query data with the retrieval condition of last being used .
- Clear data source: pop up the folder and select the window. Delete the data in the designated folder.
- Data source copy: pop up the copy folder of data source and copy the data in the source path to the destination path.

### 3) List Function Button

See  of figure 5-1 in [5.1.1Description].

- Edit report: switch to the report editing interface. See Chapter 11 Report Editing.
- Browse report: pop up report browsing window and browse the patient report.
- Export report: pop up the export report button and export the report with the selected time range.
- Save and send: save Dicom data to the local or send to other Dicom devices according to the selected data source. See 8.2 Dicom Data Transmission in Chapter 8.
- Convert data: send the local data to FTP server and save the acquired list by parsing DICOM data to the database.
- Data locking: lock the selected study data to prevent them from being deleted.
- Data unlocking: unlock the locked study data and allow them to be deleted.
- Modify: display the dialog box of "new diagnostic information", you can create and modify RIS information. See RIS Information Modification in Chapter 7.
- Delete: display the dialog box of "new branch information", you can create and modify RIS information. See RIS Information Modification in Chapter 7.

## 5.8 Series List

### 1.Description

The selected patient image series information will be displayed in the check list.

### 2.Operation

#### 1)Display Data

Display the series list by default. When the image list is displayed, the series list is displayed by clicking on “series list” label in the series /image list area. According to the first patient information selected in the check list,




all the image series information of the patient was obtained. If there is an image series information, the data elected by default in the first row is displayed in the series list.

### 2) Mouse Operation

- Adjust column width: see [5.7.2 Operation - 2 Mouse Operation].
- Adjust column position: see [5.7.2 Operation - 2 Mouse Operation].
- Select data: see [5.7.2 Operation - 2 Mouse Operation].
- Right click menu in the table head: see [5.7.2 Operation - 2 Mouse Operation].
- Select the table head font: see [5.7.2 Operation - 2 Mouse Operation].
- Select display column: see see [5.7.2 Operation - 2 Mouse Operation].
- Right click menu in the data area: click on the right mouse button in the list data area. Select the data where the mouse exists, and the right menu will pop up.
- Interlaced discoloration/cancel interlaced discoloration: see [5.7.2 Operation - 2 Mouse Operation].
- Select table body font: see [5.7.2 Operation - 2 Mouse Operation].
- Browse image: switch to the image browse interface. Load and display the selected image series data.
- Browse key image: switch to the image browse interface. Load and display the key image if there is a key image in the selected image series .
- Browse subseries : pop up image, load range and select window. After the loaded range is selected, load and display the selected image data.
- Advanced application: move the mouse here, the secondary menu will appear. Click on and enter into the corresponding advanced plug-in and open the selected series .
- Browse film typesetting: switch to the film typesetting interface and display the film typesetting of series .
- Save and send: save DICOM data to the local or send to other DICOM devices according to the selected data source.
- Anonymous export series : pop up a folder and select the window. Select the folder. Export to the folder after deleting the current patient privacy information of the series data (such as, the name information in DICOM file).
- Split series: pop up the window of splitting series . Add and adjust splitting points, and the series can be divided into seven parts at most.

### 3) List Function Button

See  of figure 5-1 in [5.1.1 Description]

- Save and send: save Dicom data to the local or send to other Dicom devices according to the selected data source.

- Delete: delete the selected series.
- Cloud diagnosis: upload series data to cloud diagnosis platform. (Hospital on the cloud platform is available.)

## 5.9 Image List

### 1.Description

Image list displays the image information of selected series in the series list

### 2.Operation


#### 1)Display Data

When series list is displayed, the image list is displayed by clicking on "image list" label in the series/image list area. All the image information of the series is obtained according to the first series information selected in the series list. If there is an image information, the first row of data displayed in the image list is selected by default.

#### 2)Mouse Operation

- Adjust column width: see [5.7.2 Operation - 2 Mouse Operation].
- Adjust column position: see see [5.7.2 Operation - 2 Mouse Operation].
- Select data: see see [5.7.2 Operation - 2 Mouse Operation].
- Table head right click menu: see [5.7.2 Operation - 2 Mouse Operation].
- Select table head font: see [5.7.2 Operation - 2 Mouse Operation].
- Select display column: see [5.7.2 Operation - 2 Mouse Operation].
- Right click menu in the data area: click on the right mouse button in the list data area. Select the data where the mouse exists, and the right click menu will pop up.
- Interlaced discoloration/ cancel interlaced discoloration: see [5.7.2 Operation - 2 Mouse Operation].
- Select table body font: see [5.7.2 Operation - 2 Mouse Operation].
- Check DICOM information: the window of DICOM information pops up and display DICOM information of image.
- Save into series: save the selected image into the series.

#### 3) List Function Button

See  of figure 5-1 in [5.1.1 Description].

- Check DICOM information: the window of DICOM information pops up and display DICOM information of

the selected image.

➤Delete: delete the selected image.

## 5.10 Bookmark list

### 1.Description

Existing bookmark information is displayed in the bookmark list..

### 2.Operation


#### 1)Display data

The sequence list is displayed by default, and the bookmark list is displayed by clicking the "bookmark" tab in the sequence, image and bookmark list area. According to the information of the first patient selected in the checklist, all the bookmark information of the patient is obtained. If there is bookmark information, it will be displayed in the bookmark list, and the first line of data will be selected by default.

#### 2)Mouse operation

- Adjust column width: see [5.7.2 operation - 2 mouse operation].
- Adjust column position: see [5.7.2 operation - 2 mouse operation].
- Select data: see [5.7.2 operation - 2 mouse operation].
- Right click menu of header: see [5.7.2 operation - 2 mouse operation].
- Select header font: see [5.7.2 operation - 2 mouse operation].
- Select display column: see [5.7.2 operation - 2 mouse operation].
- Right click menu of data area: right click in the list data area, select the data where the mouse is, and the right-click menu will pop up.
- Interlaced color change / cancel interlaced color change: see [5.7.2 operation - 2 mouse operation].
- Select table body font: see [5.7.2 operation - 2 mouse operation].
- Open bookmark: send the bookmark content to the specified plug-in.
- Delete bookmark: delete the selected bookmark.


#### 3)List function button

See  of figure 5-1 in [5.1.1 Description].

➤Delete: delete the selected bookmark.

## 5.11 Thumbnail

### 3.Description

Display the thumbnail of selected image series(See  of figure 5-1 in [5.1.1 Description]).

### 4.Operation

If there are data in the series list, the image series selected in the series list has thumbnail information, and display the thumbnail in the thumbnail display area.

## 5.12 List size adjustment

### 1.Description

Adjust the respective size of the check list and series list in the interface.

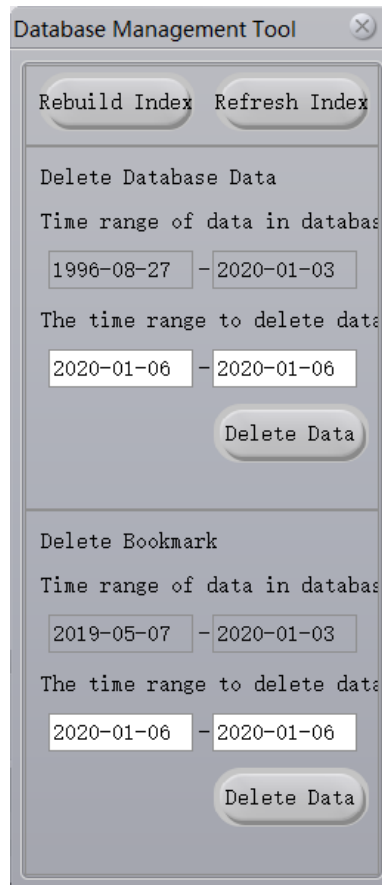
### 2.Operation

Move the mouse to the list size adjustment area between the two lists. When the mouse cursor turns into the up and down arrows, you can drag and adjust the size of the check list and series/image list by pressing down the left key.

## 5.13 Database Tool

### 1.Description

Optimize database, delete database data.



## 2.Operation

- Rebuild index, delete existing data index and create new data index.
- Refresh index, use existing index to organize data, and speed up database reading.
- Delete data (database data), which refers to the inspection data within the specified date range.
- Delete data (bookmark), delete Advanced bookmark data within the specified date range.



## Chapter 6 Burning Function

### 6.1 Burning Description

Burning function module provides the patient data with CD burning export/ backup . When users select one or more patients with the right mouse button in the patient series list (see Chapter 5 Patient Information Management Module), the selected user information will be saved in the local in the form of a file. Display the patient burning information on the interface by parsing the file, as shown in figure 6-1.

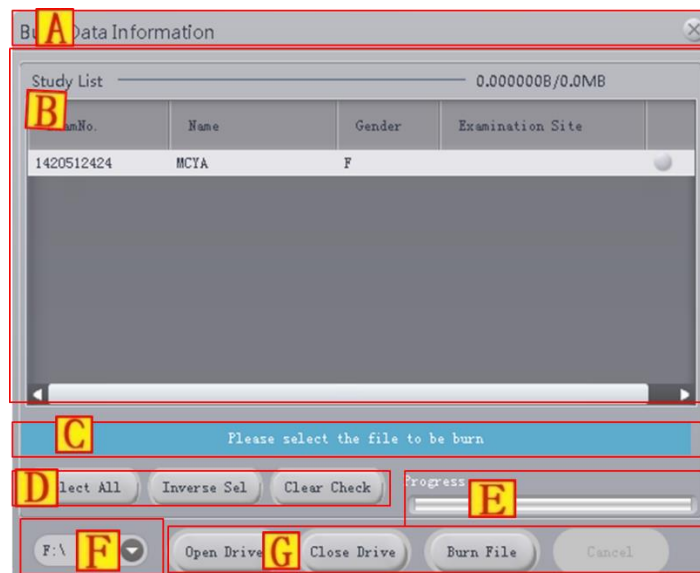


Figure 6-1 Burning the main interface

Area	Function	Description
A	Titlebar area	Display title information and close button
B	Check list area	Display the patient information to be burned
C	List button area	Conduct the selection operation on the check list
D	Schedule display area	Display the burned process information
E	Disk selection area	Select the CD-ROM to be used
F	Burning area	Control switch or close the CD-ROM, burn and close dialog box

G	Burning operation display area	Mainly display the user operation display information of the burning interface
---	--------------------------------	--

## 6.2 Burning operation

### 1.Title Area

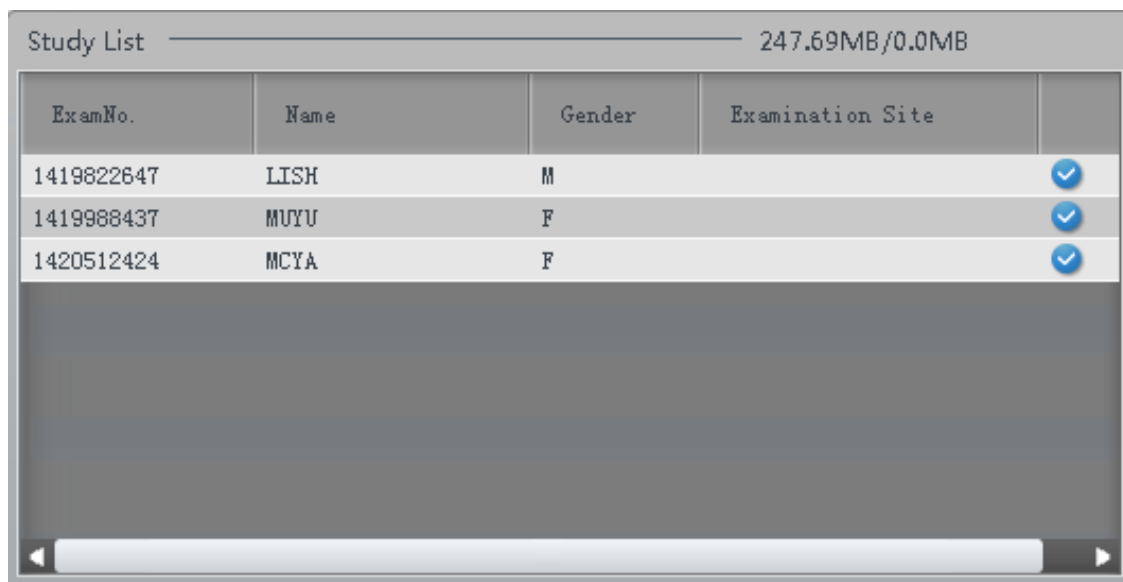
Display the title information in the dialog box and close the button in the dialog box.

### 2.Check List Area

Selection mode in the check list: Click the mouse to select the patient.

### 3.List Button Area

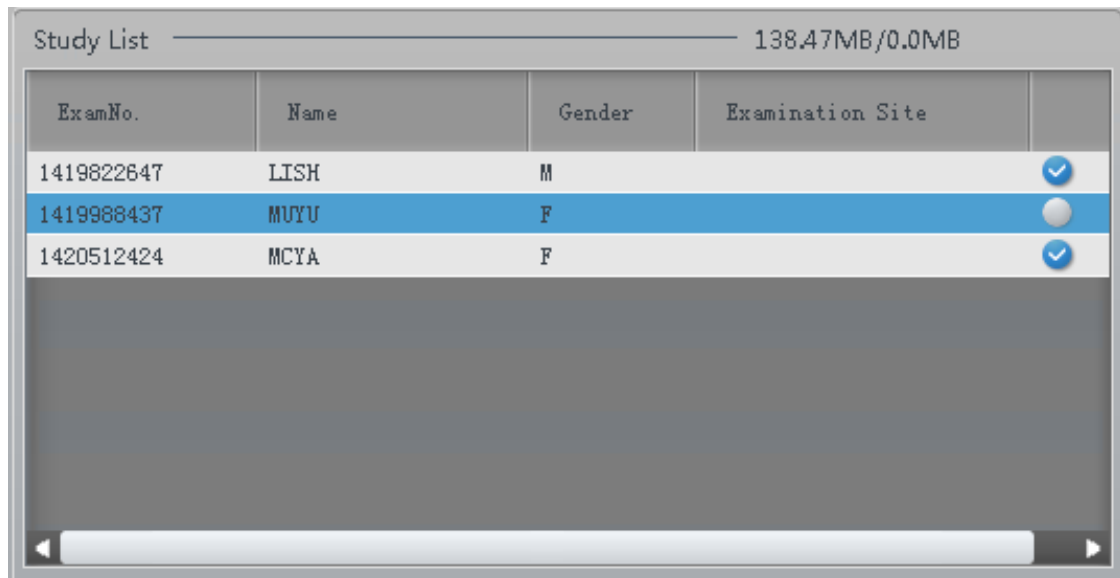
"Selcet All" : provide users with the information that when users are patients, they can directly use "select all",that is, select all the patient information in the list, not clicking on one by one. See figure 6-2.



**Figure 6-2 Select all the back- interface figure**

"Inver Sel": offer users to select a few patients who are not to burn when users don't use the "Select all" button . Click on the inverse button and select the patients who are not selected. Remove the information of the several selected patients before removal. See figure 6-3.





ExamNo.	Name	Gender	Examination Site	
1419822647	LISH	M		<input checked="" type="checkbox"/>
1419988437	MUYU	F		<input type="checkbox"/>
1420512424	MCYA	F		<input checked="" type="checkbox"/>

Figure 6-3 Reverse back-interface figure

#### 4. Burning Operation Display

The label displays the user operation information for burning. There is no other information operation.

#### 5. Progress Display Area

"Progress bar": display how many pieces of images are burned.

#### 6. Disk Selection Area

"Burned disk selection": users can select any CD\_ROM drive to burn.

#### 7. Burning Area

"Open Drive" : Open drive after users click, and users insert disk.

"Burn File" : after users click, the file will be burned according to the current selected drive.

## Chapter 7 RIS Information Modification

RIS information modification provides the functions of newly creating patient information, modifying patient basic information, checking information and quick data query, the details of which are as follows:

### 7.1 RIS Information Entry

#### 1. Description

The query triage information interface of patient information is shown in figure 7-1:

Figure 7-1 Newly create triage information

Area	Function	Description
A	Titlebar area	Display a title and have a close button
B	Basic information area	Record patient identity information
C	Check information area	Record the information of checking devices
D	Button area	Confirm patient information or fill in the information again

## 2.Operation in Basic Information Area

"Sex" : provide user with the information of selecting patient gender.

"P No." : It is used to query whether there is some information about this patient in the database.If so, extract the person's information data. If not, the system will prompt to newly create patient information prompt box.

"Age": users input patients' age information.

"Name" : provide users with inputting patients' names.

## 3.Check the Information Area Operation

"Exam" : provide users with inspection items.

## 4.Read database data information

### 1)Description

This function mainly extracts the existing information from the database. It is convenient for users to query work or modify patients' information!

### 2)Operation

The user selects the patient at the PM and seeks if the database has this person's information and then clicks on the button below:

“OK”:

➤After the user fills out the new patient's data, press "OK" and the data will be saved to the database.

➤After the user queries the database, when the above data are modified, press "ok" and the data will be saved to the database as well.

"Reset" : After pressing the reset button, all the data in the interface will be emptied and the user will have to re-add or remodify the data after query them.

"Cancel" : exit the window interface.

## Chapter 8 DICOM Sending and Receiving

In the image workstation, it is very important to acquire and transmit data. The complete data acquisition and the complete data transmission will help doctors to go on diagnosis and analysis. In IVW system, data receiving can be set through STORAGE SCP configuration file, and data receiving status can be viewed. Through STORAGE SCU configuration interface, data sending can be set.

The content of this section includes data acquisition and data transmission.

### 8.1 DICOM Data Acquisition

In the absence of a special statement, the operation of obtaining data in this system refers to the process of passing data to IVW system from other DICOM mainframe and the third-party software system that conforms to DICOM transport protocol.

Data acquisition is based on the storage path as follows:

➤ Acquire data through the network, and store them to the database server;

Usually the parameter has been debugged by the engineers at the installation. In the configuration file you can see the parameters concerning DICOM storage path, mainframe port, AETitle, storage path of receiving data, etc. which do not need any special operation in the working status. Under the running status of IVW STORAGE SCP, it can receive the image data by itself transmitted by the third party software and stored it to the database server.

#### 1. STORAGE SCP Setting

Run the service of STORAGE SCP (under the program directory of STORAGE\_WINDOW.EXE) and the system will pop up STORAGE SCP window. STORAGE SCP defaults AETITLE to SVPACS. IP is the mainframe IP. The port is 8050, and the temporary storage path is c:\Temp\_s1. See figure 8-1.

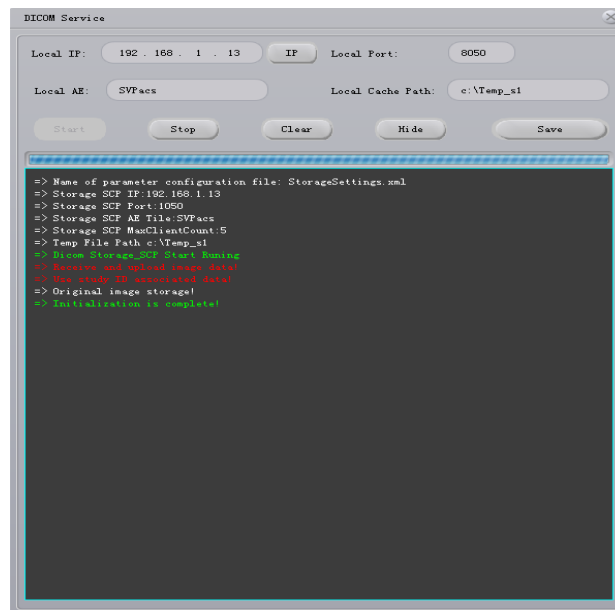


Figure 8-1 SCP interface

### 1) Set Parameters

User can define SCP parameters by themselves, and can redefine AETITLE, Local Port and Local Cache Path. If there are multiple network cards, IP address can be changed. After parameters are filled in, click on the “Save” button and save the set parameters to the configuration file. When the next program is started, the setting will take effect. If you want it to take effect immediately, you need to click on the stop button and then click on the start button again, the newly set parameter will be applied.

### 2) Start Service

When program starts, the system will default to the eavesdropping working status. When user has changed SCP parameter, the user can manually click on the start button to start the service.

### 3) Stop Service

SCP service stops after the stop button is clicked on. After clicking, the system will not receive the new connection of DICOM device request any more.

### 4) Empty

The empty button can clear the log information displayed in the information box.

### 5) LOG Information

In the log information box, the system will display the received dicom file, and the dicom file uploaded to FTP. Insert the status information into the database.

*\* Note: the setting of related parameters will be completed by the engineers who are authorized by SINOVISION or through SINOVISION.*

## 8.2 DICOM Data Transmission

Data transmission is a very important function. The function will transmit image data to other DICOM mainframe or IVPACS system. The operation steps that the data are exported to the mainframe with the function of DICOM STORAGE SCP are very simple, which include 2 steps:

- Set DCIOM transmission parameters;
- Transmit DICOM image.

The transmission setting interface of DICOM data is shown in figure 8-2, which mainly includes the following parts:

- Local mechine settings
- DICOM server settings;
- The check list to be sent;
- View the status of sending;
- Send operation function;
- Send progress bar;

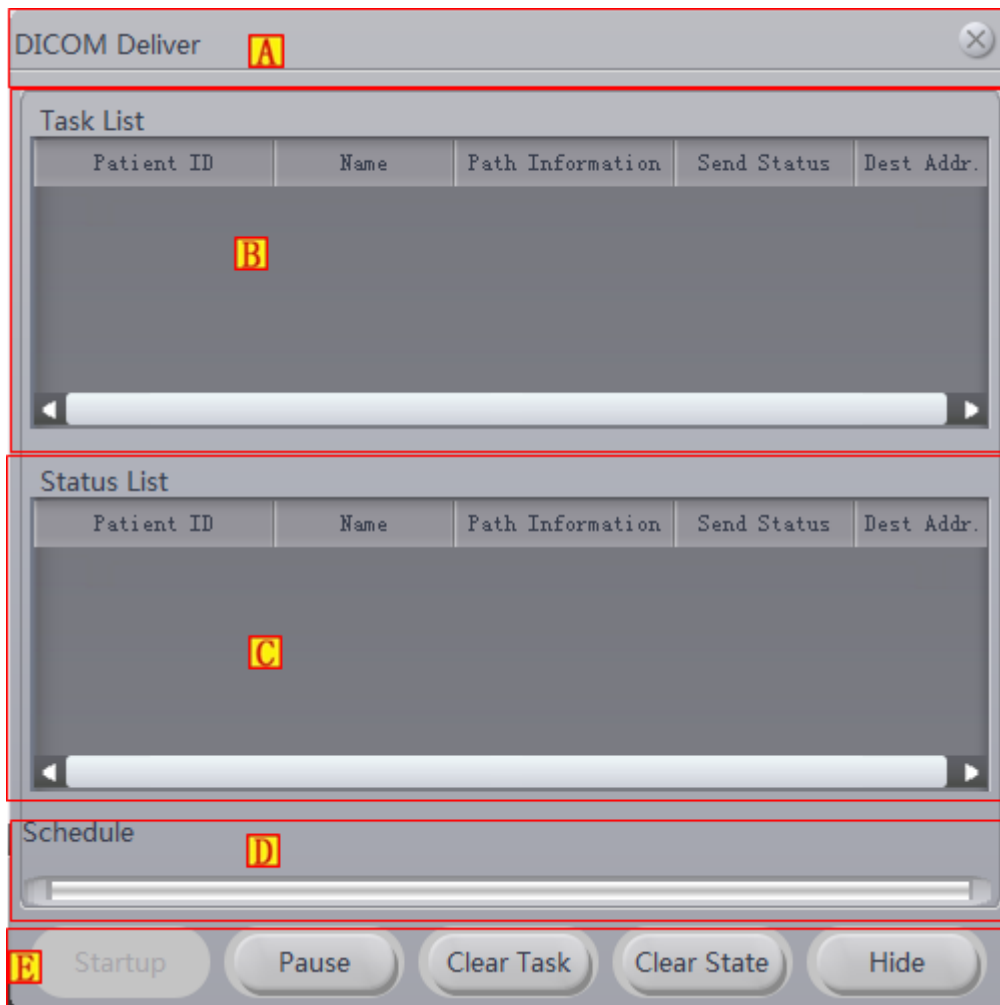


Figure 8-2 DICOM Sending Setting

Area	Function	Description
A	Title area	Display title and close button
B	Task list	Display the data of patient information downloaded from the server
C	Status List	Display the information of the failed and successful files when they are being uploaded
D	Schedule	Display patient image and progress being uploaded
E	Operation area	Whether the operation sending will be done

### 1.Task List

All the image data information prepared for sending is displayed in the list to be sent: image number, device type, patient name, image number.

## 2. Status List

View the sending state, mark the sent images in the database file area.

## 3. Schedule

Display the progress currently being sent.

## 4. Operation Area

Operate whether to send the operation or remove the task.



## Chapter 9 Image Browse

### 9.1 2D Interface

The function of 2D browsing and processing mainly includes: display the loaded and checked 2D image, display the loaded and checked series thumbnail, adjust the interface layout, open/empty images and send/print reports, etc.

According to the direction of display screen (horizontal figure 9-1/ longitudinal figure 9-2), there are two kinds of 2D interfaces with different layouts.

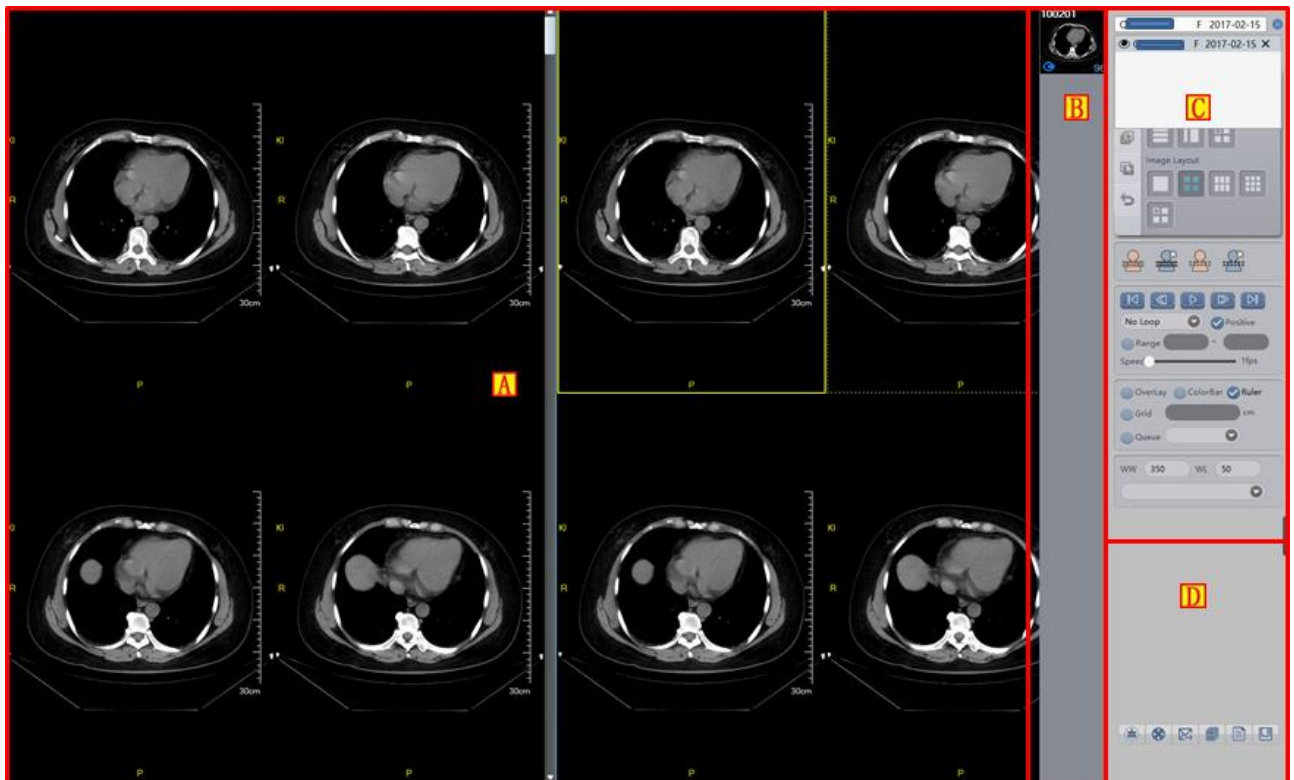


Figure 9-1 Horizontal 2d Image Browsing/Operation Interface

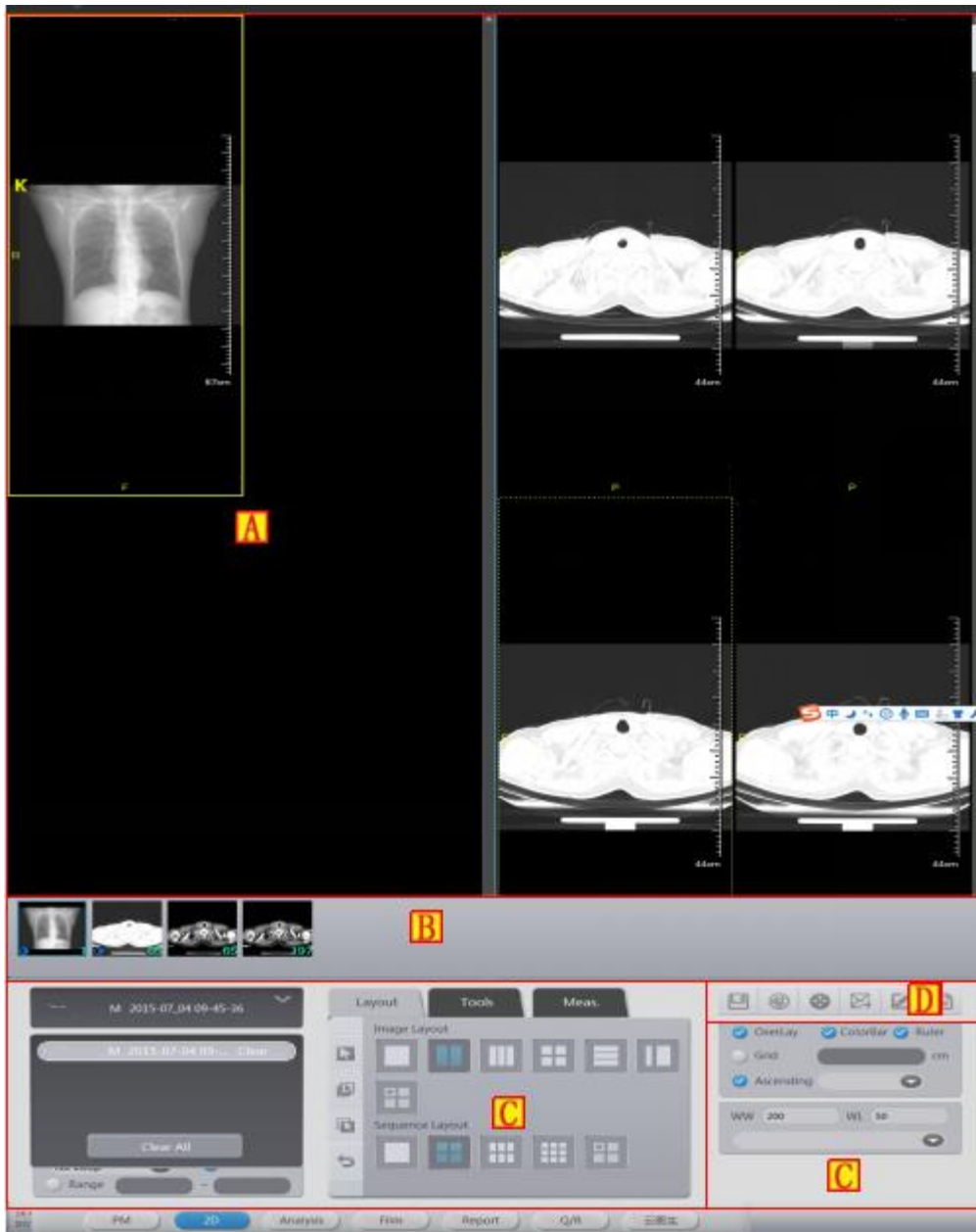


Figure 9-2 Longitudinal 2d Image Browsing/Operation Interface

Area	Function	Description
A	Image display area	Display the loaded and checked 2d image, adjust interface layout so as to display multiple studies and series images. The displayed information includes: portrait, ruler, overlay information, annotation information, measurement information and grid, etc.
B	Series thumbnail display area	Display the loaded and checked series thumbnail;When multiple studies are loaded, select different studies in the checklist; When a series thumbnail is double-clicked, the corresponding series image is displayed in the image display area.
C	Operation panel area	mainly includes the following function buttons: series layout, image layout, image information display control, image operation, image measurement, image browsing, WL adjustment, location image setting, etc.
D	Common tool area	mainly includes the following function buttons: image storage, emptying image display area image (image retention of thumbnail area), image printing, sending report and editing report.

## 9.2 Data Operation

### 1. Image Data Storage

#### 1) Description

This function is mainly to save the image selected in the image display area as the specified format file, such as bitmap file, JPG file and DICOM file.

#### 2) Operation

➤ Click on the [save as] button, as shown in figure 9-3:



**Figure 9-3 Image Data Storage Button**

➤ You can be select different saving modes in the pop-up child window.

### 2. Image Clearance

#### 1) Description

This function can clear the image of series detail image window, but retain series thumbnail image.

#### 2) Operation

Click on the "clear" button shown in figure 9-4 to clear the image displayed in the image display area.



**Figure 9-4 Clear Image**

### 3. Send the Image to Film

#### 1) Description

This function is mainly used to send the currently selected image to the film print page for printing.

#### 2) Operation

In the series detailed image window, left click on a selected image, and click on the "send to film" button to enter the print window to perform the relevant operation of image printing as shown in figure 9-5



**Figure 9-5 Images Sent to Film**

## 4. Send Images to Report

### 1) Description

This function is mainly used for the currently selected images to be sent to the report page to perform report operations.

### 2) Action

Left click on a selected image in the image display area and click on the "send to report" button to enter the report window to perform the relevant operation of image report as shown in figure 9-6



Figure 9-6 Images Sent to Report

## 5. Editing Image Report

### 1) Description

This function is mainly to edit the currently selected image report.

### 2) Action

Left click on a selected image in the image display area, and click on the "edit image report" button to enter the report window to perform the editing operation of image report as shown in figure 9-7.



Figure 9-7 Edit Image Report

## 6. View DICOM Information

### 1) Description

This function is to view DICOM information of image.

➤ Click on the [local image] button, as shown in figure 9-8:



Figure 9-8 View DICOM Information

## 9.3 Image Basic View

### 1. Series Layout

#### 1) Description

The system provides the five 1\*1, 1\*2, 1\*3, 2\*2, 3\*1 kinds of preset series layouts and a kind of location image layout mode. The system starts, the 2.2 layout is by default. As shown in fig.9-9:



Figure 9-9 Series Layout

#### 2) Operation

Click on the corresponding series layout button on the operation panel. After selecting the corresponding button, the series layout will be changed according to the corresponding setting in the image detailed window.

### 2. Image Layout

#### 1) Description

The system provides the four 1\* 1, 2\* 2, 2\* 3, 3\* 3 kinds of preset image layout and customized image layout mode. As shown in fig.9-10:



Figure 9-10 Image Layout

#### 2) Action

➤ Click on the corresponding image layout button on the operation panel. After selecting the corresponding button, the image layout will be changed according to the corresponding setting in the image detailed window. The corresponding operation of the customized image layout is the same as the one of the customized series layout.

#### ➤ Customized Layout

➤ Click on the customized image layout button. In the pop-up image layout window, move the mouse and press down the left button to select the desired image layout.

### 3.Overlay Display

#### 1)Description

This function is mainly to set the image visual information, mainly including ruler, color level, overlay information and grid.

#### 2)Description

Respectively click on the check box of Colorbar, Ruler, Overlay, and you can set whether Overlay information can be visualized, as shown in figure 9-11:

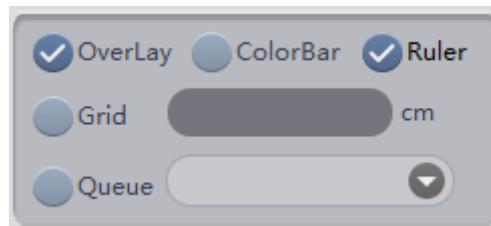


Figure 9-11 Overlay Custom Settings

### 4.Image Selection

#### 1)Description

There are three kinds of image selection modes: select series, select all, and reverse selection. As shown in fig.9-12:



Figure 9-12 Image Selection

#### 2)Action

Click on the "select series" button, the current series turns into the selected status; Click on the "select all" button, all the series becomes into the selected status; Click on the "reverse selection" button, the image outside the currently selected status becomes into the selected status.

### 5.Image Operation

#### 1)Description

In order to conform to the purposes of personal reading habits and easily identifying image interested areas, the adjustment actions such as image position, direction color and WL belong to image operations. The functions included in the image operation are shown in FIG 9-13:



**Figure 9-13 Operation**

## 2) Translation

### ➤ Description

Images can be moved to a position suitable for observation by translation. The function is not available when images are not out of window.

### ➤ Operation

Click on the "Translation" button on the operation panel. You can press down the mouse and move it in any window, all the images in the current series will move with the mouse.

## 3) Zoom

### ➤ Description

The dynamic zoom function can zoom in or out the image to the size that the user is satisfied.

### ➤ Operation

Click on the "zoom" button on the operation panel. Press down the mouse and move it within any image window to implement the image dynamic zoom desired for the current series. When the image size is not beyond the window, the image is centered displaying automatically.

## 4) Local Zoom

### ➤ Description

The local zoom function can zoom in the part of image twice as much as the original, so that the local characteristics can be carefully observed.

### ➤ Operation

Click on the "magnifying glass" button on the operation panel. Press down the left mouse button in the image window to enlarge, and enlarge the square area with the mouse centered double as much as the original size.

## 5) Region Zoom

➤Description

The region zoom function can enlarge the part of image to the entire window, so that the local characteristics can be carefully observed.

➤Operation

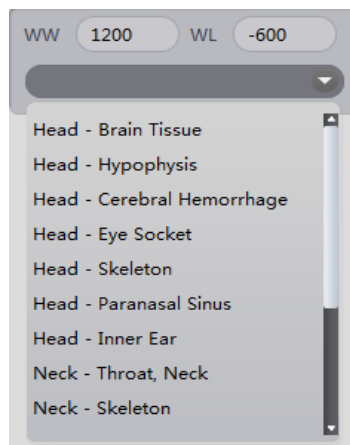
Click on the "region zoom" button on the operation panel. Select the area to be enlarged, and the region will be enlarged to the entire window.

6) WL Adjustment

➤Description

The interested image content can be viewed more clearly by adjusting WL. There are four kinds of adjustment modes of WL, which are: general mode, ROI mode, Dual mode and automatic mode respectively.

In addition, there are various preset WL values, including: brain tissue, pituitary, eye socket, bones, nasal sinus, inner ear, throat, neck, etc. See figure 9-14.



**Figure 9-14 WL preset value**

➤Operation

Click on the corresponding WL adjustment mode button or select WL preset value. Press down the mouse in the image detailed window and move it up and down to adjust the WL of image.

7) Rotation

➤Description

User can rotate the image counterclockwise or clockwise several times to make the image conform to the individual reading habits.

➤Operation

Click on the clockwise /counterclockwise rotary button to rotate all the images of the current series 90 degrees clockwise/ counterclockwise.

➤Description



User can rotate the image up /down/left/right to confirm to the individual reading habits.

➤Operation

Click on the "mirror" button, rotate all the currently selected images up/down/left/right.

8)Clipping

➤Description

Leave the interested part of the image behind to be observed carefully through the clipping function.

➤Operation

Click on the "clipping" button on the operation panel and select the interested region of any image with the mouse.

9) Fake color

➤Description

Improve the image visual effect and highlight some interested regions.

➤Actions

Select an image in the image display area, and click on the "fake color" button to adjust the different parameters and display different effects.

10)Image Inverse Color

➤Description

Inverse the original color to improve the image visual effect .

➤Actions

Select an image in the image display area, and click on the "inverse color" button on the operation panel.

11) Restore to the Initial Position

➤Description

Remove the user previous local zooming, dynamic zooming, translation operation and restore to the previous status.

➤Description

Click on the "restore the initial" button on the operation panel to restore the image to the local zooming, dynamic zooming, translation to the previous status.

## 6.Positioning Image Setting

There are four kinds of operations concerning positioning display between images in the 2d interface: Location Image;Cancel the Location Image;Associated Location;Cancel Association.As shown in fig.9-15:

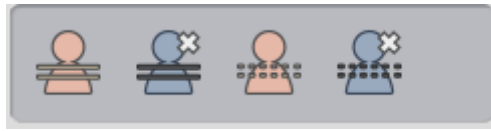


Figure 9-15 Positioning Image Setting

## 7. Image Browsing

Image browsing is mainly used for 2D interface browsing operation, including five kinds of operations in all: first page; previous page; play; next page; last page. Playing can be set as loop playback and playback in an ascending order, and the speed of playing can be set. As shown in fig.9-16:

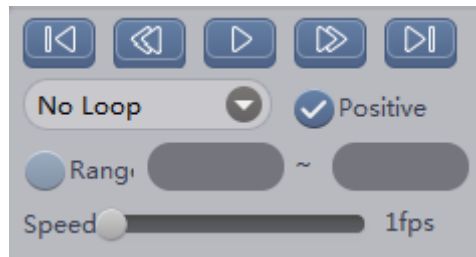


Figure 9-16 Image Browsing

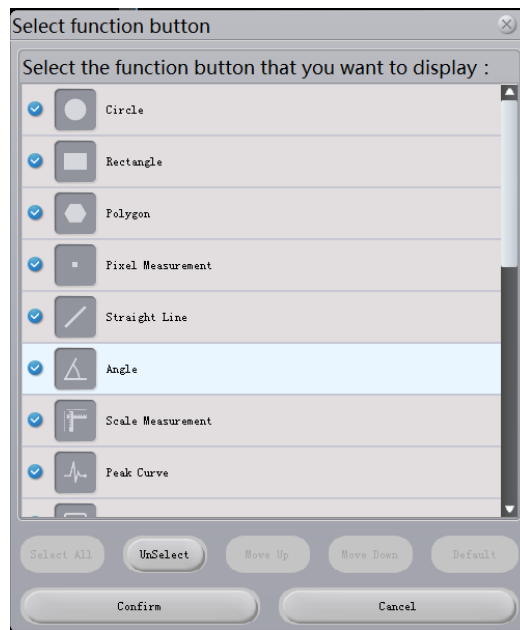
## 8. Measurement annotation

It is used for information annotation, measurement of image post-processing, etc, mainly including the tools such as circle, rectangle, polygon, point pixel, line, angle, scale, peak curve, text, arrow, etc. As shown in fig.9-17:



Figure 9-17 Measurement Annotation

The panel that supports the custom measurement labeling and tools displays the common tools can be shown on the panel. As shown in figure 9-18:



**Figure 9-18 Customization of tools**

# Chapter 10 Film Layout

## 10.1 Film Layout Function

The function is to send a browser image to the film layout, and the image is formatted in a certain format. After the image is adjusted, it is exported to the film printer, as shown in figure 10-1.

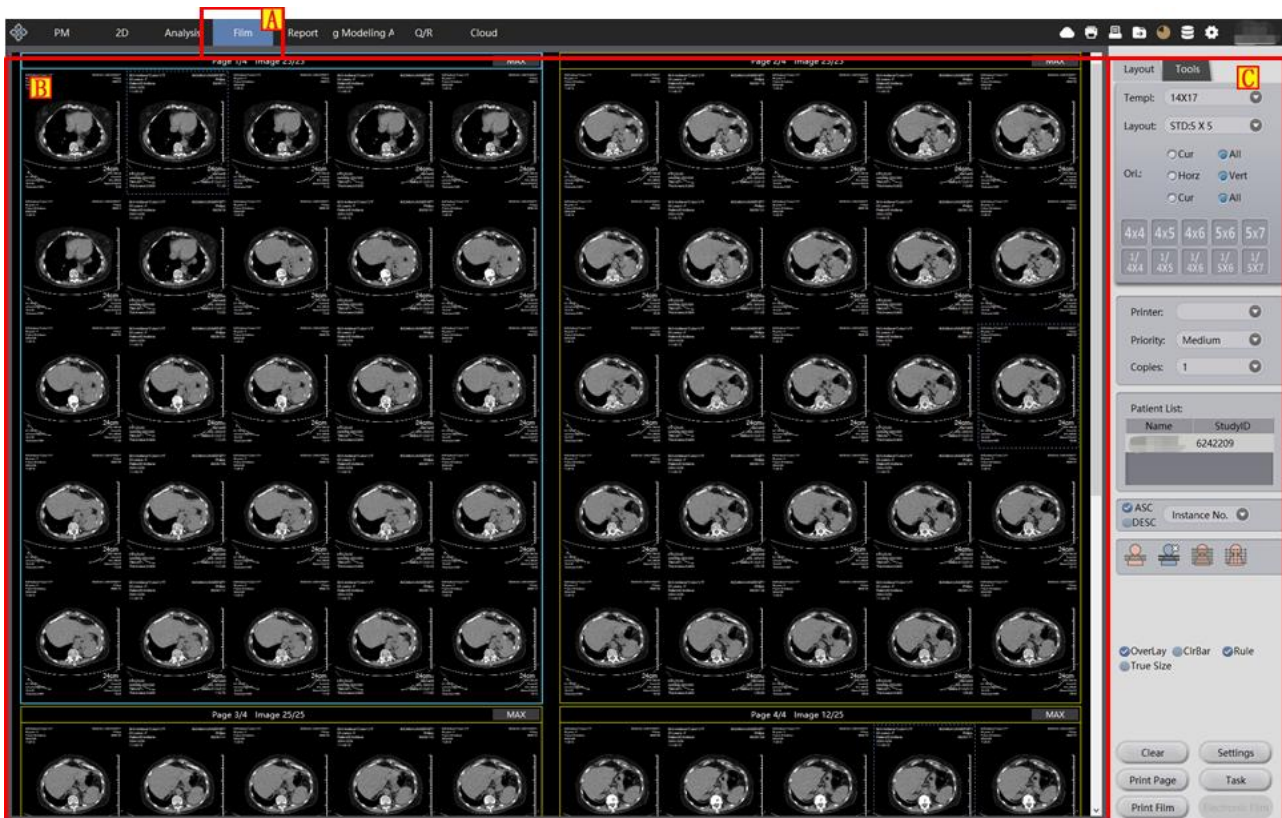


Figure 10-1 Film Layout

Area	Function	Description
A	Plug-in switch button	Click on the film printing button, the system will switch the window to the film typesetting print window.
B	Film typesetting view area	This area is used to display the format and effect of the image printing to the film.
C	Tools panel area	The printer sets function areas for various tools and templates of typesetting operation and save electronic film..

## 10.2 Open Film Typesetting

Click on the "Film" button at the top of the program and open the Film window as shown in fig.10-2. The

interface will switch to the film print window, as shown in figure 10-3.

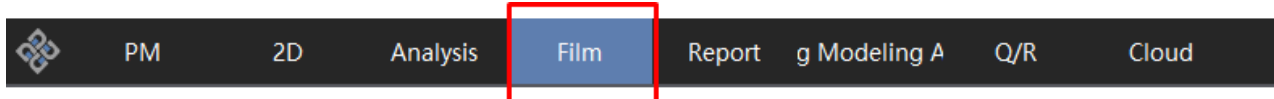


Figure 10-2 Film Switch Button

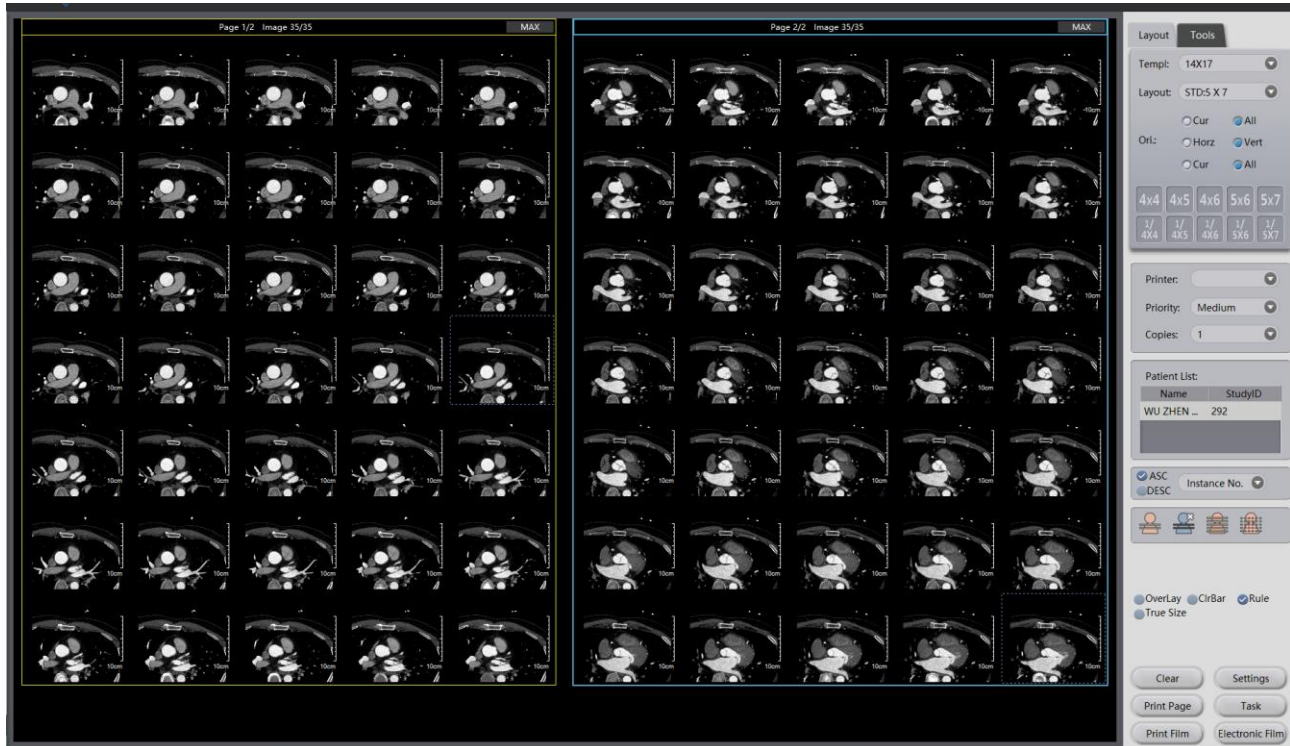


Figure 10-3 Film Typesetting Window

## 10.3 Film Window Function Introduction

### 1.View Window of Film Layout

This window is used to display the layout format and image exported to the printer. See figure 10-4.

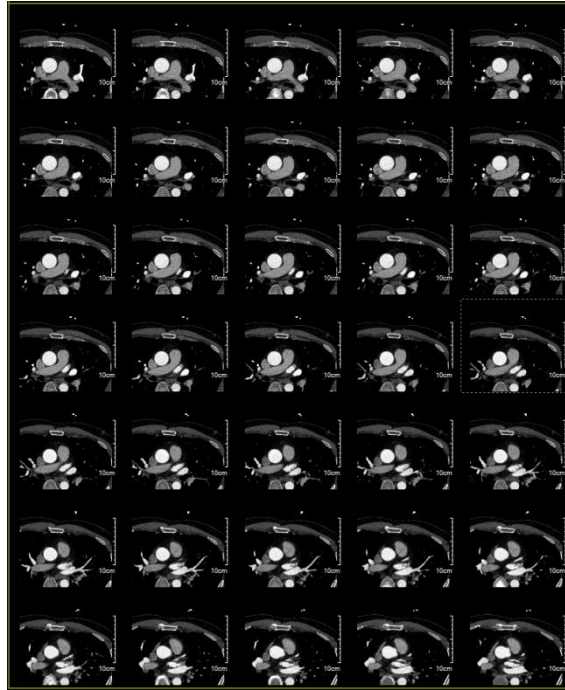


Figure 10-4 Film Layout Window

## 2.Tools Panel Window

Include window layout setting, image adjustment, template setting function. See figure 10-5.

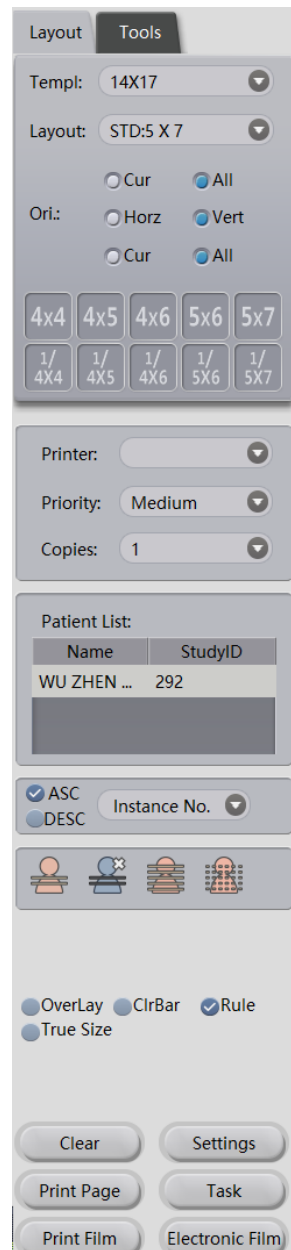


Figure 10-5 Film Tool Window

### 1) Select Tool

After clicking on the Select tool, you can select the single image in the image panel area, and hold down the CTRL key, you can select multiple images.

### 2) Select All Tool

Click on the Select All button, you can select all the images in the image panel area, the effect of which is shown in figure 10-6.

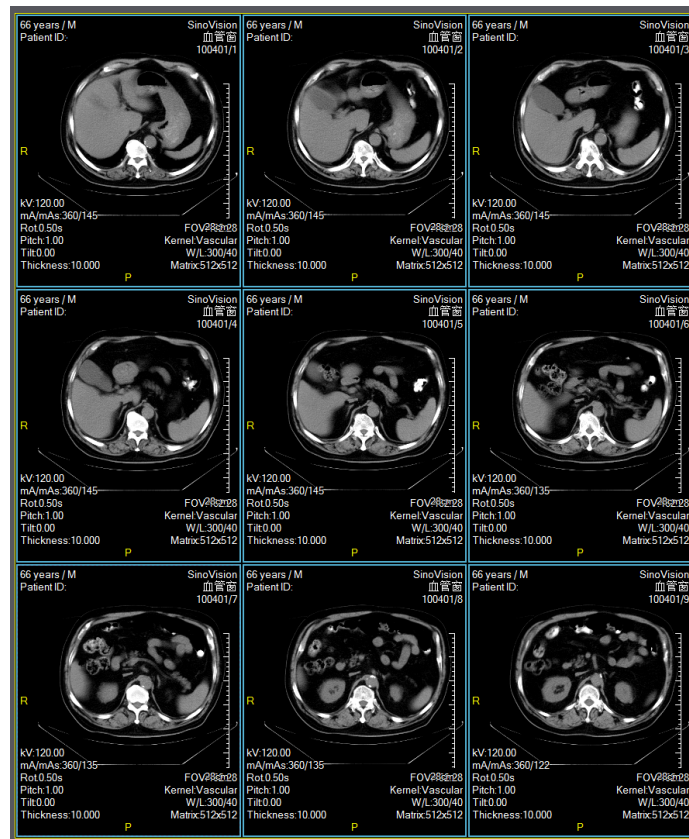


Figure 10-6 Film Layout Window

### 3) Deselect Tool

Click on the Deselect button, the image in the selected status can be turned into the one in the unselected status, and the image in the unselected status can be turned into the one in the selected status.

### 4) Pan Tool

Click on the function button, the image position in the image panel can be moved.

### 5) Zoom Tool

After clicking the button, hold down the left mouse button dragging on the image, the image function of zooming in and zooming out can be achieved.

### 6) Sorting Tool

After clicking the button, the image in the view area will be sorted in the ascending order. Click on the button again, the above image will be sorted in the descending order.

### 7) Brightness Saturation Adjustment

After clicking the function button, hold down the left mouse button dragging on the image, you can adjust the brightness saturation of the image display.

### 8) Image Reverse Color Tool

After clicking on the function button, you can display the selected image in the way of reverse color.



#### 9) WL Tool

By default, the right mouse button is to adjust the WL function. Hold down the right mouse button dragging on the image, you can adjust the WL of the selected image.

#### 10) Reset the Transformation Tool

After clicking the function button, all kinds of transformation (zooming in or out, movement, etc.) of the image can be restored to the image original status (the initial state of the image when it is opened).

#### 11) Rotate Tool of 90 Degrees Clockwise

After clicking on the function button, you can rotate the selected image to 90 degrees clockwise.

#### 12) Rotate Tool of 90 degrees Counterclockwise

After clicking on the function button, you can rotate the selected image to 90 degrees counterclockwise.

#### 13) Vertical Mirror Image Tool

After clicking on the function button, the selected image can be processed vertically.

#### 14) Horizontal Mirroring Image Tool

After clicking on the function button, the selected image can be processed horizontally.

#### 15) Delete the Selected Image Tool

After clicking on the function button, the selected image can be deleted from the layout interface.

#### 16) Film Preview

After clicking on the function button, window will pop up and display preview with the actual film size.

#### 17) Image Zooming

By default, the mouse middle key is the image zooming function. Hold down the mouse middle key button dragging on the image, you can complete the operation of zooming in and out the image.

#### 18) Film Layout Page Switch Tool

Film page switch button. The left and right arrows represent the previous page and next page. The middle drop-down list can be selected to jump to the specified page.

#### 19) Film Template Selection Tool

Click on the combo box button, you can select the appropriate layout template (window cloth) from the drop-down list and apply it to the layout window.

#### 20) Window Layout Tool

Click on the function button, the layout setup dialog box will pop up. You can use the mouse to select the layout grid in the pop-up window. Set the image layout format displayed in the layout window. (image row, number of columns). You can also set whether the layout is applied to the current film page or all the film pages.

#### 21) Layout Transverse/Longitudinal Tool

Click on the single function button, you can set the used transverse or longitudinal layout when the film is output. And you can set it to the current film page or all the film pages.

22) Commonly used layout buttons provide the usual 4X4, 4X5, 4X6, 5X6 and 5X7 layout, and after clicking on one of the buttons, apply the layout to all the film pages.

23) The tooth layout button supplies the commonly used layouts of 1/4X4、1/4X5、1/4X6、1/5X6、1/5X7. Click on and apply them to all film pages.

#### 24) Select the printer that actually outputs the film

After selecting the combo box, select the printer that actually outputs the film in the drop-down list.

#### 25) Select the priority of the printing tasks in the printing list.

Click on the combo box to select the print priority in the drop-down list. Priority level is divided into high,middle and low. The system selects the default.

#### 26)Select the number of copies

Select the combo box to select the number of copies of the film in the drop-down list.

#### 27) Patient Information Display

Display the user name and check number of the current layout.

#### 28)OverLay、 ColorBar、 Ruler

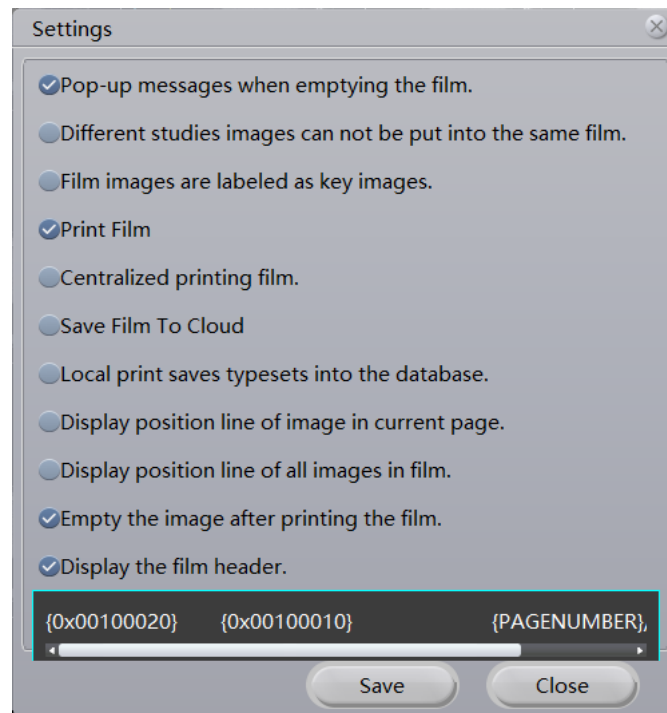
Check or don't check whether the overlay information, color bar, scale are displayed on the control image.

#### 29) Newly Created Print Task Tool

Click on the function button, and newly create typesetting task. Empty the contents of current typesetting. Only one blank film is waiting for the user to add image.

#### 30) Setting Tools of Typesetting Option

Click on the function button, the option setting dialog box will pop up. See figure 10-7.



**Figure 10-7 Typesetting Option Setting Dialog Box**

- When the content of typesetting is emptied, the prompt dialog box will not pop up.
- Different patient images are not forbidden to put on the same film to be printed.
- Typesetting image is marked as a key figure.
- Typesetting is centralized to be printed
- The typesetting of local printing is saved to the database
- Location line on the position map will be displayed. The current page takes effect.
- Positioning line on the location map will be displayed. All the pages come into effect.
- Empty typesetting images after outputting the typesetting.
- Display header when printing film.

### 31) Print and Output Typesetting Tools

After clicking on the function button, the current typesetting will be sent to the selected printer for printout.

### 32) Print out and typeset the current page.

After clicking on and select the function button, typesetting the current page will be sent to the selected printer for printing out.

### 33) Print Task Tools

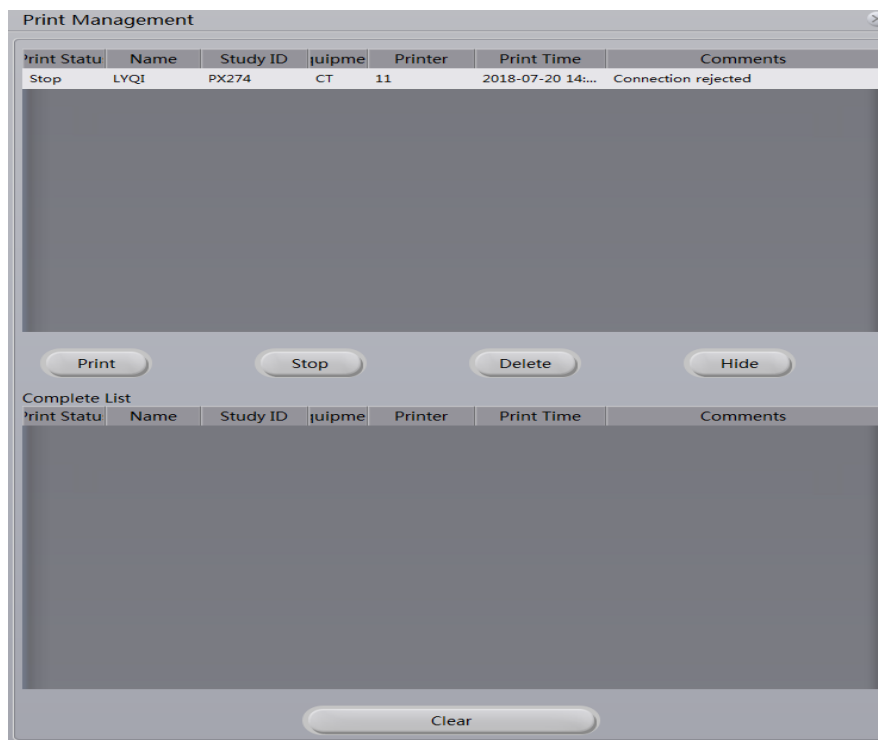
Click on the function button, the print task dialog box will pop up. You can view the print task information in the pop-up window.

34) Electronic Film.

After clicking on and select the function button, Save images to cloud.

## 10.4 Film Printing Task Manager

Click on the task button on the film typesetting interface or click on the film button of the top right corner in the workstation, the system will pop up the film printing manager. As shown in figure 10-8 -



**Figure 10-8 Printing Task Manager**

- 1) The print task is displayed on the top list. The unprinted task is displayed as waiting, and the print task of failure is displayed as stopped printing.
- 2) Press the print button, print the selected print task again.
- 3) Press the stop button, stop the task that is being printed or waiting to be printed.
- 4) Press the delete button, delete the print task in the printing list.
- 5) Press the hide button, hide the dialog box in the print task manager.
- 6) Press the button of print success list, the print success task will be displayed in the list as print success status.
- 7) Press the button of emptying print success record, print success list will be emptied.

# Chapter 11 Report Edit

## 11.1 General Report Editing Function

Report editing consists of report writing area, image area to be selected, shortcut input template area and function button area. Users can write reports according to the pattern of description, diagnosis and suggestion and place the image in the report. The input template can quickly fill in the areas of description, diagnosis and suggestion of the report with the commonly used words, which reduces user input, as shown in figure 11-1.

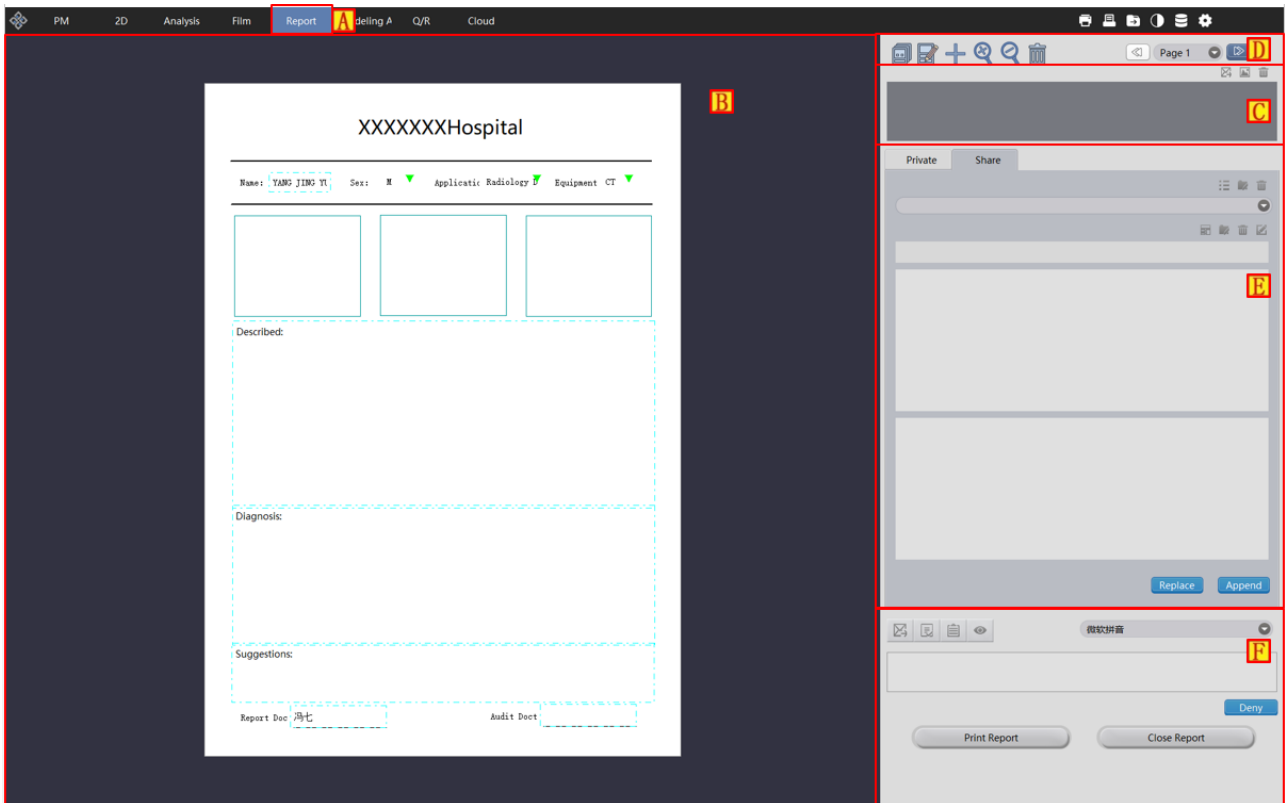


Figure 11-1 Report Editing

Area	Function	Description
A	Plug-in switch button	Click on the report button, you can switch the window to the report editing window.
B	Report editing area	The area displays the effect of output report and users can write the edited and output report content and image and QRCode in this area.
C	Image area to be selected	The area displays the image waiting to be selected, and users can select part of the image from the region to output it to the report.
D	Template operation	This area can conduct the operations of changing, adding, editing, deleting or zooming the template.

E	Quickly enter the template area	The area is divided into private templates and shared templates. Users can fill in the report content with the existing template content, or newly create a template content for later use as well. Delete and rename the selected template. You can preview the selected template content.
F	Report output	The area conducts the operations of temporary storage, submission, browsing application forms, browsing images, printing and closing reports.

## 11.2 Open Reports

From the patient management interface, right click on the record in which you are going to write a report. Select the [Edit Report] button in the pop-up menu, the window will automatically switch to the report writing interface as shown in figure 11-2, 11-3.

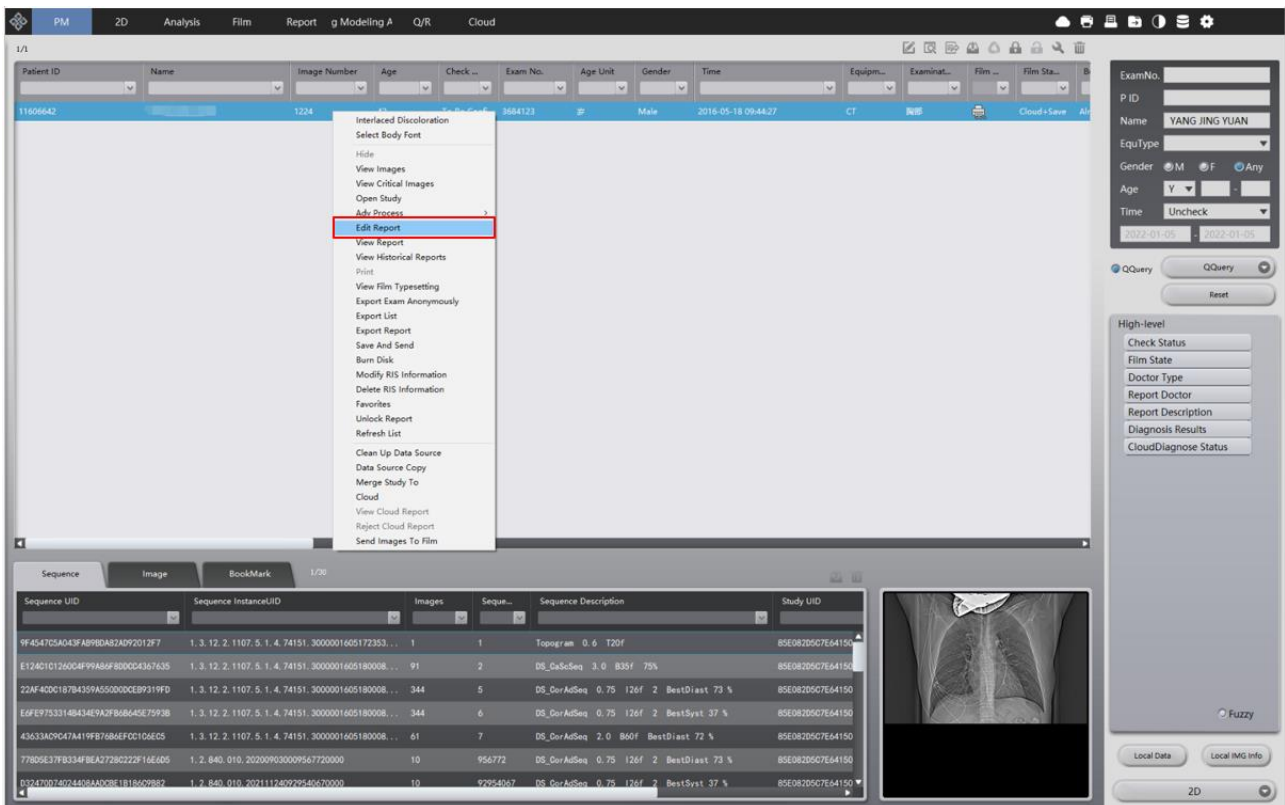


Figure 11-2 Open the Report from Patient Management

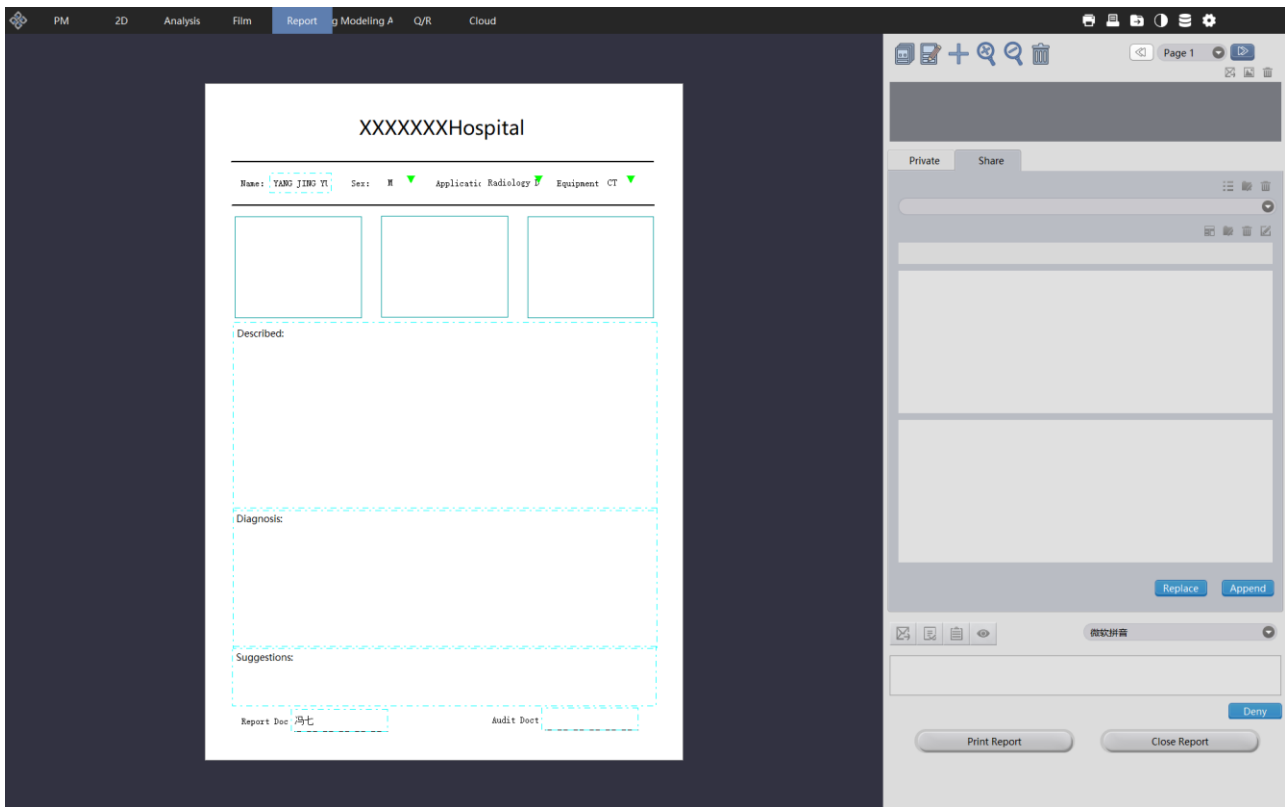


Figure 11-3 Report Writing Interface

## 11.3 General Report Function Introduction

### 1. Report Editing Area

It is used to carry users content of writing and inserted images, which can be output on the printer, including patients basic information such as study image, doctor description, diagnosis, suggestion and the doctor signature.

### 2. Image Area to be Selected

It is used to temporarily save the image that user sends from the browser or opens from the local. It's for the user to select which images are to be placed in the report to be output. See figure 11-4.

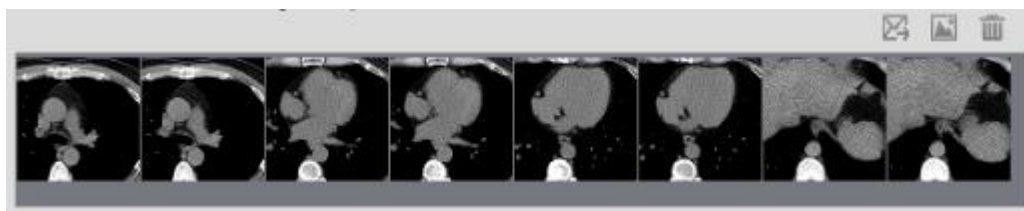


Figure 11-4 Image Selection Area

➤ Send the selected image to the report

Click on the [Send Image to Report] button, the system will send the selected image in the area to be selected to the report editing page.

#### ➤Open the local image

Click on the [Open Local Images] button and the file selection dialog box will pop up. The image file will be loaded to the image area to be selected after selecting the file.

#### ➤Empty Images

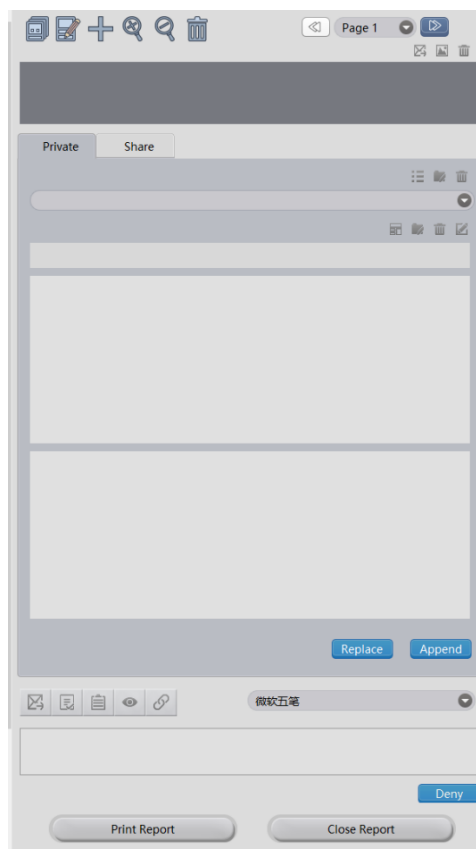
Click on the [Clear Image] button, the system will empty the image in the area to be selected.

### 3.Template Operation

Conduct the operations of changing, adding, editing, deleting and zooming the template.

### 4.Quickly Input Template

Quickly input the input content saved by the user, or the shared input content saved by other users into the description and diagnosis of the current report. The user can create a input template, delete or modify the renamed and selected template, you can preview the contents of the selected template, as shown in figure 11-5.



**Figure 11-5 Insert Template Effect**

#### ➤Private Template

Users can create their own input templates in Private templates. You can also quickly apply the contents of a private template to the report. The contents saved in a private template can only be used by the user and other users are not visible.



#### ➤Share Template

Users can create their input templates in the shared templates. You can also quickly apply the contents of the shared template to the report. The user who uses the current system can see the contents saved in the shared template and uses the contents in the template.

#### ➤Create a New Directory

The user can create a new directory to classify and save the templates so as to be easy for index search.

#### ➤Save templates

You can save the contents of description, diagnosis and suggestion in the current report editing to the category in the selected template.

#### ➤Preview Template Contents

When users click on the saved template option in the private or shared template, the system will display the saved content in the preview template content area. Users can judge whether the current template content is applicable for the current report by previewing and further decide whether to use it.

#### ➤Apply the Current Selected Template

Overlay: replace the current template content to the report editing area.

Append: append the current template content to the report editing area.

### 5.Report Function Button

Include the operations of printing, submitting reports, temporary storage, closing, browsing application form, etc. The details are as follows:

#### ➤Report printing

You can output the currently edited report content to the WINDOWS default printer.

#### ➤Close Report

Close the currently written report and do not save the report.

#### ➤Submit Report Function

You can save the currently edited report content to the database, and you can continue to edit the report next time.

#### ➤Temporary Storage Report Function

The unwritten report can be temporarily stored. At this moment, the report status is in the temporary status and the report will not be printed.

#### ➤Browse Application Forms

The photo of paper application form will be displayed for user reference.

➤ Browse Image

It will switch to the 2D interface and display the patient scanned image.

➤ Relevant Diagnosis

It will switch to the relevant diagnostic interface and display the patient relevant diagnostic information.

➤ Refusal

After you enter the reason for refusal in the text input box, click on the [Deny] button, you can reject to give any diagnosis effect in the report.

➤ Switch Input Method

In the drop-down box, you can select the required Chinese input method and switch to the current input environment.

## 11.4 Senior Reporting Functions

### 1. Overall Description

When you use the function of sending and forming reports through the analysis of lung nodules or bone mineral density, the system will enter the senior report interface. The senior report uses the PDF format to store and cannot be edited again after it forms. The senior report image contains the control area and report display area. As shown in figure 11-6.



Figure 11-6 Senior Report

Area	Function	Description
A	Control area	The control area can only save and close the report.
B	Report display area	Display the lung nodule senior report in the format of PDF.

## 2.Function Introduction in the Control Area

In the software, only reports can be saved and closed. The saving function is to save the report to the database, and other functions, for example printing can directly use the function that Adobe Reader comes with the software.

## 3.Report Content Introduction

The report contains the following content:

➤Head Information

Display the information of hospital Logo, hospital name, hospital address, phone and website.

➤Patient Information

Display the basic information of patient name and age,etc.

➤Scanned Surface Parameters

Display the parameter information of CT equipment.

➤Result information

Display all kinds of results information.

## 11.5 Report Browsing

From the patient management interface, right click on the record, and select the browsing report in the pop-up menu. Display the general report content and senior report that has been written and saved in a read-only manner. See figure 11-7, 11-8.

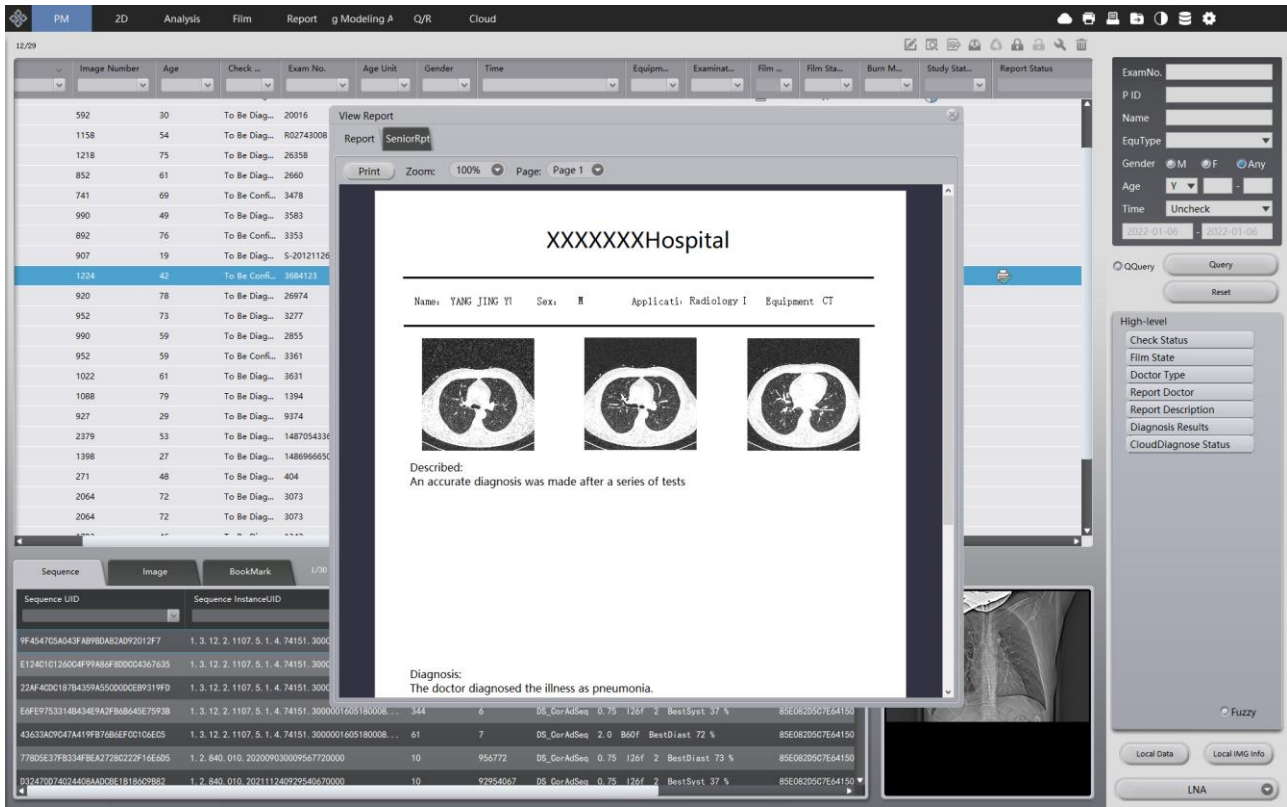


Figure 11-7 General Report Browsing

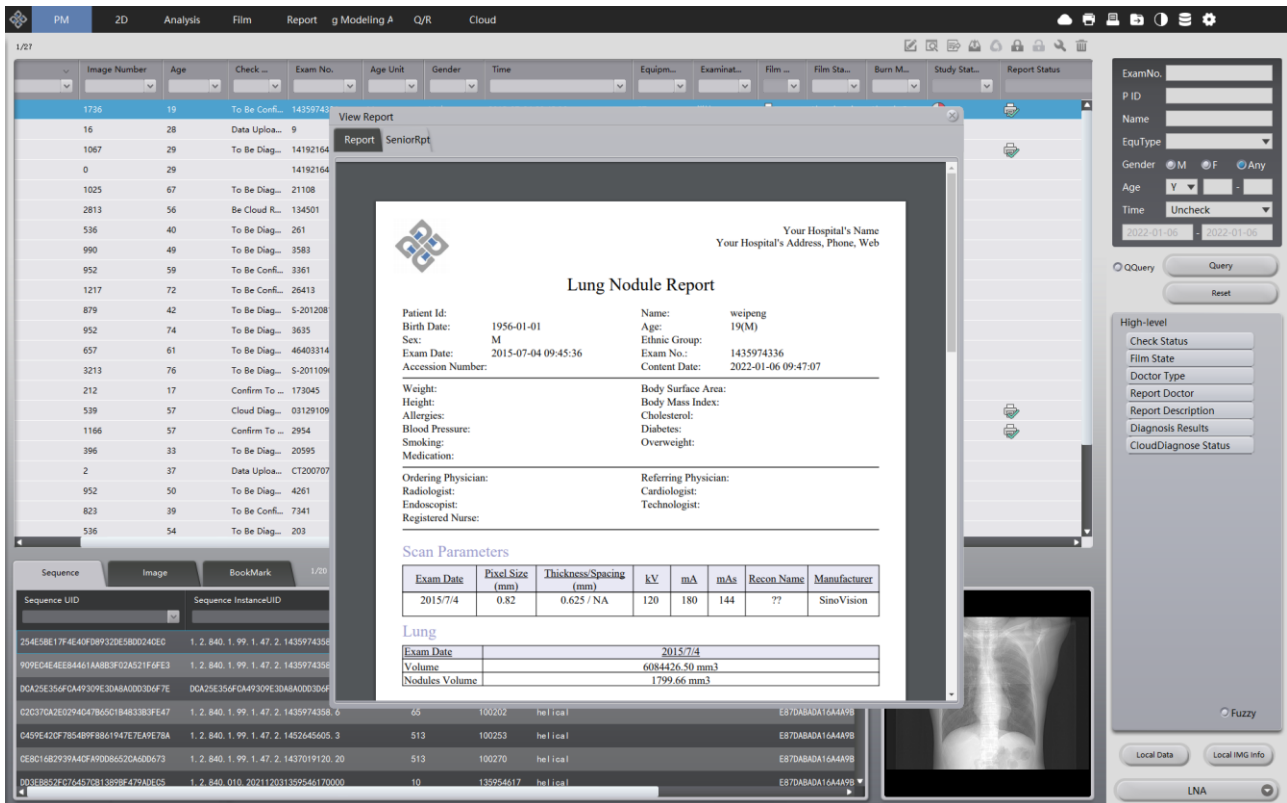


Figure 11-8 Senior Report Browsing

## Chapter 12 3D

3D visualization (3D) plug-in, based on the patient management loaded image data, the image series as the unit, after correction and rotation, generates the recreated data with HFS direction and is displayed. In order to assure the correctness of the recreated data, 3D plug-in has a certain requirements for patient management loaded data, for example, the number of images in a series should be greater than 5 pieces, the location information of head information in each image can't be empty and the order of image series number has no interval, etc.

### 12.1 Start

3D plug-in, as a function plug-in of the system, is deployed in the advanced application modules.

First, click on the [3D] button in the system function switch panel in figure 12-1 to switch to the advanced application module.

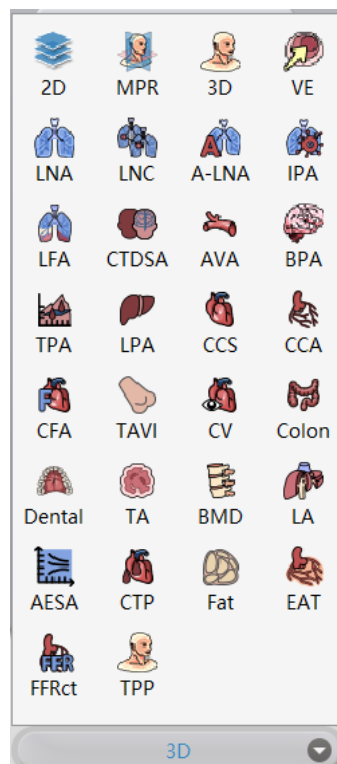


Figure 12-1 Start 3D

Click on the [3D function] button on the function switch panel in the advanced application module, and the system can switch to 3D plug-in, as shown in figure 12-2. The selected 3D function can be loaded and switched through the patient management as well.

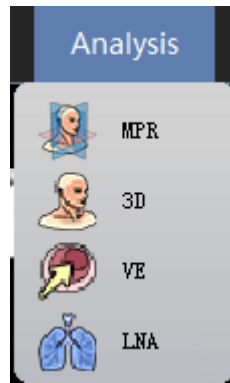


Figure 12-2 Switch to 3D

## 12.2 3D Operation Interface Description

3D operation interface is shown in figure 12-3, which mainly consists of two parts, view region and function operation panel area:

- A: View area displays the axial plane, coronal image and sagittal plane section and 3D visual images of image data, and the system will implement the display requirements of different images by adjusting the layout and display mode;
- B: The function operation panel provides methods and tools of the display windows of operation images, and the settings of the attributes of the image display.

Figure 12-3 3D Operation Interface

The image display window implements the content output of image display window, taking the basic window (C) in the image display as unit, through the combination layout of multiple basic windows.

The displayed content of image display basic window includes overlay information, location information, display mode, scale and location box and the displayed different contents according to different functions: non-generic information, as shown in figure 12-4.

- Overlay information(A): display the head Information of DICOM image and real-time WW、WL information. The custom settings of head information display item can be set in the setting interface;
- Location information(B): synchronized with the displayed image content, identify the location information of the currently displayed image, which is displayed in the text form in position of the four sides in the image display basic window;
- Display Mode (C): display the display mode of the current image display window, including the contents of 2D, MIP, AIP, MinIP, SSD, VR, etc. Right click on the display mode text in the window and the system

will pop up the display mode switch menu. Select the corresponding menu item, the system can switch the display mode of the image window;

- Ruler (D) : based on the half height of the image display window, output the image scale;
- Location box(E): the adjusted location information display box synchronized with the image. The location information display box is adjusted with the image synchronously adjusted;
- Scrollbar(F): the adjustment layer operation can rapidly be performed through the mouse wheel;
- Layer Thickness G: click the layer thickness value, and then perform the edit operation in the pop-up edit box.
- WW and WL(H): click the WW and WL value, and then perform the edit operation in the pop-up ;
- Non-generic information: display the different contents according to the different function of window (for example, MPR displays the crosshair and displays the defined curve when CPR is defined).

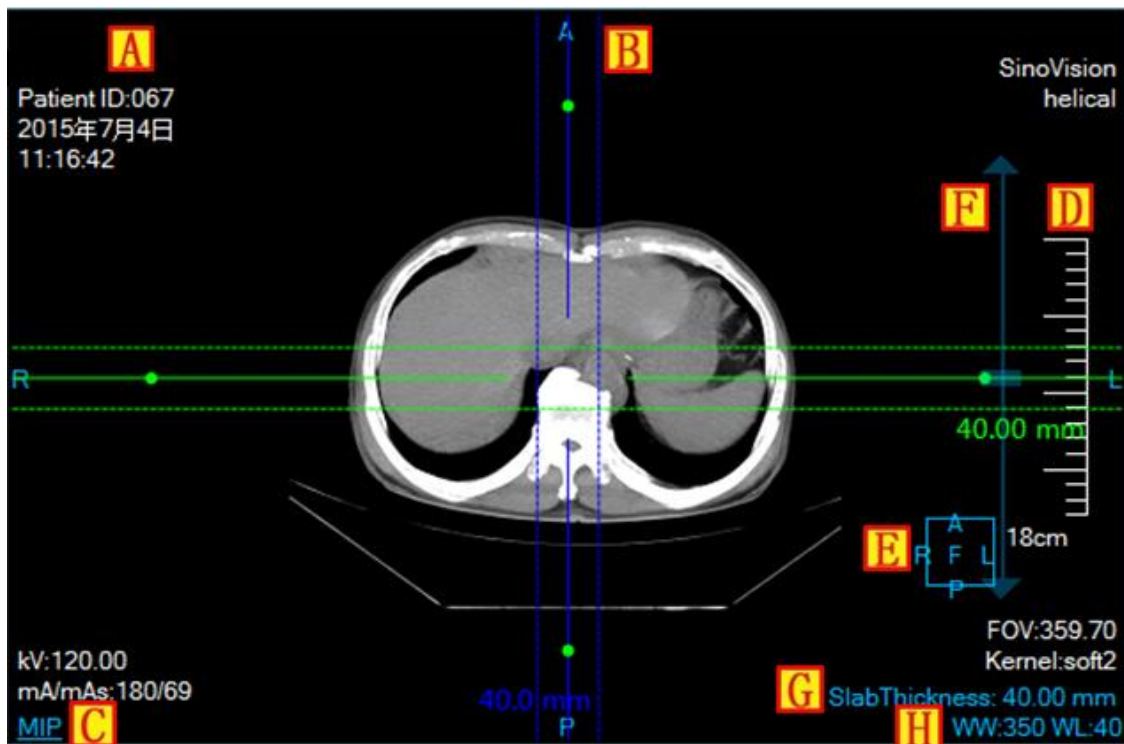
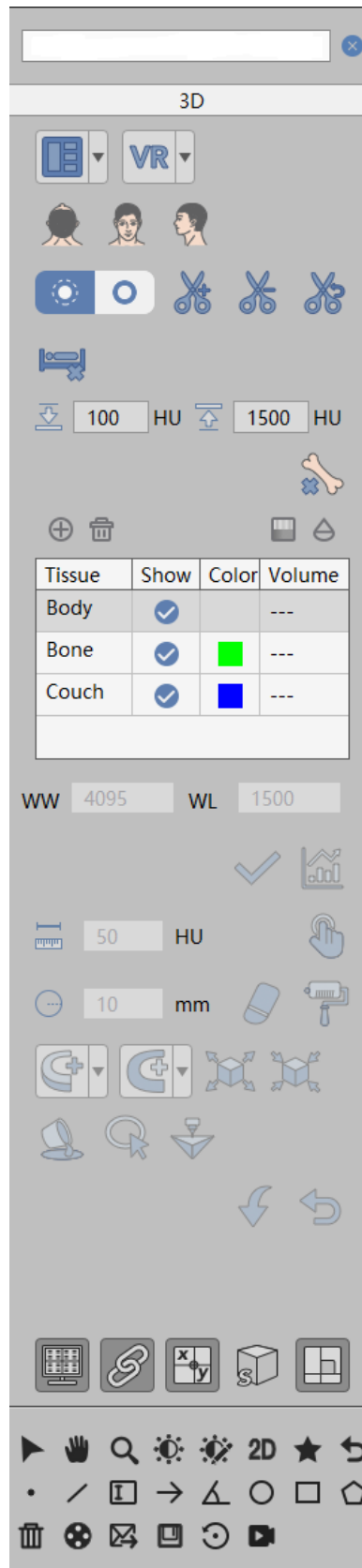


Figure 12-4 Image Display Basic Window

## 12.3 Function Operation Panel



**Figure 12-5 Function Operation Panel**

Function operation panel as shown in figure 12-5, is mainly divided into two regions, general function and



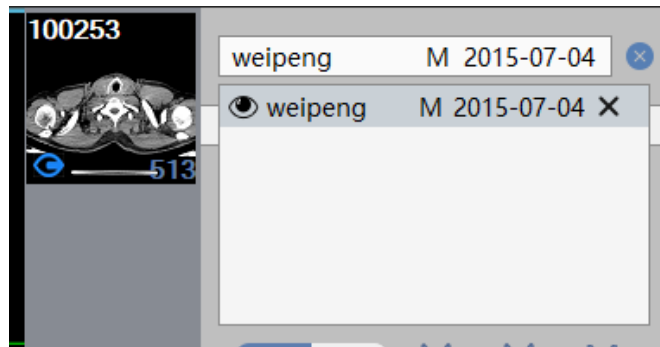
function operation panel. General function has realized the general function of each post-processing plug-in. The function operation panel provides the various function operations required by 3D.

#### 4.General Function


##### 1)Basic Operation



The upper patient name line provides the displayed functions of loaded data information, switched image series, deleted study and image thumbnail, etc.



Click on the arrow, the expand and close button display the loaded data information: take the study as unit and it is displayed on the image in the form of lists. Double click on the entry in the list, the system can switch the loaded study. The series information adopts the form of thumbnail to display a image in the series, and series No. displayed in the upper left corner while image count is displayed in the lower right corner.

Switch image series: the  button in the series thumbnail identifies the image series that is currently being displayed. Double click on the series thumbnail, you can switch the image series that is currently being displayed.

Delete study: click on the "Clear" and "Clear All" buttons to complete the unloading function of loaded study .

*\* Note: delete study is a global action. Delete the study, and at the same time close the relevant information such as report, film, 2d display, etc.*



As shown in the figure above, the lower function button provides the functions of default operation, translation, zooming, adjusting W/L, quick browsing and bookmark in order.

2)Send, Preset and Reset



Provide the preset WL setting button of the system. Click on the [Preset WW And WL] button, and unfold the preset WL list of the system. Double click on the WL that can switch the currently displayed image and you can also input the WL for setting.

The bottom five buttons from left to right are: reset, send film, send reports, save and tools.

- reset: reset plug-ins to the initial status;
- send film,report: send the activated and selected images to the film or report;
- save: save images, screen to database, and save screen to the local;
- tools: pop up the general tools of measurement annotation, etc. .

5.Function Operation Panel

Display panel provides the setting functions such as crosshair display setting, MPR linkage set, the overlay information display setting, VR visual display mode setting, page layout switch and VR visual location information setting function.

3)Layout Setting



Layout setting provides two kinds of layout modes, the left button is 2\*2 layout, the right button is 3\*1 layout, and the modes of layout are shown in figure 12-6.

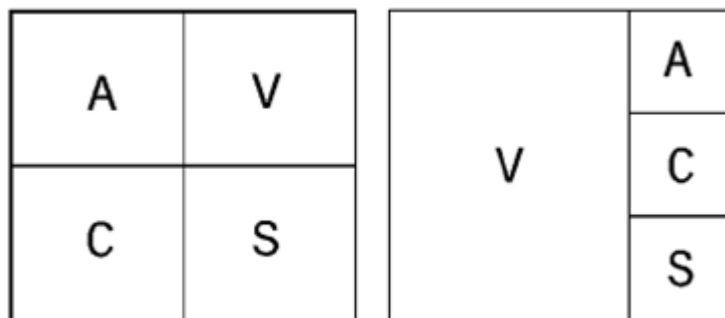


Figure 12-6 Layout Setting

#### 4)Display Location Setting



VR visual location information setting provides three kinds of body position orientation by default: Axial, Coronal and Sagittal. Click on the corresponding button, you can switch the orientation of VR window data.

#### 5)Display Mode Setting



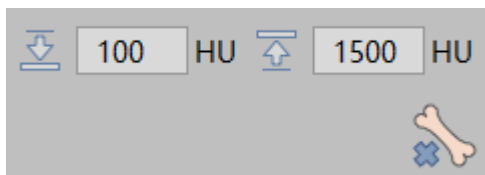
VR visual display mode setting: click on the [VR], [MIP], [AIP], [Min IP] button, you can switch 3D visual window display mode, the corresponding switch to VR drawing, the minimum intensity projection and average density projection drawing.


#### 6)Cut



The cut function provides in the VR view to cut the medial, cut lateral, and restoring medial and lateral. And you can reset to restore to the original status before cutting.

#### 7)Remove Bones and Remove Beds



Click on the [Remove Bones] button and click on the skeleton in the VR view, you can achieve the boning function by clicking. The default upper and lower limiting values of the boning threshold are respectively 3071HU and 200HU. Users can manually input the threshold. Click the button of removing beds  to perform the operation of automatically removing beds.

#### 8)Organization Management

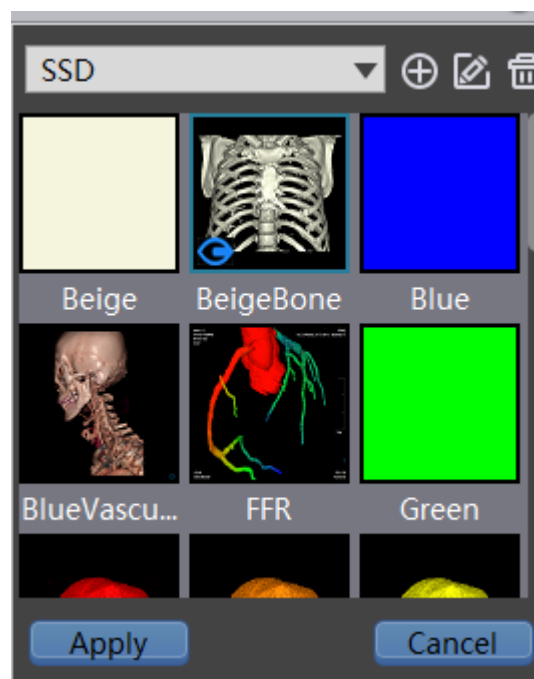
Organization management realizes organization management and display function based on segmentation, and the segmentation results of removing bone and removing bed are also displayed in the organization list.

- Adding and deleting organization, the setting of opacity and permeability: you can add and delete the organization in the organization list. Select an organization, and you can change the 3D displayed

opacity and permeability of the organization.

- Organize extraction: provide manually setting WL extraction. Hold down the left mouse button, pressing down the SHIFT button at the same time , the area generation will be extracted in the MPR interface;
- The basic operation of partition data repair: you can preset the erased dyeing operation of the radius.
- Segmentation modification function: provide the operations of adding layer by layer, deleting layer by layer, projected adding, projected deleting and corrosion expansion;
- Printing Modeling: Send selected segmentation to Printing Modeling plugin.
- Reset and return: the system supports returning to the last step operation (Seven steps are returned at most) and supports resetting as the initial operation.

### 9)Opacity Adjustment



**Figure 12-7 Opacity Adjustment Function Panel**

Opacity adjustment function panel (Figure 12-7) Taking organization as a classification project, lists the opacity model list of each organization. Click on thumbnail on the list, you can switch the current displayed 3D visual image to the corresponding opacity model. The opacity in the opacity model list supports new creation, editing and deletion, where the opacity in the system default does not support the functions of editing and deletion.

When newly creating and editing the opacity, the opacity adjustment panel shown in figure 12-8 will pop up. The opacity name item in the panel cannot be changed when the opacity is edited. The opacity adjustment panel is divided into three parts from top to bottom:

The first part is the curve adjustment panel which is used to adjust the corresponding Alpha value of CT

values. The horizontal axis in the coordinate system is CT value, and the vertical axis is 0-1Alpha permeability. By pressing down the moving mouse on a curve or a key point, you can adjust the position of curve or key point. Double click on the left button in the panel, you can automatically add curves or key points. The menu pops up by clicking the right hand and you can delete curves or key points.

The second part is color adjustment panel, which is used to adjust the color value corresponding to the CT value. You can adjust the gradient color bar by pressing down the green key frame in the moving color bar with the left button. Press down the right hand button, the function options of creating color, editing color and deleting color pop up in the color adjustment panel. Select the corresponding function, you can adjust the color bar content.

The third part is the light adjustment panel, which is used to adjust illumination parameters in the visualization. Move the slider control, you can adjust the corresponding diffuse reflection, mirror reflection and illumination intensity.

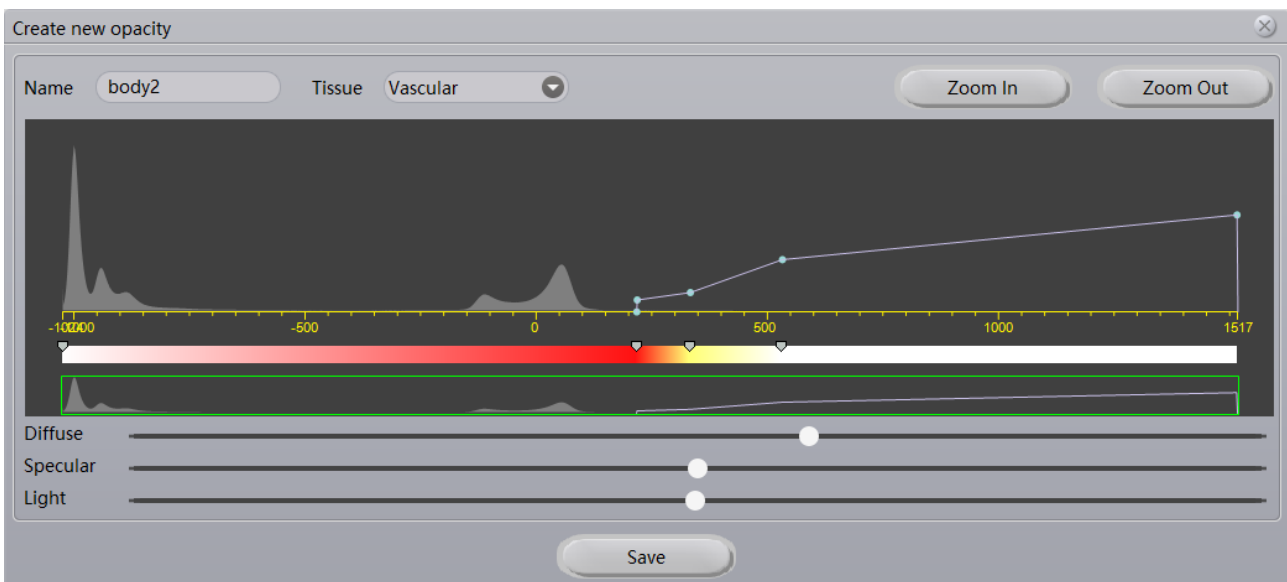


Figure 12-8 Opacity Adjustment Panel

#### 10) Display Content Setting



Crosshair display setting: this setting is in the selected state, and the crosshair is shown in the MPR interface. Otherwise it is not displayed.



MPR linkage set: this setting is in the selected state, and the functions of MPR three windows of zooming in or out and the WW/WL adjustment are coordinated. Otherwise, they aren't;



Overlay information display setting: this setting is in the selected state, and the overlay information in all the windows is displayed. On the contrary, they don't;



Bounding box setting: this setting is in the selected state, and the bounding boxes of VR,MPR three windows appear, you can adjust the bounding box to realize the 3D cutting display function of VR window.



Orthogonal setting: If this item is selected, the crosshair can only be translated and rotated in the form of 90°, otherwise the crosshair can be translated and rotated at any angle.

## 6.General Tools Panel

### 4)General Tool

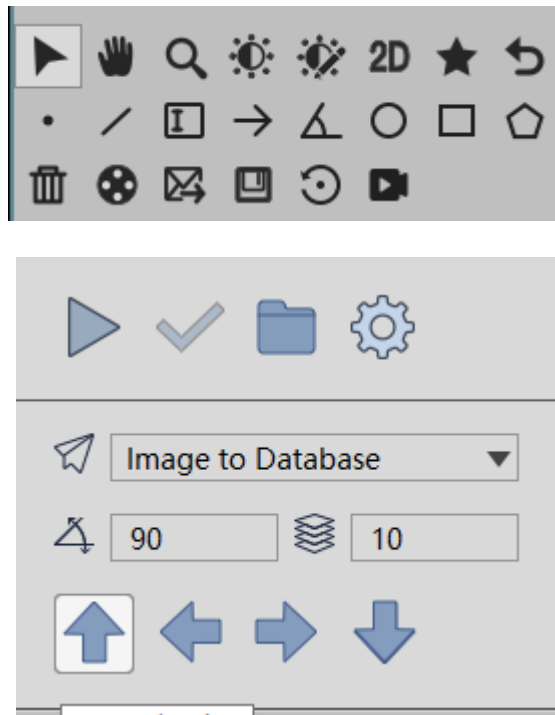


Figure 12-9 General Tools Panel

The general tools panel includes two parts, measurement annotation, screen recording and rotation function.

### 11)Measurement Annotation

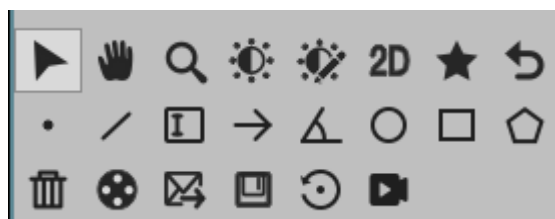


Figure 12-10 Measurement Annotation Panel

As shown in figure 12-10 measurement annotation function provides CT value of some point, distance measurement and provides words, arrows, angular dimension. Meanwhile, it also provides the maximum, minimum and average CT value in the selected area of the different shapes and the functions of area and standard variance, etc.

## 12) Screen Recording

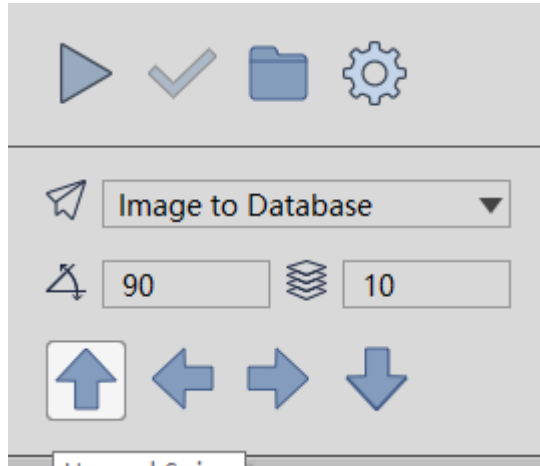


Figure 12-11 Screen Recording Panel

As shown in figure 12-11 screen recording provides dynamic recording of full screen or activated window to video file and provides the option of recording the mouse cursor. You can also play the recorded video file by playing function.

## 13) Rotation

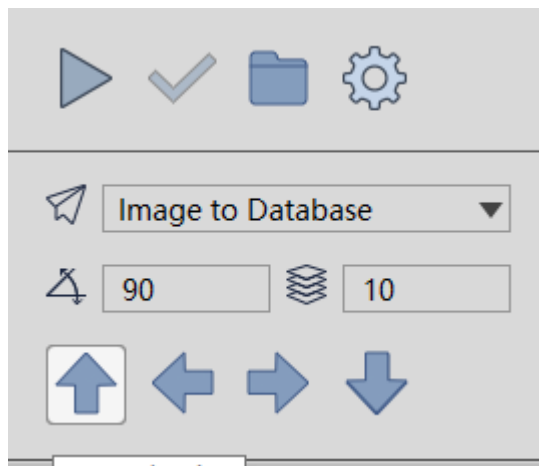


Figure 12-12 Rotation Panel

As shown in figure 12-12 rotation function provides VR image with the rotation function of the four directions, and supports the rotation angles and the setting of rotation image number. At the same time it can save the image series generated in the rotation to the database, the screen to the database, sent to the film and sent to the video file.





# Chapter 13 MPR

Based on the image data which is loaded by the patient management, MPR plug-in is used to rebuild the 2D image display, taking the series as unit, with the 3D data intercepted from transverse plane, coronal plane and sagittal plane or any phase section.

## 13.1 Start

As a function plug-in of the system, MPR plug-in is deployed in the advanced application module.

First, click on the [MPR] button in the system function shift panel in 13-1 to switch to the advanced application module.

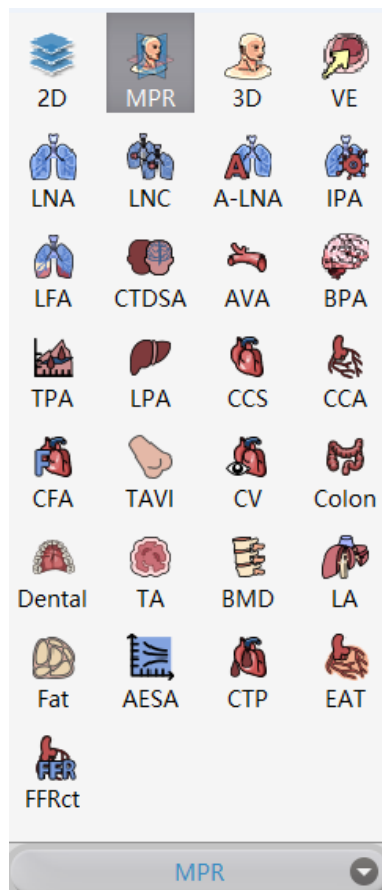


Figure 13-1 Start MPR

Click on the [MPR] button in the function shift panel of the advanced application module, the system will be switched to the MPR plug-in, as shown in figure 13-2.

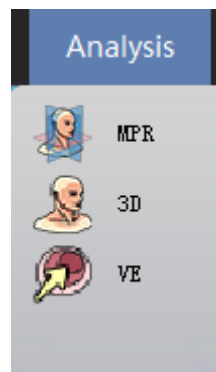


Figure 13-2 Advanced Switch to MPR

## 13.2 The Description of MPR Operation Interface

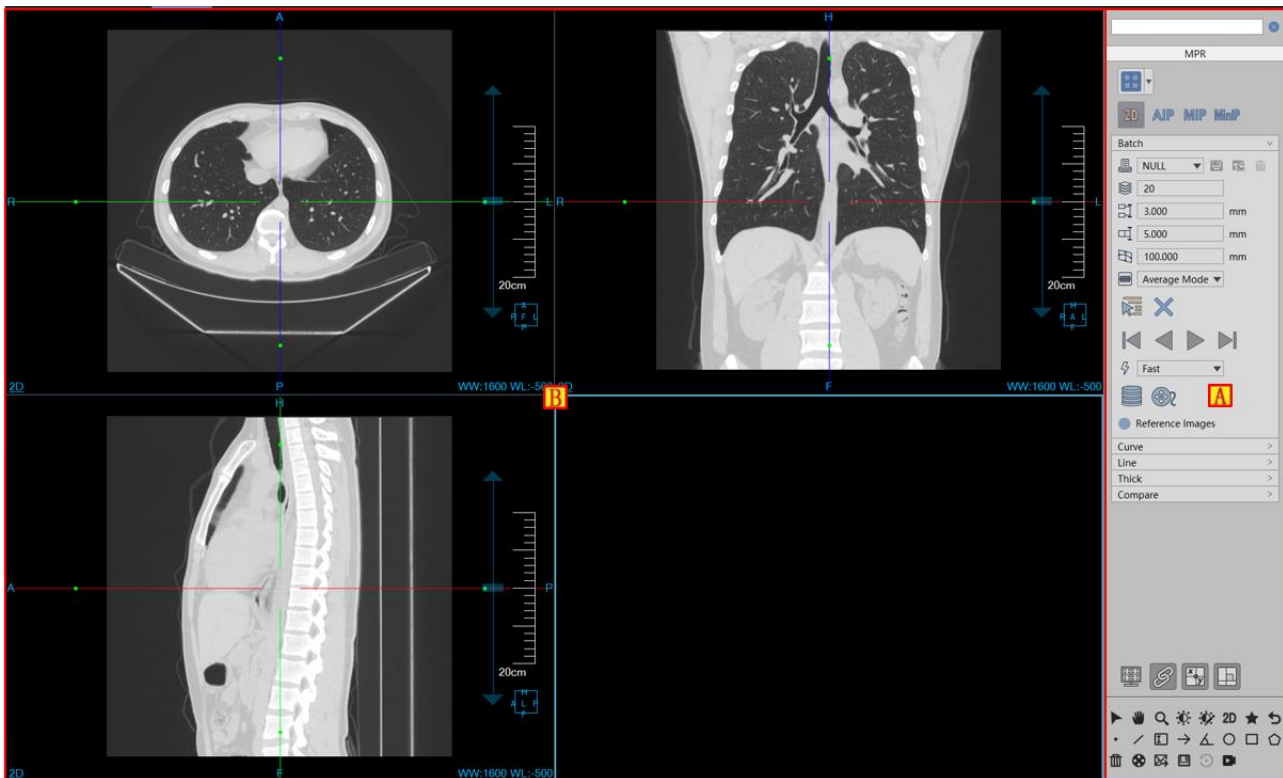


Figure 13-3 MPR Operation Interface

MPR operation interface has two parts as shown in figure 13-3: view area and function operation panel area.

➤A: View area, display the MPR section of image data including axial plane, coronal plane and sagittal Plane and the intercepted image from any phase section.

➤B: Function operation panel, provide the ways and tools of operating image display window as well as the setting of the attributes of the image display.

## 13.3 MPR View

### 1.MPR Overall View

MPR view area is divided into 2 parts: image display windows (A, B, C, D) and series thumbnail image window (E), see figure 13-4.

➤Image display window implements the content output of image display window through multiple basic window combination layout. For example, figure 13-4 displays the images with 2\*2 window layout, among which four basic windows are respectively: axial plane window (A)、coronal plane window (B)、sagittal plane window(C) and diagonal plane window (D). Double click on any of the four windows, the window will be displayed in full screen in the view area. Double click on the full screen image again, the view area will be restored to the 2\*2 window layout to display the image.

➤Series thumbnail window will display the loaded original image data in the form of a thumbnail .

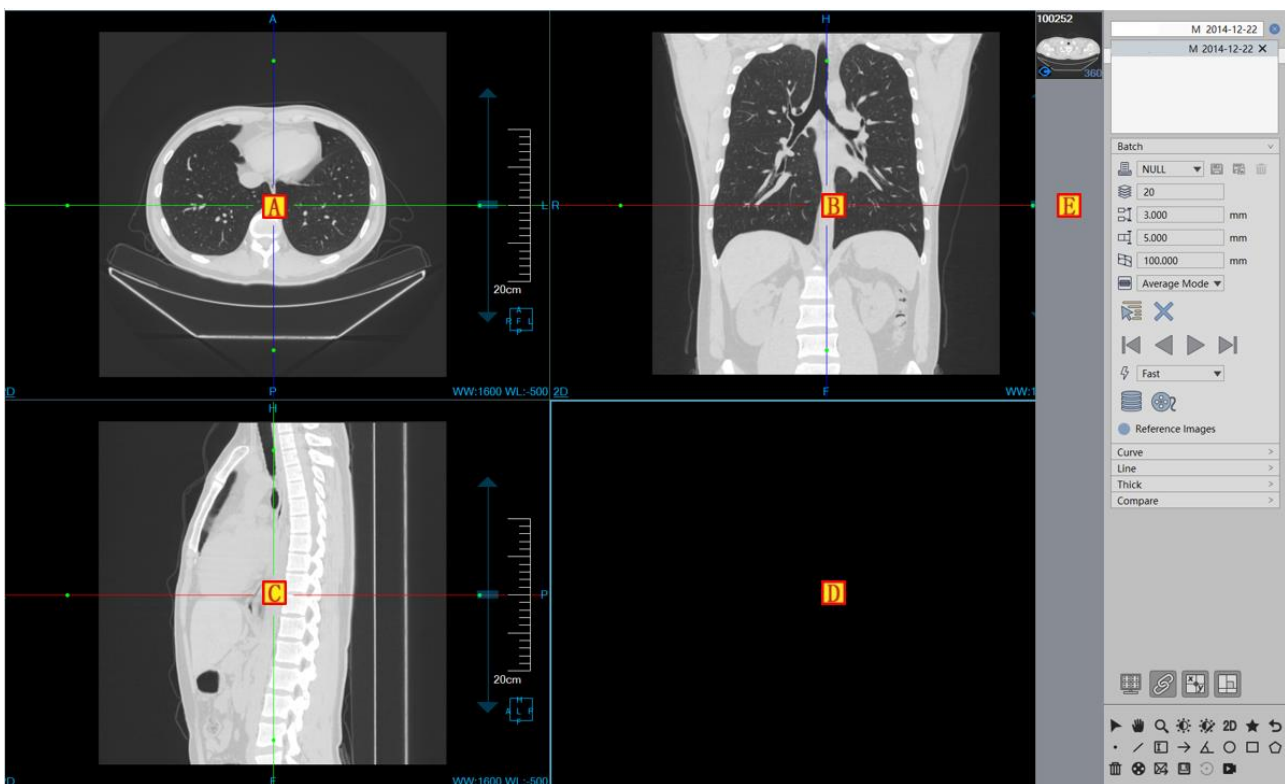


Figure 13-4 MPR View

### 2.Image Display View

The basic window of image display includes: crosshair, overlap information, location information, display mode, ruler, location box, as shown in figure 13-5.




Figure 13-5 Image Display Basic Windows

- Overlap Information(A): display the head information content of DICOM image and the real-time information of window width and window level. The information can display the content of custom display in the setting interface;
- Location information(B): identify the location information of current display image. The information is displayed in the form of text in the middle of four lines of image display basic window;
- Display mode(C): show the display mode of current image display window, including the contents of 2D, MIP, AIP and MinIP,etc. Click the right button on the display mode text in the window, the system will pop up the switch menu of display mode. Choose the corresponding menu item, the system will switch the display mode of image window;
- Ruler(D): output the image scale based on the half height of image display window;
- Location box(E): the display box of location information with the image synchronous adjustment.
- Scrollbar F: the adjustment layer operation can rapidly be performed through the mouse wheel;
- Layer Thickness G: click the layer thickness value, and then perform the edit operation in the pop-up
- WW and WL H: click the WW and WL value, and then perform the edit operation in the pop-up ;
- Image Thumbnail

Image thumbnail provides the functions of displaying the loaded data information, switching the image series, deleting the study, etc. The display contents of thumbnail is shown in figure13-6.

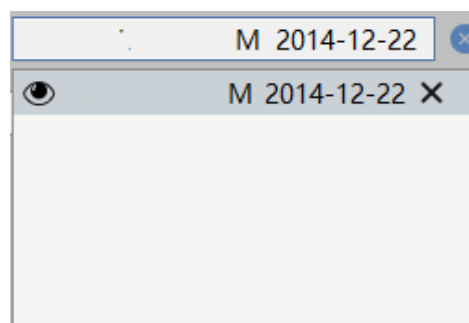
Loaded data information: include two parts, which respectively are the patient list and the study series list of every patient. When clicking on the patient in the patient list, the patient study series can be switched and viewed. Every series adopts the form of thumbnail to display a piece of series image. The green figure in the lower right of thumbnail indicates the loaded series image number.

Switch image series, the  button identifies the current image series which are being displayed. Double click on the series thumbnail, the currently displayed image series can be switched.

Delete study. Click on the button at the right side of the patient, complete the unloaded function of the loaded study.

Delete all the studies: click on the button in the lower part of the patient list to unload all the loaded studies.

*\*Notes: deleting the study is an overall action. When deleting the study, the information of corresponding report, film and 2D display will be closed at the same time.*



**Figure 13-6 Loaded Patient List**



Figure 13-7 Series List of the Patient

## 13.4 Function Operation Panel

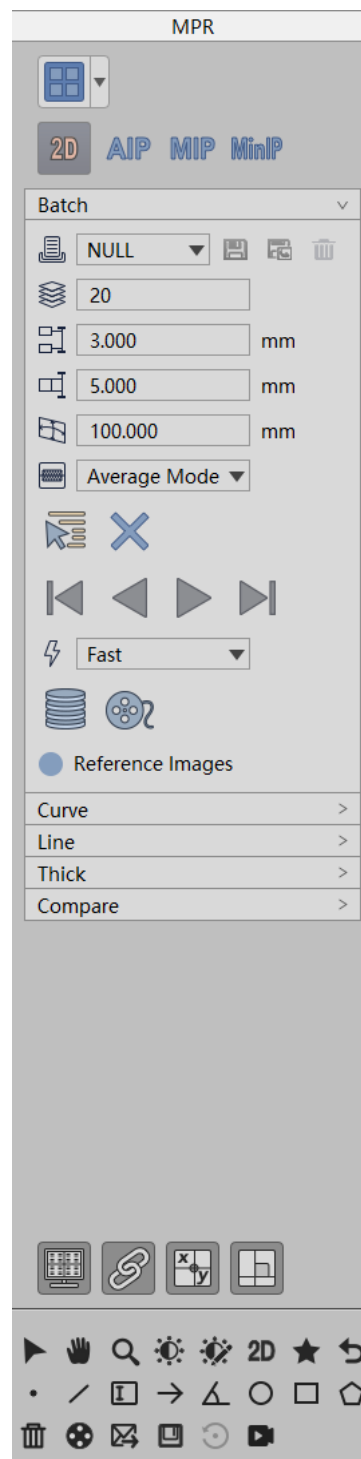
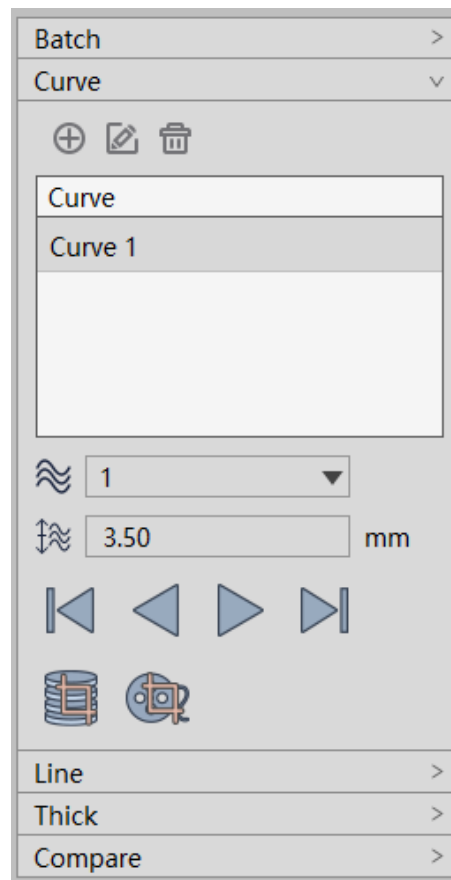


Figure 13-8 Function Panel

Function operation panel has three main areas as shown in figure 13-8: mode switch area, mode panel area and common information control area. Mode switch is mainly used for the switch between the function modes of the curve, diagonal line, batching and layer thickness mode. Mode panel Area is mainly responsible for displaying the information of special operation, list, parameter of this function mode, etc. The detailed description is as followed:

## 1. Curve Mode

Curve mode is the default mode of MPR plug-in. When you first enter the MPR plug-in, you automatically come into the curve mode. The panel content of display area is shown as figure13-9 .



**Figure13-9 Curve Mode Panel**

The display panel mainly includes the following functions:

### 5) Add Curves

Click on the [Add] button, left click on the button of setting control point on MPR image, and the curve result image is displayed in the lower right window at the same time. Press the Esc key, double click the left mouse button, or click the right button to end the curve definition.

### 6) Rename Curves

Click on the [Edit] button, the chosen curve name can be edited.

### 7) Delete Curves

Click on the [Delete] button, the selected curve can be deleted.

### 8) Define Batch Processing

After setting the curve number and curve spacing parameters, use the values of selected by the number



of curves drop-down menu to generate the bath curves on the cross-section, coronal and sagittal planes..

The number and spacing parameters can be manually changed, and the batch processing result can be accordingly changed .

#### 9)Edit Curves

Provide three kinds of edit methods: add, delete, and change control points.

Add: first hold down the Ctrl key, and then click the left mouse button in any area of the image to add a control point.

Delete: press the right mouse button on any control point to pop up the delete menu, and then perform the operations of deleting the current control point, removing all the previous control points and removing all the latter control points. In addition, when the curve has only two control points, the deletion operation cannot be performed.

Change: move the mouse onto the control point of the MPR image curve, and hold down the left mouse button and drag it to edit the control point of the curve.

#### 10)Browse Curves

Provide the four kinds of curve browsing modes of the previous, reverse, positive and the next.

#### 11)Send Snapshot



: Send snapshot to database.



: Send snapshot to film.

#### 12)Display settings



Overlay Information Checkbox: when it is selected, the window will display the overlay information; when it is not selected, it will not display the overlay information.



Linkage checkbox: when it is selected, the synchronous linkage of the three MPR window zooming and WL adjusting will be performed. Otherwise, the aboved linkage will not be performed.



Crosshair checkbox: when it is selected, the overlay information on the Axial, Coronal and Sagittal window will be displayed; Otherwise, the crosshair information will not be displayed.



Orthogonal checkbox: Set whether the crosshairs are orthogonal. If it is selected, the crosshairs are

orthogonal.

## 2.Diagonal Line Mode

Click on the [Line] button, the [Tab] is moved to diagonal line mode, as shown in figure 13-10.

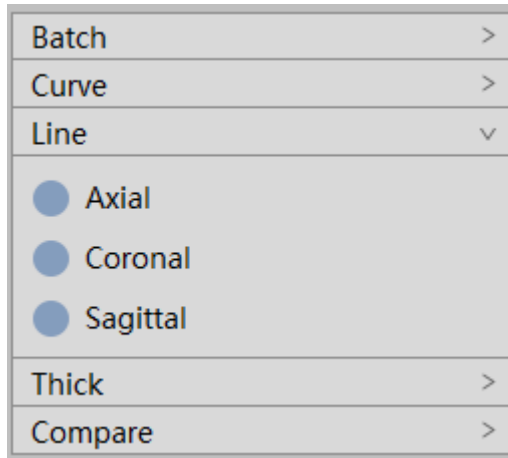


Figure 13-10 Diagonal Line Function Panel

### 1) Axial Plane Tangent

Function description: After selecting the radio button, the axial plane image window displays the diagonal line. The lower right result window displays the plan after the axial plane is diagonally cut according to the diagonal line, as shown in figure 13-11.

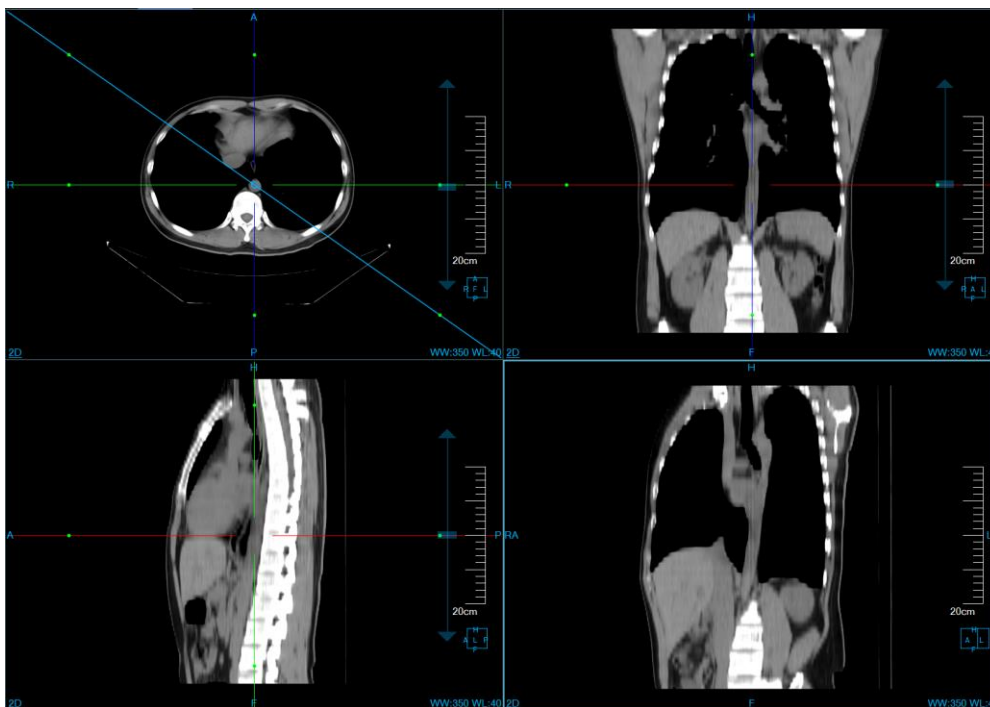
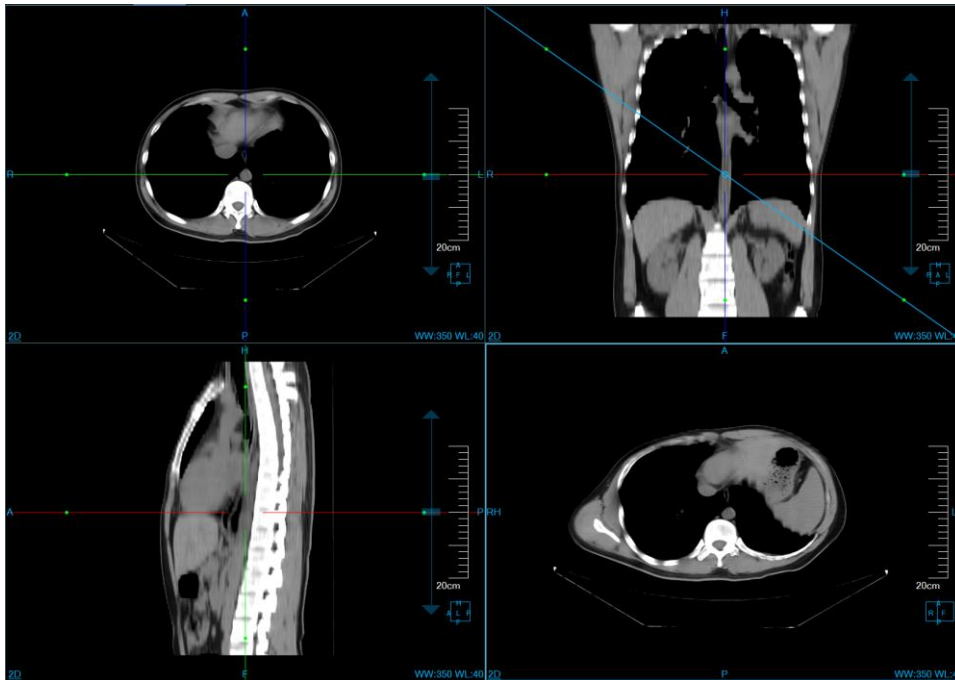


Figure 13-11 Axial Plane Tangent Image

## 2) Coronal Plane Tangent

Function description: After selecting the radio button, a diagonal appears in the coronal plane image window. The lower right window displays the plan after the coronal plane is diagonally cut according to the diagonal line, as shown in figure 13-12.



**Figure 13-12 Coronal Plane Tangent Image**

## 3) Sagittal Plane Tangent

Function description: After selecting the radio button, a diagonal appears in the sagittal plane image window. The lower right window displays the plan after the sagittal plane is diagonally cut according to the diagonal line, as shown in figure 13-13.

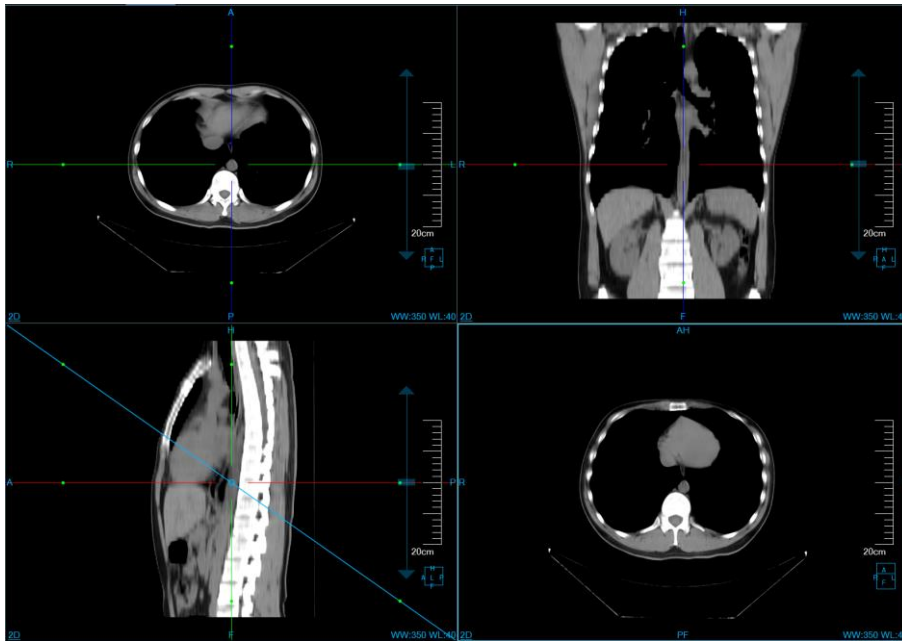


Figure13-13 Sagittal Plane Tangent Image

### 3. Batching Mode

Click on the [Batch] button, the [Tab] is moved to the batching mode. The panel style of the mode is as shown in figure 13-14.

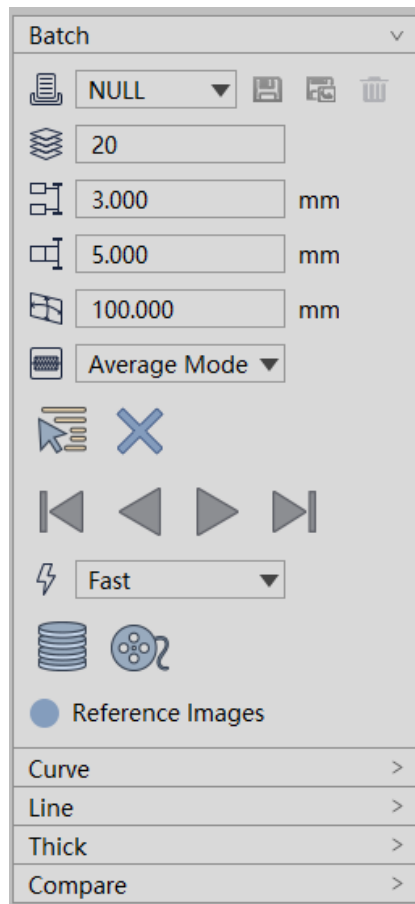


Figure 13-14 Batching Panel

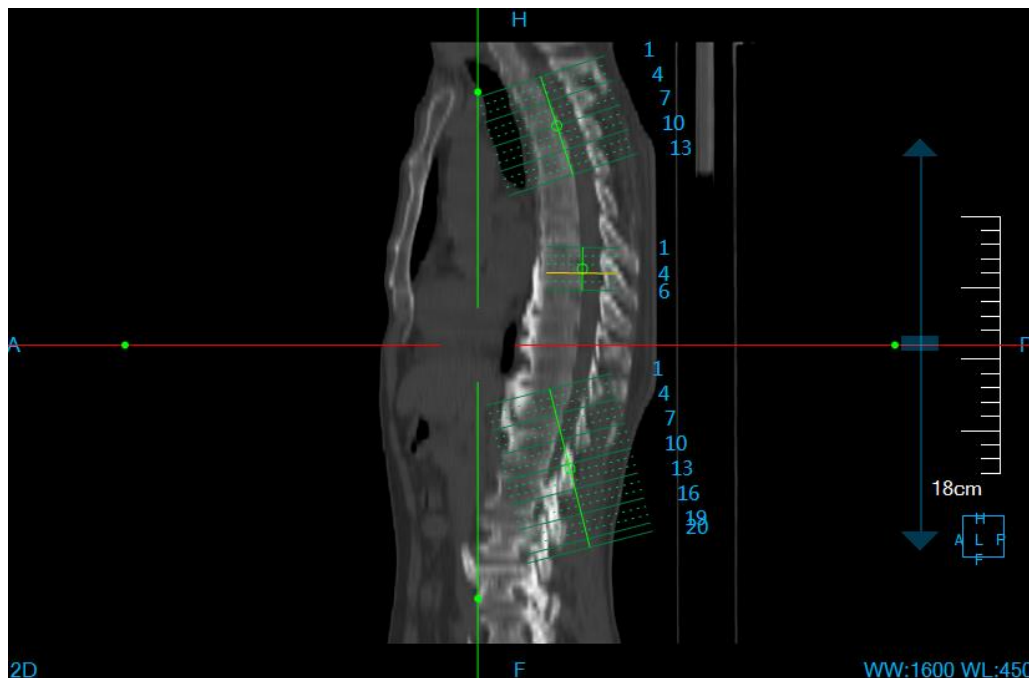
### 13) Define Batching

Provide two kinds of batch processing definition methods: protocol definition and manual definition.

**Protocol Definition:** select and activate a MPR window. In the protocol drop-down list, choose the protocols outside NULL, Generate the batch processing on the window according to the protocol parameters, which are shown in the control on the panel. If the NULL protocol is selected, the batch processing results on the window are emptied and the NULL protocol parameters are displayed on the panel.



**Manual Definition:** click the button first, and then hold down the left mouse button on the window and drag it to perform the manual definition. In addition, when there is no batch processing before manual definition, the manual definition can be done in any window. When batch processing already exists, manual definitions can be allowed in the batch processing window. As shown in figure 13-15:



**Figure13-15 Batching Image**


Change the batching result by changing the following parameters:

- Protocol: predefined number of layers, layer gap, layer thickness, FOV, offset, angle and render mode. The saving, saving as and delete operation of executable protocol. The default predefined protocol can not be deleted.
- Layer numbers: set the layer numbers between the batching reference lines.
- Layer spacing: set the distance between the batching reference lines, with the unit of mm.
- Layer Thickness: set the thickness value of the result window.
- FOV: set the length range of the batch referene lines, with the unit of mm.

➤Render Mode: set the display mode of the result window, including AIP, MIP, MinIP, 2D, and default is AIP mode.

#### 1)Cancel Batching



Click on the  button, the defined batching can be cleared, including clearing the reference lines and result window images.

#### 2)Protocol Operation

The protocol is the collection of predefined batch processing parameters. The parameters included in the protocol include layer number, layer spacing, layer thickness, FOV, offset, angle and render mode. The operation of providing the protocol is as follows:

Save: save the protocol of the current batch processing application and the old parameters will be covered.

Save as: save the protocol of the current batch processing application as the new protocol.

Delete: delete the currently selected protocol. The NULL protocol cannot be deleted.

Parameter Changes: one way is to edit the parameters on the panel. Another approach is to change the parameters by operating the batch processing with the mouse.

#### 3) Play Batching

This function is mainly used to perform the operations of playing and browsing on the defined batching result so as to be convenient to view the image. Provide three kinds of play speed of fast, medium and slow. The included main function of playing: from left to right in turn: previous, reverse play, play, next as shown in figure 13-16.



Figure 13-16 Batching Image

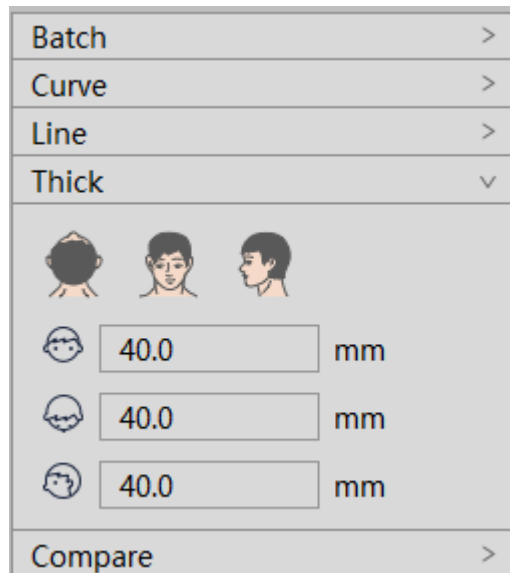
#### 4)Send Batching

➤Send to the database: Save location image and all the images produced by batching as new series and send them to the database.

➤Send to the film: Send location image and all the images produced by batching to the film plug-in.

### 4.Layer Thickness Mode

Click on the [Thick] button, the [Tab] is moved to the layer thickness mode. The panel style of the mode is as shown in figure 13-17.



**Figure 13-17 Layer Thickness Mode Panel**

### 1) Orientation setting

Click on the [Axial] button, the corresponding drawing diagram in the axial plane window will be displayed in the lower right corner window; Click on the [Coronal] button, the corresponding drawing diagram in the coronal plane window will be displayed in the lower right corner window. Click on the [Sagittal] button, the corresponding drawing diagram in the sagittal plane window will be displayed in the lower right corner window, the “Cross Section” of which is default option.

### 2) Layer Thickness Setting

The layer thickness value of the axial plane, coronal plane and sagittal plane can be separately set, and the the corresponding window images can be rendered according to the set value.

### 3) Image Location

Press down the shift button and the right mouse button in the lower right window, the window of the axial plane, coronal plane and sagittal plane can be positioned to the corresponding place by the crosshair on the three surfaces of the axial plane, coronal plane and sagittal plane.

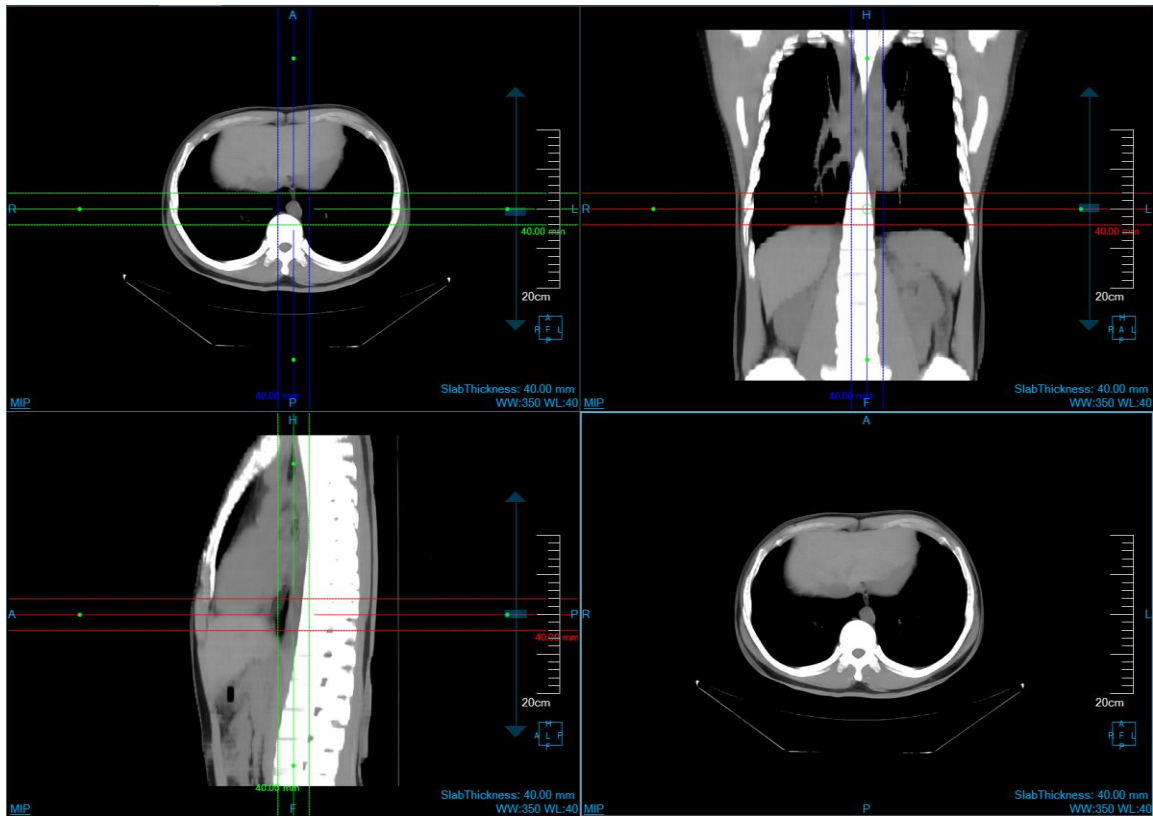


Figure 13-18 MIP Drawing Diagram of the Coronal Plane

### 5.Layer Compare Mode

Click on the [Compare] button, the [Tab] is moved to the layer thickness mode. The panel style of the mode is as shown in figure 13-19. This mode is used to compare and browse multiple series. Up to four series comparisons are supported.

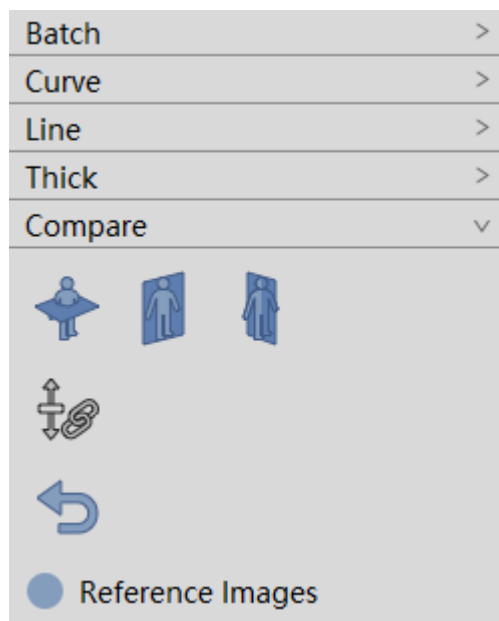


Figure 13-19 Layer Compare Mode Panel



1) Orientation setting

Click on the [Axial] button, the image orientation of all comparison windows is set to axial. Click on the [Coronal] button, the image orientation of all comparison windows is set to coronal. Click on the [Sagittal] button, the image orientation of all comparison windows is set to sagittal.

2) Link

Select the [Link] check box, all the images in the window with the current reference scroll synchronously. Uncheck the check box to scroll separately compared with the image in the window.

3) Reset to default.

All images in the comparison window return to the initial state.

4) Reference image.

If selected, the reference image will be displayed; otherwise, the reference image will not be displayed.

# Chapter 14 Setting Introduction

## 14.1 Interface Information

Set the operations of changing the system information so that it is convenient for the user to operate the software.

➤ This is used for the setting of 2D overlap Information. The patient or setting information to be needed by the doctor can be displayed on CT scanning images and all the information can be in the different positions, as shown in figure 14-1.

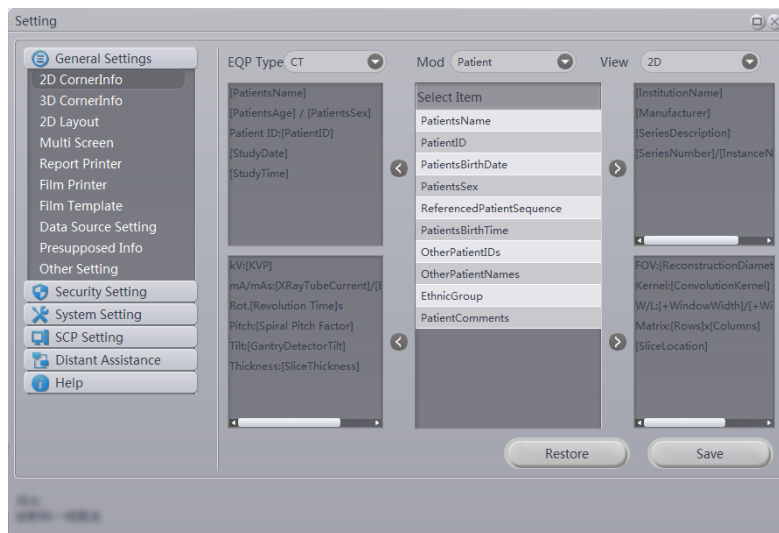


Figure 14-1 2D Setting Interface

➤ This interface is used for setting 3D overlap setting. The patient or setting information to be needed by the doctor can be displayed on CT scanning images and all the information can be in the different positions, as shown in figure 14-2.

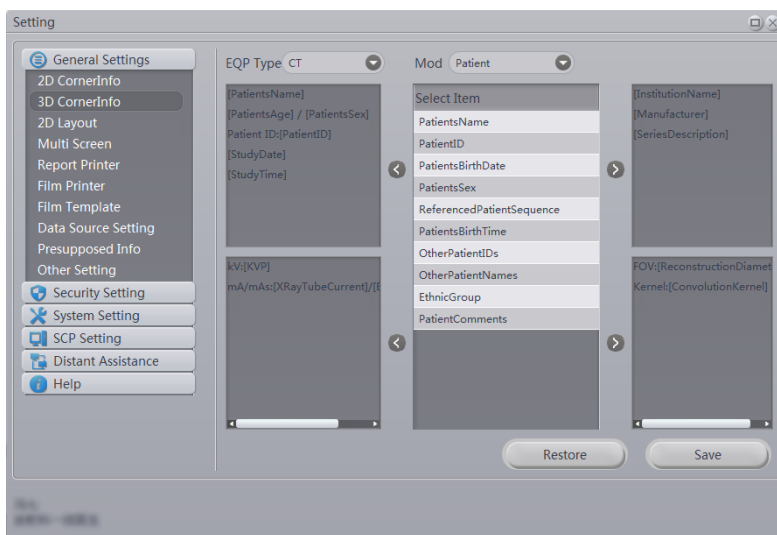


Figure 14-2 3D Setting Interface

➤ This interface is used for 2D layout setting, and can control the 2D plug-in layout, as shown in figure 14-3.

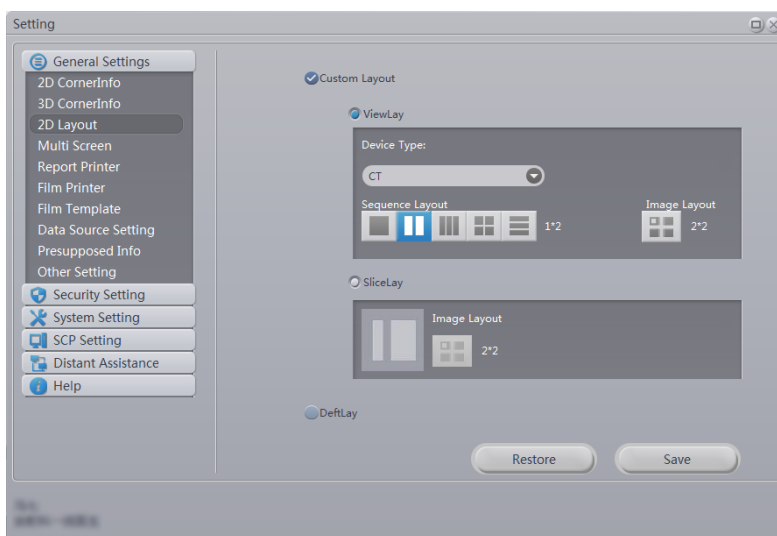


Figure 14-3 2D Interface Layout

➤ This is used for Multi-screen setting and can display different plug-ins in the different screens, as shown in figure 14-4.

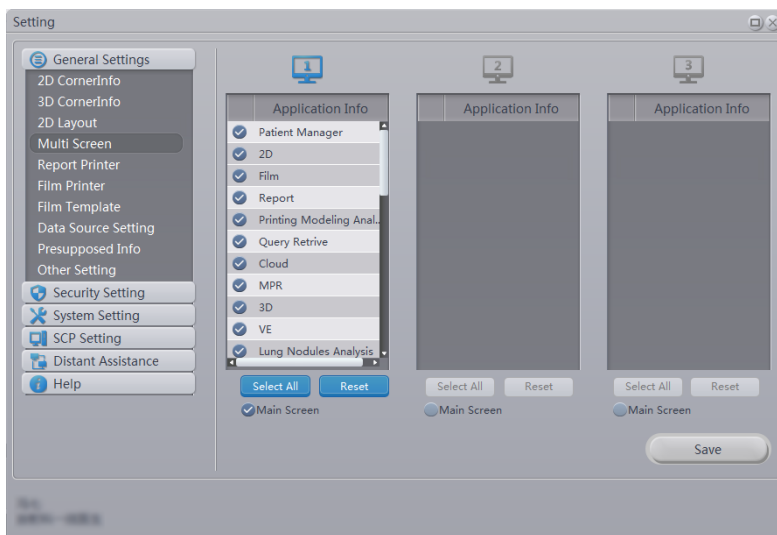


Figure 14-4 Multi-screen Interface

➤ This is used for the setting of report printer, and the system default printer can be configured, as shown in figure 14-5.

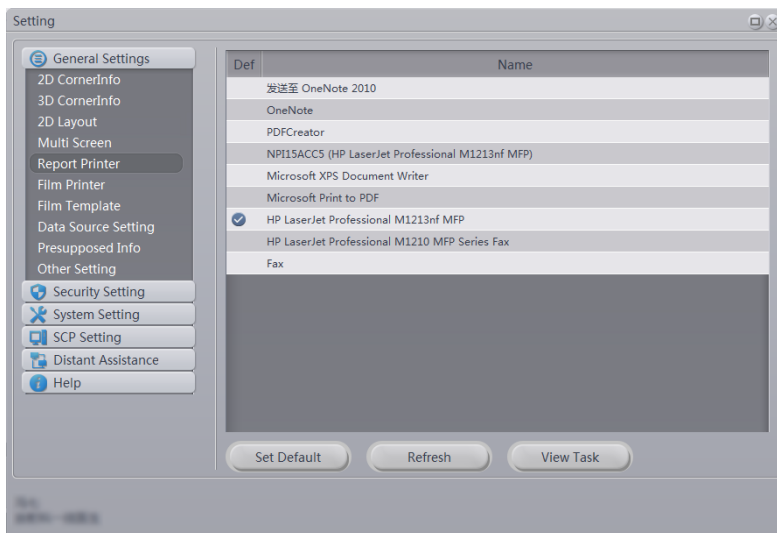


Figure 14-5 Report Printer Interface

➤ This is used for the setting of film printer and the system default printer can be configured, as shown in figure 14-6.

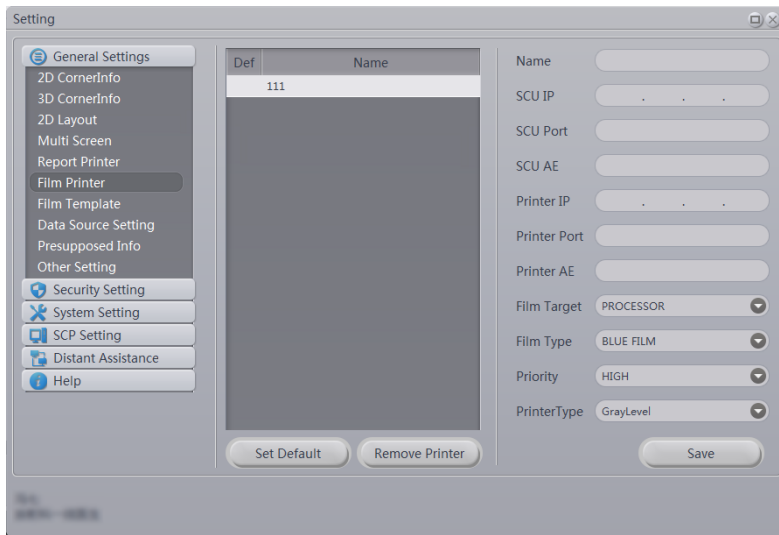
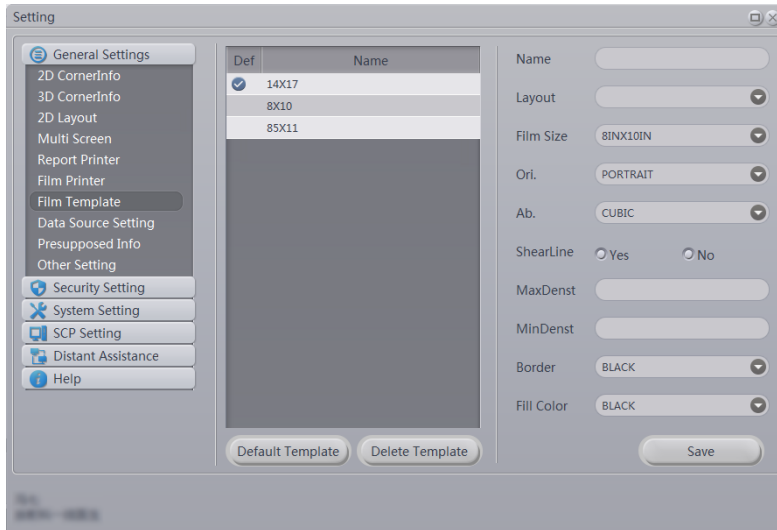


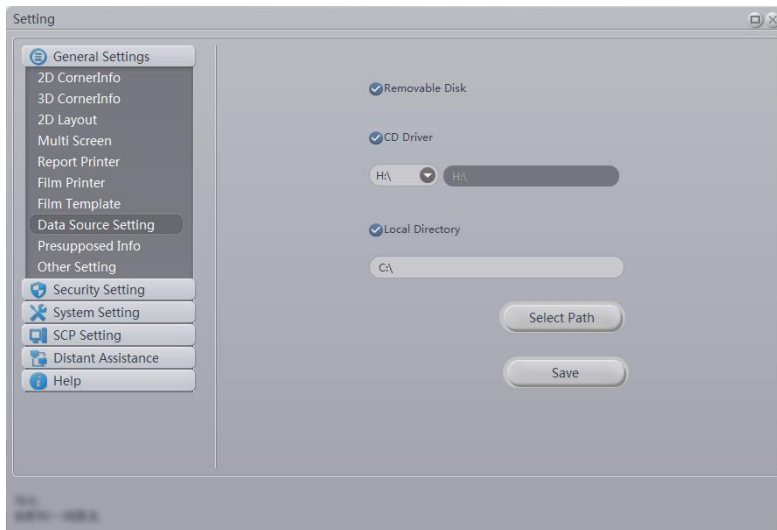
Figure 14-6 Film Printer Interface

➤ This is used for the setting of film printing template and the film template can be configured, as shown in figure 14-7.



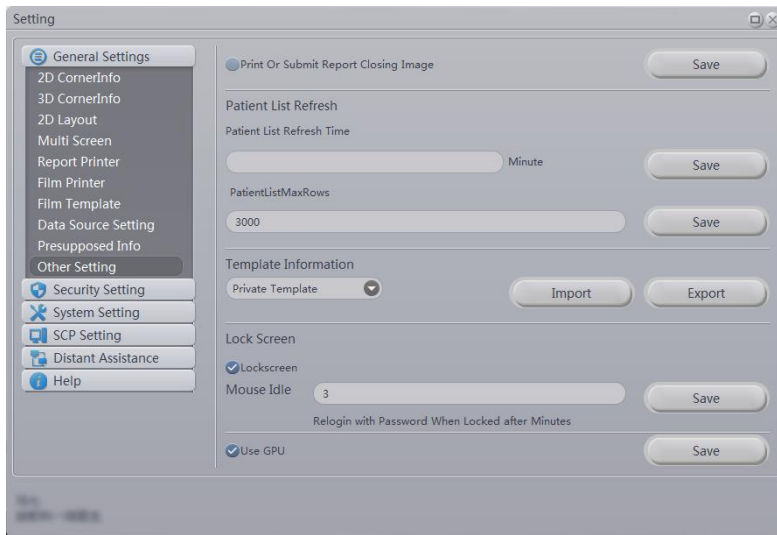
**Figure 14-7 Film Printer Template**

➤ This is used for the setting of data source and the data savings of different data source can be configured, as shown in figure 14-8.



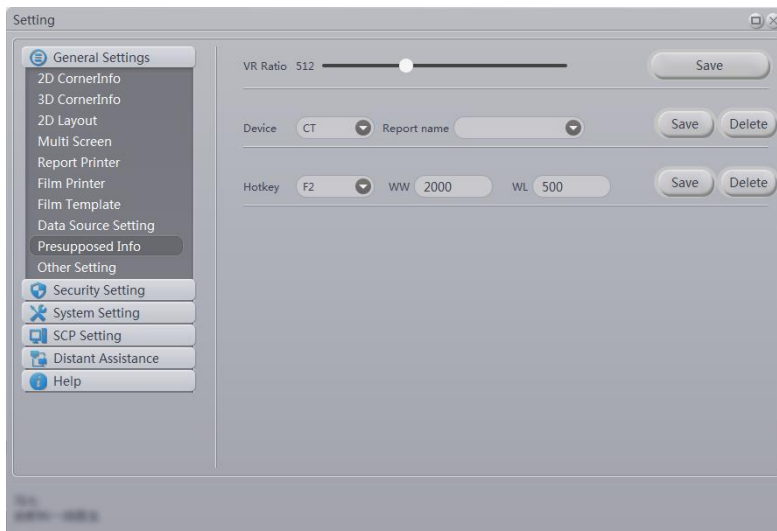
**Figure 14-8 Data Source Interface**

➤ This interface is used for other settings and can configure the information of whether to close the image of print report, refresh the list, number of list line, the prefix of image name, frequency locking, etc, as shown in figure 14-9.



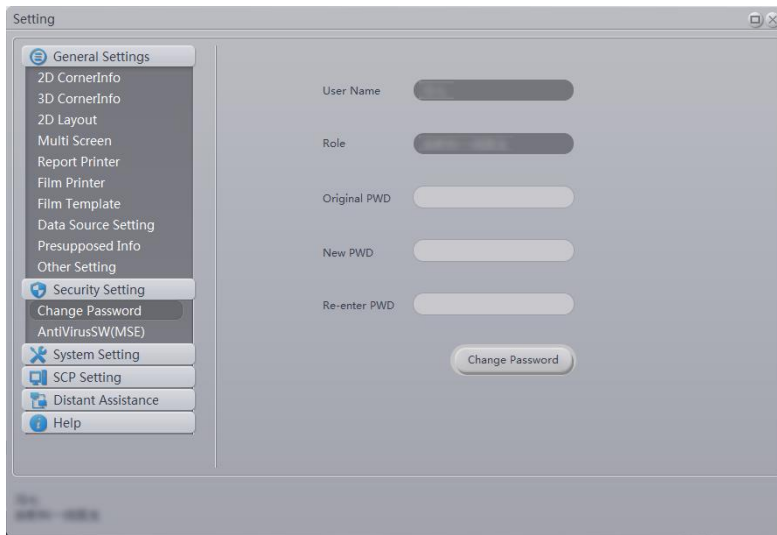
**Figure 14-9 Other Interface**

➤ This interface is used for preset setting, and can modify the image resolution, as shown in figure 14-10.



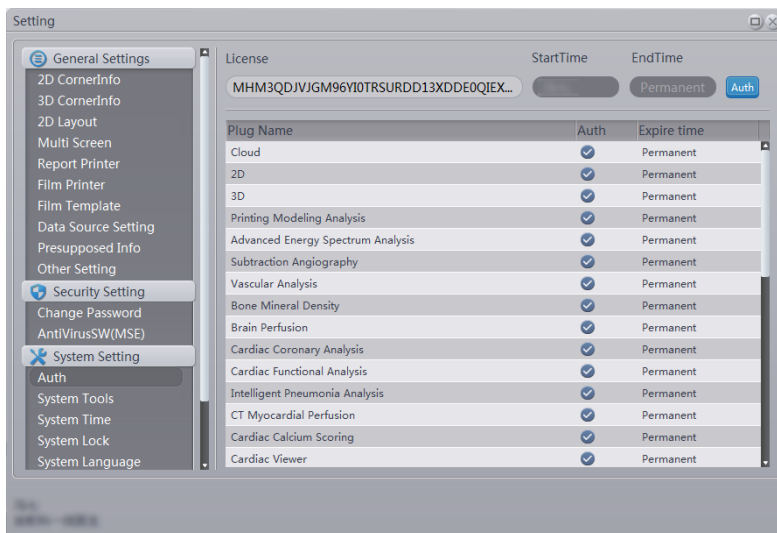
**Figure 14-10 Preset Setting Interface**

➤ This is used for the password setting, and can login user name and modify the password, as shown in figure14-11.



**Figure14-11 Password Setting Interface**

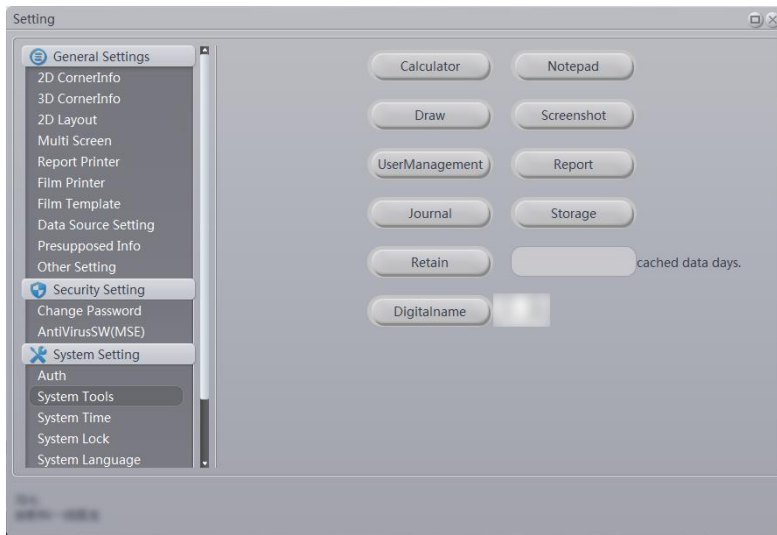
➤ This is used for the authorization setting, and can set the using time for different plug-ins, as shown in figure 14-12.



**Figure 14-12 Authorization Setting Interface**

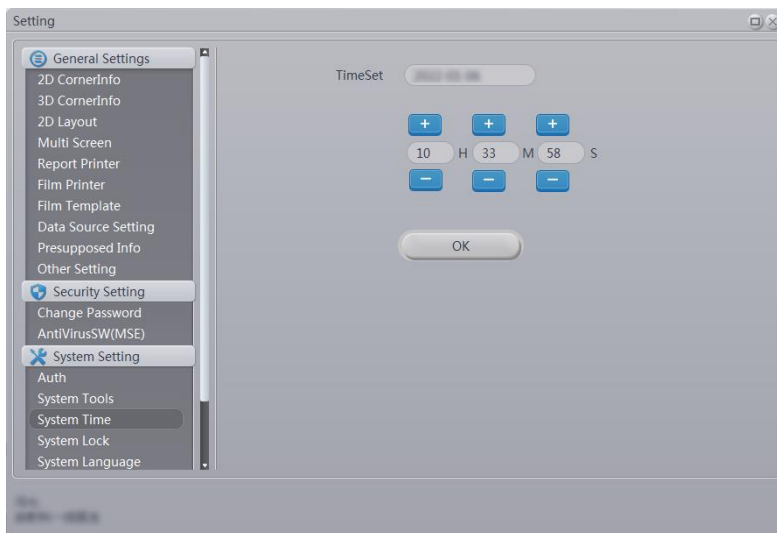
➤ This is used for the system tool setting, and can use system tools for the operations of screenshot, calculation, saving and drawing, etc. Cloud doctor version can save the cloud data at the local time setting, as shown in figure 14-13.





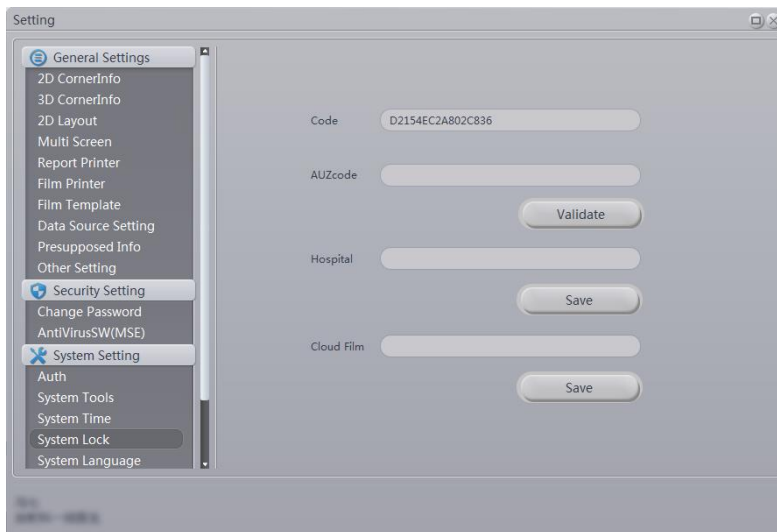
**Figure14-13 System Tool Interface**

➤ This is used for the system time setting, and can use the system time to operate, as shown in figure 14-14.



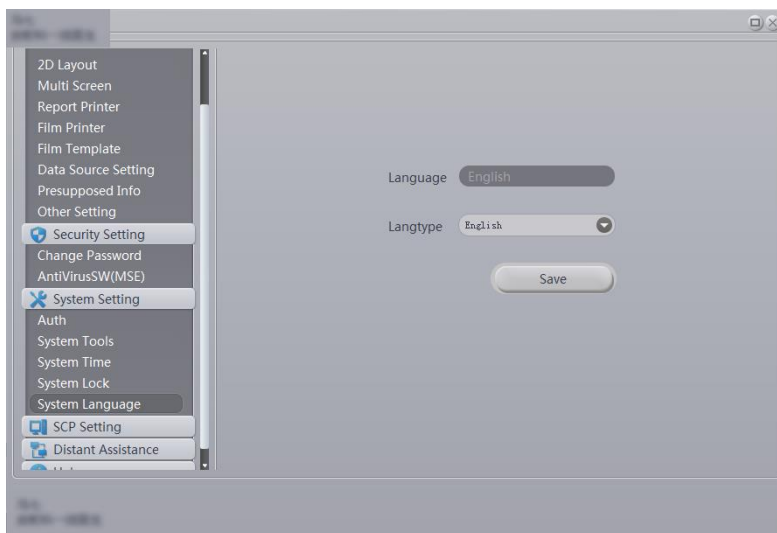
**Figure14-14 System Time Interface**

This interface is used for the setting of system locking and cloud hospital account number, as shown in figure 14-15.



**Figure 14-15 System Locking Interface**

This interface is used for the setting of system language , as shown in figure14-16.



**Figure 14-16 System Language Interface**

This interface is used for the setting of SCP storage, SCP query , and can configure the SCP data path, as shown in figure14-17, 14-18, 14-19.

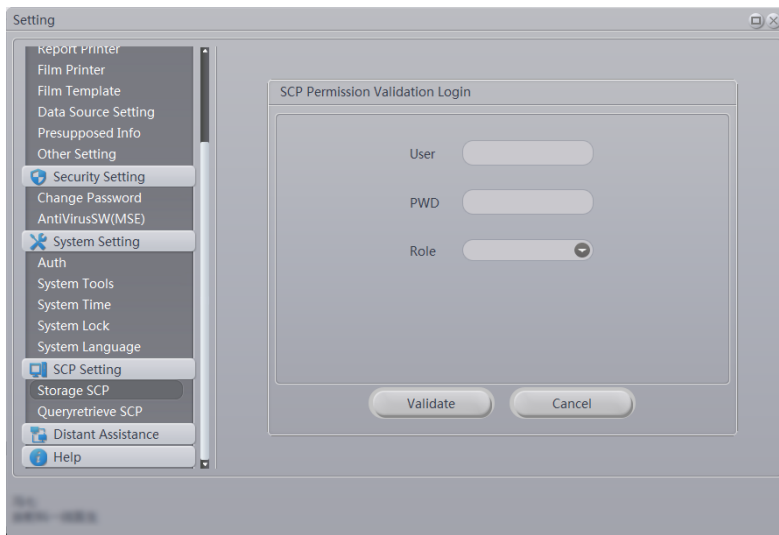


Figure 14-17 SCP Login Interface

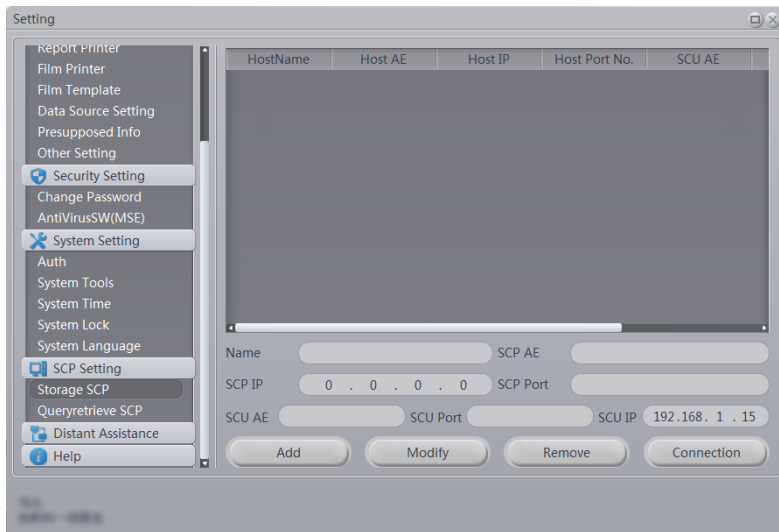


Figure14-18 SCP Storage Interface

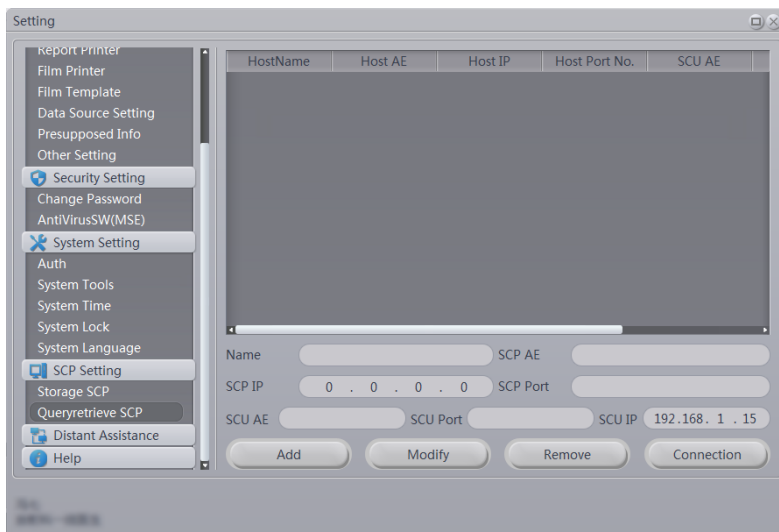
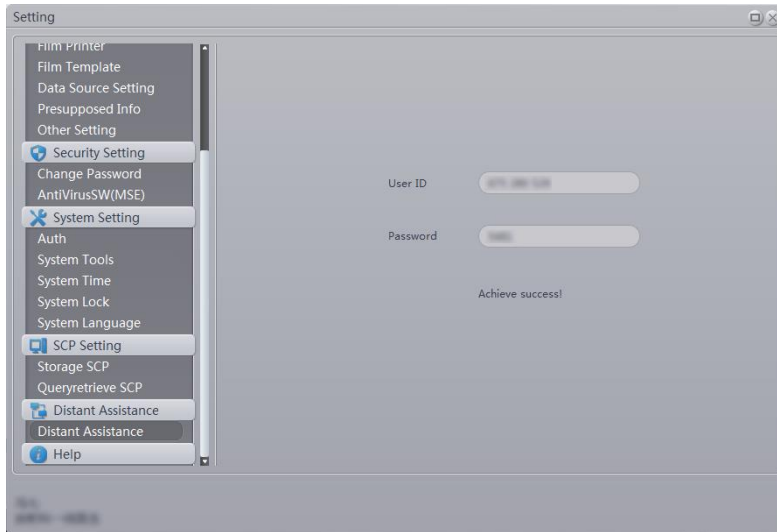


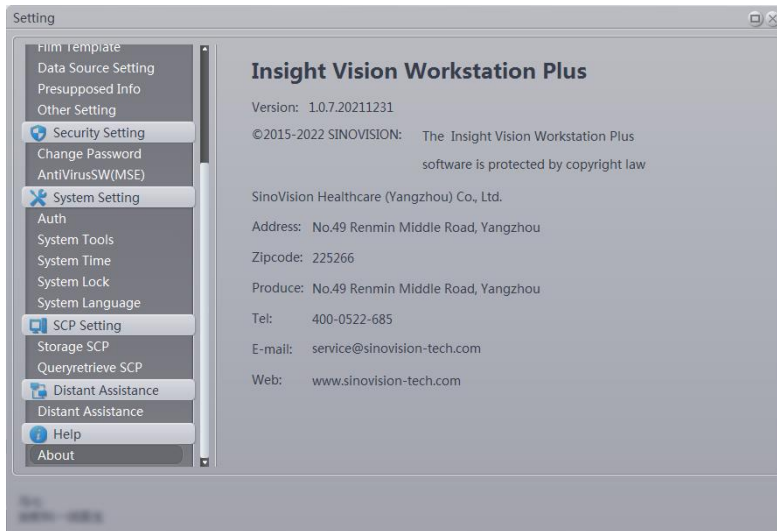
Figure 14-19 SCP Query Interface

➤ This is used for the setting of the remote assistance and the server remote operation configuration, as shown in figure 14-20.



**Figure 14-20 Remote Assistance Interface**

This is used for “About Setting”, as shown in figure 14-21.



**14-21 About Setting Interface**

## Chapter 15 Virtual Endoscope

Virtual Endoscopy (VE) plug-in creates 3D model based on the video data loaded by patient management. VE is used to display the cavity and anatomical mode image within 3D volume and achieve the flight roaming function within the cavity.

### 15.1 Start

VE plug-in, as a system function plug-in, is deployed in the advanced application module. There are two ways to start VE plug-in: First, click on the [Advanced Application] button in the system function switch panel to switch to the advanced application module, as shown in figure 15-1.

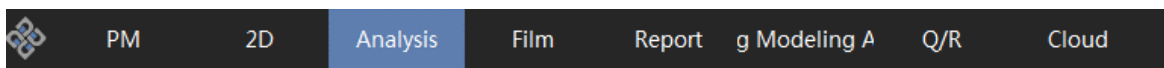


Figure 15-1 System Function Switch Panel

Click on the [2D] button in the patient management panel, click on the [VE] plug-in button in the pop-up menu and then switch to VE plug-in, as shown in figure 15-2.

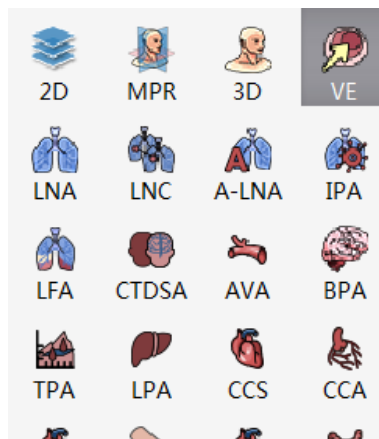


Figure 15-2 Shortcut Start Interface

### 15.2 The Description of VE Operation Interface

As shown in figure 15-3, VE operation interface has two parts: function operation panel area and view area:

- A: Function operation panel: provide the way and general tool of operating image display window and the setting of the attributes of the image display.
- B: View area: display the MPR section of the axial plane, etc. of the image data and VE image within the 3D

volume, and achieve the different image display requirements by adjusting layout, locating mode and roaming way. MPR and VE windows both support the general right-button menu function.

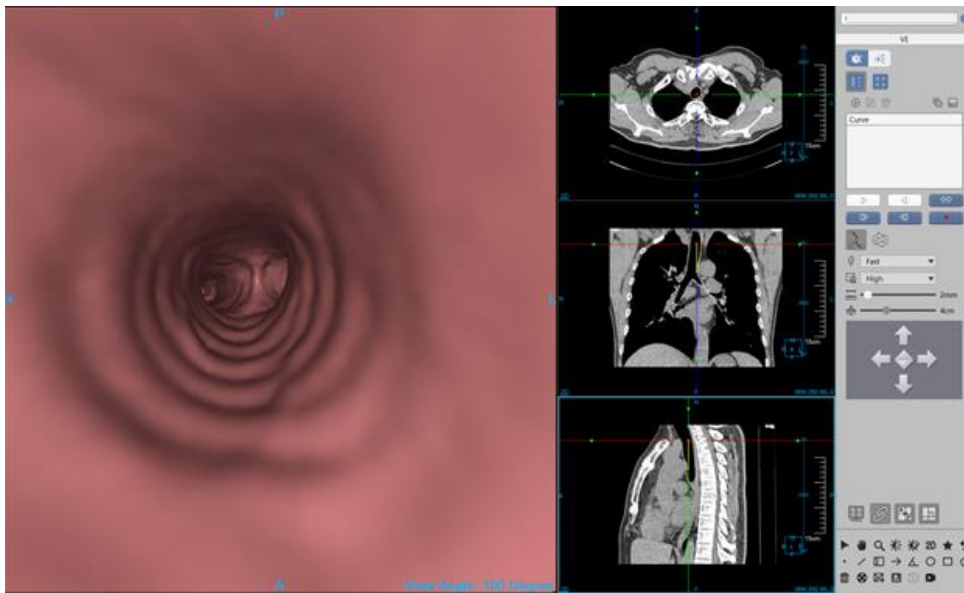


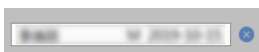
Figure15-3 VE Operation Interface

### 15.3 Control Panel

VE operation panel is made up of general tool and VE tool.

#### 1.General tool

##### 1)Patient Information



Click on the [patient information]button, the system will pop up A [patient list] and B [series list] corresponding to the selected patients. After switching the patient, the series list will also be switched, as shown in figure 15-4.

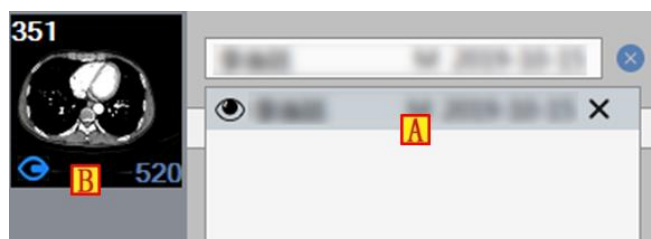



Figure 15-4 Patient Information List

##### 14)General operation



➤Default 

Function description: Click on the button to restore to the default mouse operation. The default operation of the mouse in MPR window is the adjusting layer function and roaming function in VE window.

Operation mode: adjusting layer: after pressing down the left mouse button, move the mouse up and down to realize the forward and backward function of the current display surface (The mouse wheel rolling up and down can also realize the adjust layer function of the activated window); roaming function, press down the left mouse button in VE window and after moving the mouse, the system can roam forward from all directions.

➤Translation 

Function description: MPR and VE images can be moved to an appropriate position suitable for observation by translation.

Operation mode: Click on the translation button in the operation panel, and press down the mouse moving it in any window. The image in the current window will move with the mouse.

➤Zooming Operation 

Function description: Click on this button to zoom in or out MPR images to the size that the customer is satisfied. At this time, VE is the roaming function by default.

Operation Mode: Click on the zoom button in the operation panel, press down the mouse moving it in any image window to realize the image dynamic zoom in the current window.

➤Adjusting WW/WL or opacity 

Function description: Adjust WL in MPR window, adjust the opacity in VE window to observe the interested images more clearly.

Operation Mode: Click on the button of adjusting WW/WL on the operation panel. Press down the mouse moving it up and down, or from left to right in the image window to adjust WL or opacity.

➤Quick Browsing 

Function description: Click on the “Quick Browsing” button to browse the 2D images corresponding to the browsing series.

### 15)Preset WW and WL



Click on this button, you can find 15 WW and WL preset values provided in this function, as shown in figure 15-5. Click on the corresponding preset value in the list, the image WW and WL will be changed correspondingly.

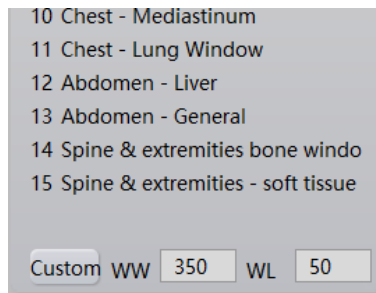


Figure 15-5 The WW/WL Preset Value

### 16)General Tool Bar



#### ➤Reset Function

Function description: Restore the image to the loaded original default state.

#### ➤Send to the Film

Function description: Send the image in the current selected window to the film.

#### ➤Send to the Report

Function description: Send the image in the current selected window to the report.

#### ➤Save

Function description: Save the image/screen to the designated position.

#### ➤Tool

Function description: Provide measurement annotation and screen recording function.



## 2.VE Tool

### 1)Positioning Mode Switch




#### ➤Volume Mode

The volume mode is the default mode. In this mode, view area is made up of VE view image (A) and MPR profile view image including: axial plane (B), coronal plane (C) and sagittal plane (D), as shown in figure 15-6. Users can know the position in profile structure. The exact linkage way is as followed:

➤Positioning Cursor inside MPR window  can provide the function of changing the viewpoint position and the direction of view angle. Move the positioning cursor in MPR window  , VE images and other MPR images can be also coordinated with it.



➤If MPR Image adjusts Layer, other MPR images and the position of positioning cursor, VE images are all coordinated with it.

➤If the roaming function inside VE window is performed, MPR window image and the position of positioning cursor  are also coordinated with it.

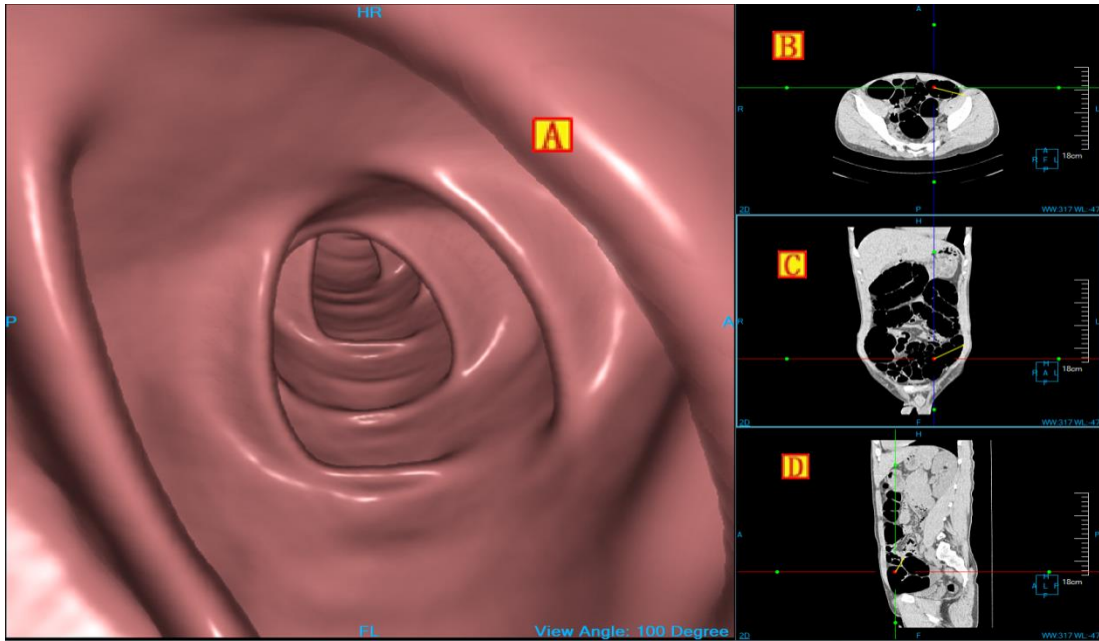





Figure15-6 Volume Mode

➤Eye Mode 


This mode is made up of VE view image (A) and MPR profile image, including axial plane (B) same as volume mode , eye pinacoidal section (C) and oblique MPR cross-sectional image (D), as shown in figure 15-7: Users in this mode can know the direction of viewing angle and observation contents.

➤The field depth of VE image is 4cm.

➤Rotate Bar: Activate and hold the rotating handle on both ends of the hollow yellow solid line in VE image. You can spin the Rotate Bar around the rotation center (centre view point). At the same time, MPR section (D) in the lower right corner will change correspondingly. This oblique MPR section is a plane vertical to the VE image along the Rotate Bar.

➤In the oblique MPR section  : The bottom of the arrow shows the position of view point. The top of the arrow shows the position that can be seen from the 4cm filed depth. The yellow transverse line shows the mapping reference line of the eye axis section (C) on the oblique MPR section (D). Translate the yellow reference line, the eye axis section (C) is also updated. The eye axis section is the plane vertical to the oblique MPR section along the reference line. The reference line is always vertical to the arrow ,  which can perform

the operations etc. of the whole translation, partial translation (reference line, the translation of separated arrow ) and integral rotation. During the translation, the images in the 4 windows of A,B,C,D are coordinated correspondingly.

➤In the eye axis section(C) ,  represents the mapping position of the view point center on the section. When the eye axis section (C) adjusts layer, the yellow reference line on the oblique MPR section (D) translates correspondingly.

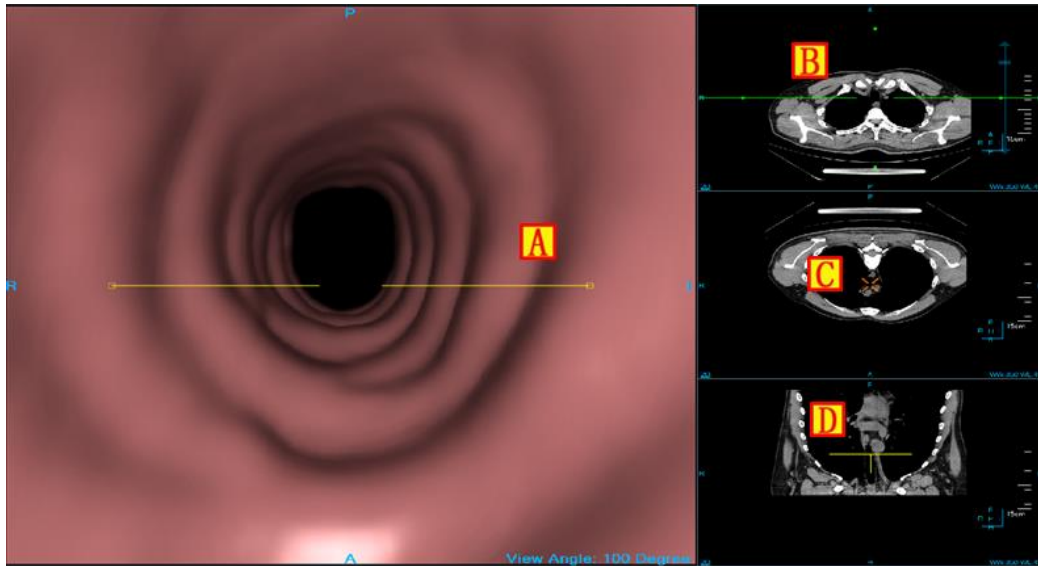


Figure15-7 Eye Mode

17)Layout Setting



Layout setting provides two kinds of page layout ways: the left button is the 3\*1 default layout; the right button is the 2\*2 layout, as shown in figure 15-8.

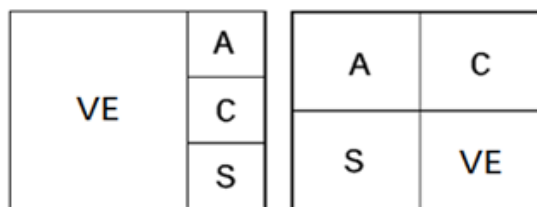
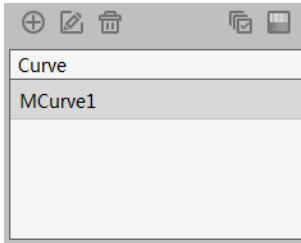



Figure 15-8 Layout Setting

## 18) Curve Function



Curve function is to define the roaming path as a curve, and then the curve can be edited and played.

➤ Create the Curve 


Function description: on any image in any window of the axial, coronal and sagittal view, click on multi points with a mouse to form a curve. Figure 15-10 shows the green smooth curve on MPR image. The position of the control point is expressed inside the white box. The control point labeled by “S” is the starting point, the control point labeled by “E” is the stop point. When the curve is created, the roaming cursor is located to the starting point of the curve. At the same time, the curve appears in the curve list. The curve can be switched in the list, and the corresponding MPR window will show the corresponding curve.


➤ Move the control point: Click on the curve to activate it in MPR window. Select any point on the curve, and drag the point to the target position.


➤ Delete the Curve 

Delete the designated curve, and the curve is deleted in MPR window and the curve list.


➤ Play the Curve


➤ The curve of playing : The curve path roams according to the located cursor arrow direction.

➤ The curve of playing backwards : The curve path roams according to the located cursor arrow reverse direction.


➤ Step forward : Step forward along the direction of viewing angle according to the designated step length.

➤ One step back : Step backward along the opposite direction according to the designated step length.

➤ Pause : Pause the roaming activity along the current curve.


➤ Turn around function : Set the located cursor arrow direction as the reverse direction.

➤ Hide and display of the curve: : Control hide and display of the curve.

➤ Loop: : After the selection, the view point can go on loop playback along the viewing angle on the curve.

➤Setting playing speed: 

The three kinds of speed of fast, middle and slow can be set according to different requirements.

➤Setting the step length of playing 

The step length shows the roaming distance of playing each step. The played step length of 1-20mm can be set according to different requirements.

➤Edit the Curve



Function description: click on the  edit button, the system pops up the following curve edit dialog box which is the model dialog box, including four parts: simulation curve path and key points; curve location cursor; function button and rolling bar. This dialog box can perform the operation of editing and playing the curve.



Figure 15-9 Curve Edit Dialog Box

➤Rename the Curve

➤ 

Change the naming of the curve. After entering the new name, enter or click the [Save ] button to save the new name.


➤Rename the Key Point

Click the right mouse button on the key point, the system will pop up the menu of renaming control point. Click on the menu, the system will pop up renaming the dialog box and you can modify the name of the control point in the dialog box.

➤Location function:

Relocating the view point. Click on the location cursor  with the mouse and slide along the straight line,


and it can be located to any position on the curve, or double click the mouse on any position on the curve. At this point, the view point is changed correspondingly and the corresponding Endo and MPR images update synchronously.

➤Zoom in :

Zoom in the whole curve. A progress bar appears on the left side of the dialog box. This function is used to solve the problem that the key points in the curve are too dense to be located and of inserting or deleting key points.

➤Zoom out Function :

It retracts the zoomed in image with equal proportion.

➤Insert key points :

The mouse drags the located cursor to the designated position within the path and click on the [Insert] button, the point is inserted into the curve as a key point.

➤Delete Key Points :

Locate the cursor to the designated position of key points, or double click the mouse on the designated the key point. At this point, the key point is activated and marked blue. Click on the [Delete] button, the key point is deleted.




➤Hide the Curve :





The curve can be hidden.

➤Display Curve :

Display the hidden curve.

➤Play the Curve:

Control the view point in the curve to play in series , play backwards , pause , which is the same as the outside curve play function.

➤Position setting function: The function of up , down , left , right . Adjust the viewing angle after the view point is located.

➤Step Length Adjustment: Set to play the step length, which is the same as the outside length setting.

## 19)Record Roaming

Function description: after clicking on the  button, start the function of roaming record. The manual

roaming in MPR or endoscopic window will be performed. Click on the button again when the roaming is over. The manual roaming path has been recorded and saved in the curve list.

20) Opacity Adjustment Function




Click on the  panel, the protocol list of the well defined colon and vessel opacity will pop up, as shown in figure 15-10.



Figure 15-10 Opacity List

➤Switch the Opacity: double click on the icon of opacity to switch the opacity.

➤Create, Edit the Opacity

Click on the [Create]  and [Edit]  buttons, the corresponding dialog box of [Create]/[Edit] will pop up. As shown in figure 15-11: the system will create or edit the opacity.

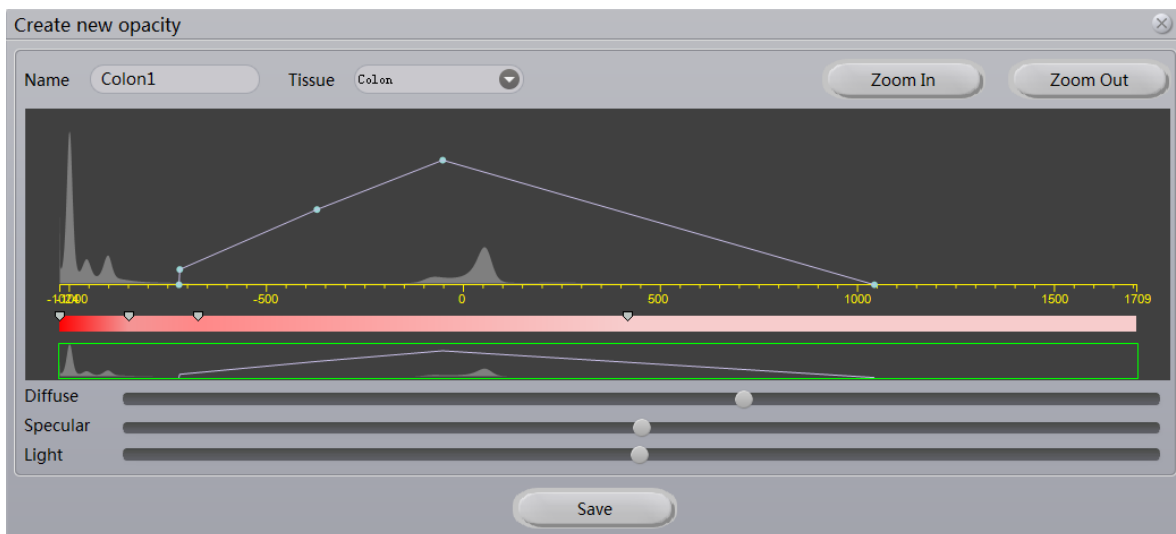




Figure 15-11 Create New Opacity Dialog Box

➤Delete Opacity

Click on the [Delete]  button to delete the customized opacity in the opacity list.

➤Automatic Switch of the Opacity

Move the position of the view point, and the system can automatically switch the colon and vessel opacity model according to CT value.

21)Batching Tools :

Function Description: Select the curve, and click on the [Batch] button. The system will pop up the batching dialog box. Set the images of start, end, numbers of image and the gap between images to create the batching.

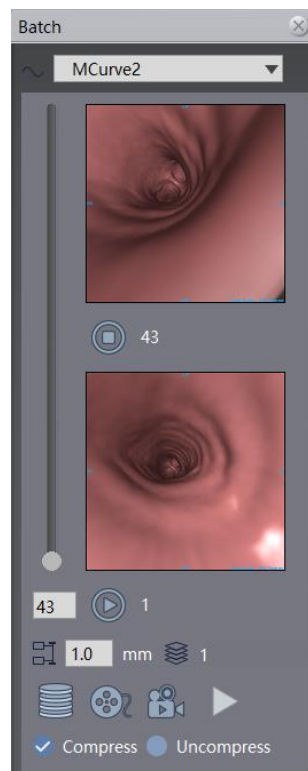





Figure 15-12 Batching Dialog Box

➤Locating function: Slide the circular cursor on the sliding bar of the left side to be located to the designated position and the corresponding image of the current position will appear in the lower part of the position.


➤Set start and end position: use the mouse to slide the circular cursor on the sliding bar of the left side to be located to the designated position and click on the  or  button to set start and end position. The corresponding image will appear.

➤Set the Batch Gap:  1.0 mm


The default is 1.0mm. After modifying the gap value, the image corresponding. Index in the beginning and end position will change accordingly.

➤ Save the series to database  :

The corresponding images which are batched from the beginning to the end are saved as series and sent to the database.

➤ Send to the Film  :

Send the corresponding images which are batched from the beginning to the end to the film.


➤ Save as movie  :

Save the corresponding images which are batched from the beginning to the end as Movie with the format of Avi, among which compressed mode or uncompressed mode can be selected to finish the Movie.

➤ Play Movie  :

Play the recorded Movie.

## 22) The Adjustment of viewing angle

Click on the general tool  button, and hold down the left mouse button to slide up and down in the inner endoscope window to adjust the viewing angle range.

## 23) Imaging Quality Adjustment High :

High, medium, low levels can be set to adjust the imaging quality.

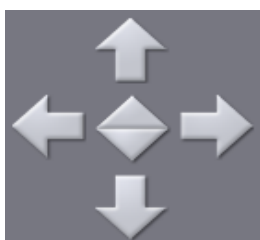
## 24) Setting depth of field 4cm :

Setting depth of field can be used in eye mode, and its value is from 1 to 10cm. Default value is 4 cm.

## 25) Roaming Navigation Function


There are two kinds of roaming navigation ways: panel navigation function and keyboard navigation function. These two navigation ways can coordinate the mouse to roam more flexibly in the VE window.


➤ Panel Navigation: The same as the location setting function in the curve editing dialog box.








➤ Forward : Forward in the direction of the view point vertical to VE image.

➤ Backward : Backward in the direction of the view point vertical to VE image.

➤ Upward swing : Keep rising in the direction of the image within VE window vertical to VE window.

➤ Downward swing : Keep coming down in the direction of the image within VE window vertical to VE window.

➤ Levo-rotate : Keep spinning left in the direction of the image within VE window vertical to VE window.

➤ Dextro-rotate : Keep spinning right in the direction of the image within VE window vertical to VE window.

#### ➤ Keyboard Navigation

➤ Direction keyboard “↑” key: Forward in the direction of the view point vertical to VE view.

➤ Direction keyboard “↓” key: Backward in the direction of the view point vertical to VE view.


➤ Direction keyboard “←” key: Move left in the direction of the view point vertical to VE view.


➤ Direction keyboard “→” key: Move right in the direction of the view point vertical to VE view.


➤ PageUp key: Move above in the direction of the view point vertical to VE view.


➤ PageDown key: Move down in the direction of the view point vertical to VE view.

#### 26) Control Display

➤  Overlay Information Checkbox: when it is selected, the window will display the overlay information; when it is not selected, it will not display the overlay information.

➤  Linkage checkbox: when it is selected, the synchronous linkage of the three MPR window zooming and WL adjusting will be performed. Otherwise, the aboved linkage will not be performed.

➤  Crosshair checkbox: when it is selected, the overlay information on the Axial, Coronal and Sagittal window will be displayed; Otherwise, the crosshair information will not be displayed.

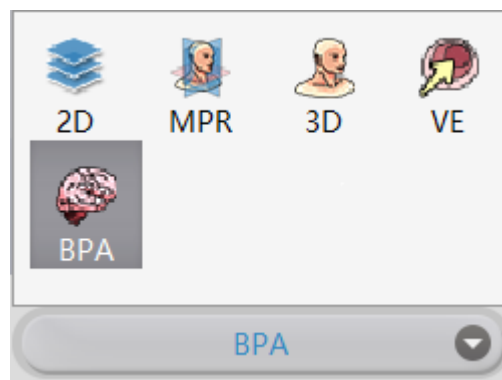
➤  Orthogonal checkbox: Set whether the crosshairs are orthogonal. If selected, the crosshairs are orthogonal.

## Chapter 16 Brain Perfusion Analysis (Option)

The plug-in of brain perfusion analysis (BPA) plug-in is a brain CT image study based on the same layer or multi layers which are injected with contrast agent. Through the analysis of cerebral perfusion image, the severity degree of the patient cerebral stroke can be evaluated to achieve the aim of assisting the diagnosis of disease.

### 16.1 Start

In the patient management list, select one or more brain perfusion studies. Select “Brain Perfusion Analysis” in the plug-in list and enter into the plug-in.



**Figure 16-1 System Function Switch Panel**

BPA is mainly divided into three stages: image optimization, vascular definition, perfusion analysis.

### 16.2 Image Optimization

Image optimization is mainly a series of preprocessing operations on images to prepare data for the subsequent calculation and analysis, which mainly include image correction, series editing, series playing and tissue extraction.

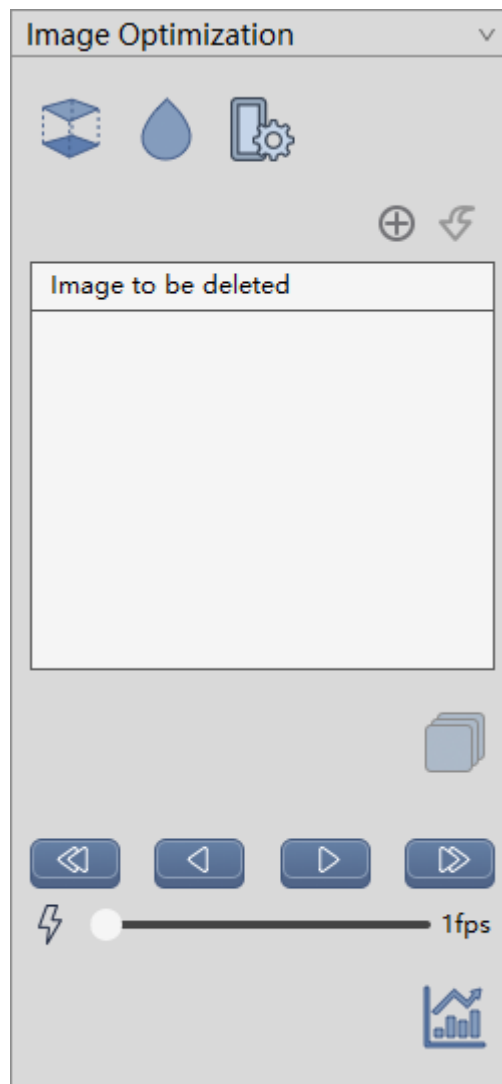


Figure 16-2 Image Optimization Panel

## 1. Image Correction

- Registration: Correct the head movement during the scanning.
- Image Smoothing: Operate the image smoothing.
- Setting Parameter : Set the ways and times of image smoothing.

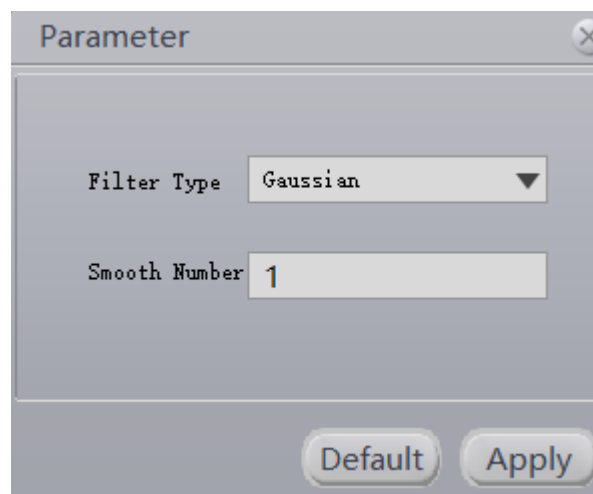


Figure 16-3 Parameter Setting

## 2.Series Editing

- Image Deletion: Delete any one of the image series and mark it.
- Undo Deletion: Undo the delete operation.
- Generate series: Regenerate new image series according to the deleted images.

## 3.Series Playing

- One Step Back: Switch to the previous image display.
- Reverse Play: Play the image in reverse.
- Playing: Play the image in turn.
- One Step Forward: Switch to the following image display.
- Setting Play Speed: Set the playing speed.

## 4.Tissue Extraction

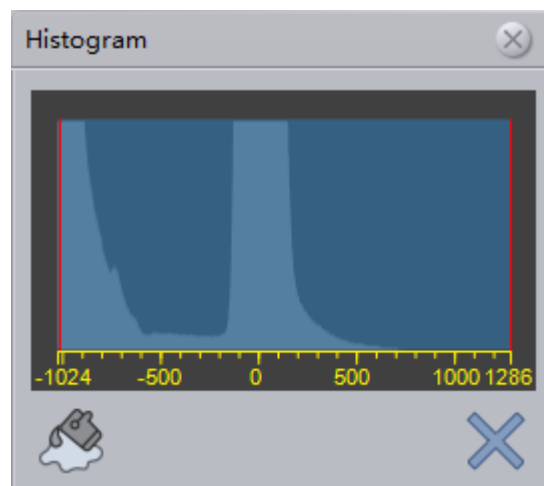


Figure 16-4 Grayscale Histogram

- Brain tissue extraction: Remove the skull according to the scope of the selected histogram;
- Close the Histogram: Close the Histogram;

## 16.3 Vascular Definition

After completing the image optimization, click Vascular Definition to enter vascular definition stage, where the arteries and veins are selected manually on the image and the time period of perfusion is defined to complete the calculation of the perfusion parameters.

Vascular definition panel is shown in the figure below and its main functions are as followed:

➤ Artery Definition (red icon): On the image, manually delineate the artery area and generate the time density curve of the artery.

➤ Venous Vein Definition (blue icon): On the image, manually delineate the vein area and generate the time density curve of the artery.

➤ Time Period Definition: according to the time density curve of the generated arteries and veins, the perfusion time period is defined.

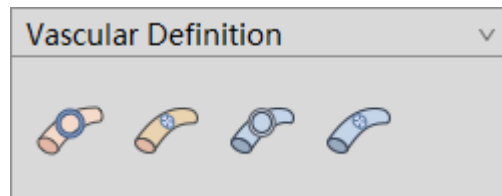


Figure 16-5 Vascular Definition Tools Panel

## 16.4 Perfusion Analysis

After click perfusion analysis, the system is automatically switched to the perfusion analysis phase. The perfusion analysis is mainly about the quantitative analysis for the calculated perfusion parameter image in ROI tissue area and the low perfusion area statistics. And the related measurement indexes are calculated.

### 1. Perfusion Analysis Panel

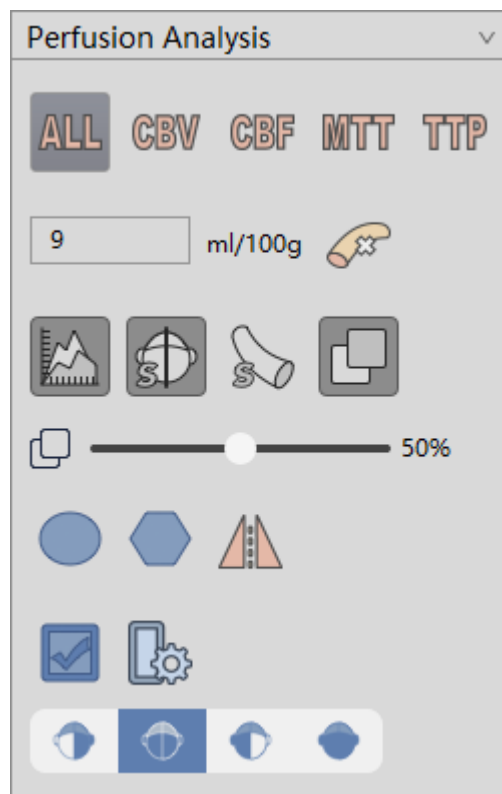


Figure 16-6 Perfusion Analysis Tools Panel

The following functions are mainly included in the perfusion analysis tools panel:

- Layout of the perfusion parameter graph: A single or all the perfusion parameter map is shown separately.
- Vessel Removal: Remove the vessel area according to the specific threshold value;
- TDC Curve Display: Whether the artery/vein time density curve in ROI time density curve image will be displayed;
- Vessel Area Display: Whether the vessel area in the original image view will be displayed;
- Center line Display: Whether the brain center line will be displayed;
- Automatic Calculation of Centre line: Automatically calculate brain centre line.
- ROI Area Selection: Provide two ROI choice ways of circular area and polygon area and automatically calculate the mirror area according to the brain center line. The selected area will be displayed in the original image and the perfusion parameter diagram.
- Low perfusion calculation: Automatically calculate the low perfusion area, and mark it with different colors in the original image.

## 2. Perfusion Parameter Maps

The result of the perfusion parameter map is displayed at the top right of the measurement analysis interface, as shown in the figure below, respectively containing the cerebral blood flow map (CBF), cerebral blood volume map (CBV), mean transit time (MTT) and time to peak (TTP). Any perfusion parameter map can be displayed separately in the tools panel area on the left. And you can also select to display all the perfusion parameter map.

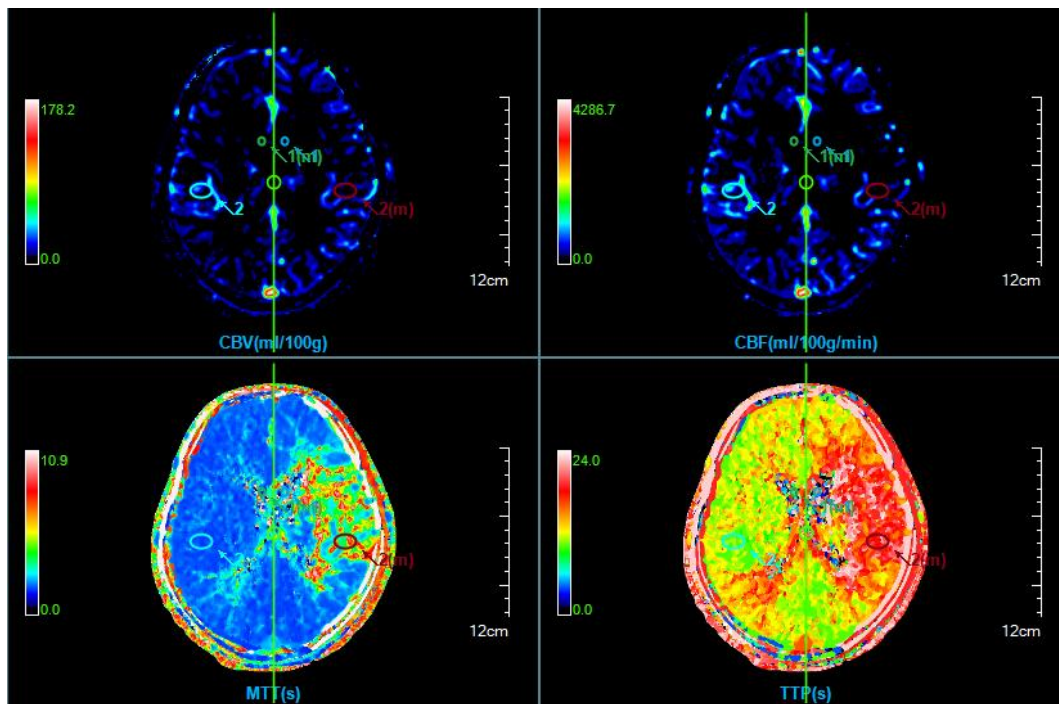


Figure 16-7 Perfusion Parameter Maps

In the perfusion parameter map window, you can double click on the pseudo color bar to replace the pseudo color of the current perfusion parameter map.

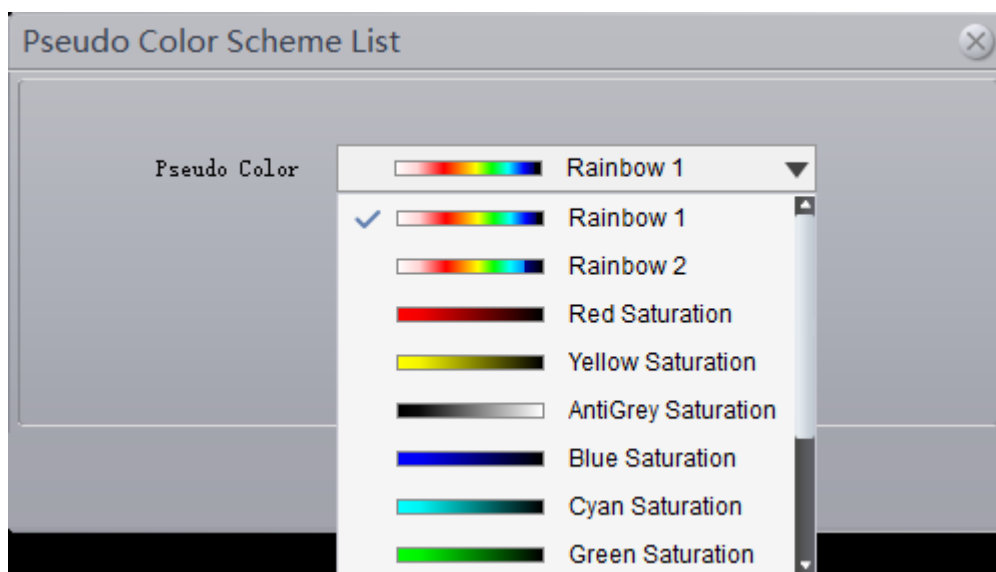


Figure 16-8 Pseudo Color Coding

### 3.ROI Time Density Curve Graph

The ROI time density curve is located at the bottom left of the measurement analysis interface, as shown in the figure below, which can draw arteries and veins of blood vessels or you can manually delineate the time density curve in the ROI area. And the image density can be measured at different time points.

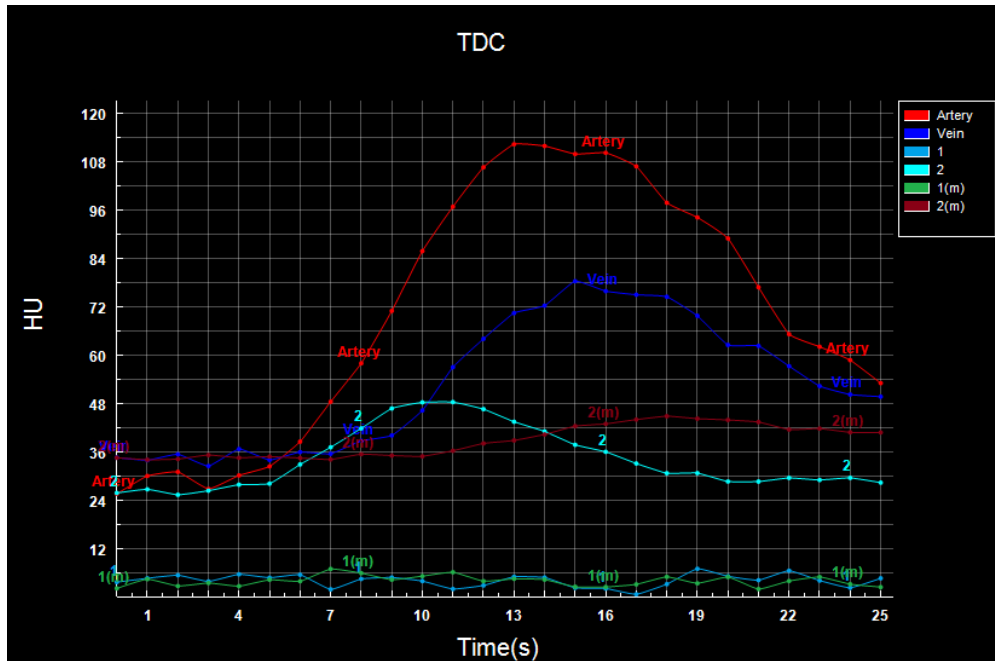


Figure 16-9 ROI Area Time Density Curve Graph

#### 4.ROI Analysis Statistics Table

The ROI statistics analysis table is located at the bottom right of the measurement analysis interface to show the average value of all the perfusion parameters of the organization's ROI, including cerebral blood flow (ml / 100g/min), cerebral blood volume (ml / 100g), average transit time (s), and time to peak (s).

ROI Statistics Table				
ROI#	CBV (ml/100g)	CBF (ml/100g/min)	MTT (s)	TTP (s)
1	2.14 ± 1.11	40.07 ± 22.07	4.35 ± 2.53	16.26 ± 4.75
1 (m)	0.47 ± 0.50	13.45 ± 14.66	4.48 ± 3.92	13.35 ± 6.85
2	14.62 ± 10.20	493.01 ± 342.23	1.78 ± 0.08	10.50 ± 0.60
2 (m)	6.77 ± 4.29	103.69 ± 87.38	5.17 ± 2.02	18.78 ± 1.64

Figure 16-10 ROI Statistics Table

#### 5.Low Perfusion Analysis Statistics Table

Low Perfusion Statistics Table					
Type#	MTT ↑ (mm <sup>2</sup> )	(%)	MTT ↑ CBV ↓ (mm <sup>2</sup> )	(%)	Index
LEFT	7030.94	21.83	1428.42	4.43	0.83
RIGHT	1945.14	6.04	587.08	1.82	0.77
ALL	8976.08	27.86	2015.51	6.26	0.82

Figure 16-11 Low Perfusion Analysis Statistics Table

The low perfusion analysis statistics table is also located at the bottom of the measurement analysis interface to calculate the parameter values of the low perfusion area. Here the low perfusion analysis statistics table is



divided into the left brain, right brain and the whole brain according to brain tissue area and respectively counts the low perfusion parameters about the brain tissue area of mean transit time decrease, mean transit time decrease, blood volume decrease area and their respective percentage of brain tissue, etc. And at the same time it also calculates the index of the whole low perfusion brain tissue of the mean transit time decrease.

## Chapter 17 Lung Nodule Analysis (Option)

Based on the image data loaded by the patient management, taking image series as unit, lung nodule analysis (LNA) plug-ins can perform the operations of extracting nodules through lateral lung, calculating the volume of lung nodules and describing the form of nodules, etc. And LNA plug-ins can effectively evaluate the lung nodule and generate the nodule report at last.

For the selected and designated nodule, the rebuilt nodule data with HFS direction can be formed. The information of the 3D volume of the nodule and effective diameter can be calculated automatically and can be provided effective proof for the information of the future follow-up study, the volume change rate required when the nodule is contrasted and the doubling time, etc.

### 17.1 Start

LNA plug-ins, as a function plug-in, is deployed in the advanced application module.

In Figure 17-1 browse and select [LNA] through the image of the patient information page, which can be switched to the lung nodule analysis (LNA) plug-in.

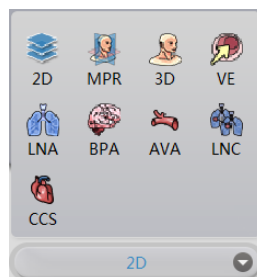


Figure 17-1 Lung Nodule Shortcut Start Panel

Click on the [LNA] button on the function switch panel in the advanced application module, which can be switched to the LNA plug-in, as shown in figure LNA.

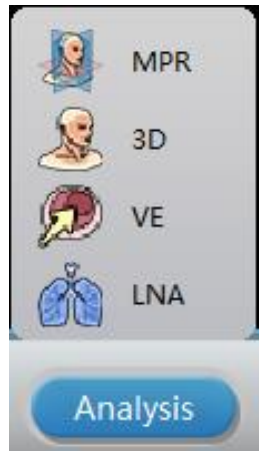


Figure 17-2 Switch Panel between Plug-ins

## 17.2 Description of Operation Interface

As shown in Figure 17-3 and Figure 17-4, the LNA operation interface mainly has two parts: view area and function operation panel area:

- A: View Area, display the MPR section of the image data: include the images of axial plane, coronal and sagittal plane; nodule locally zoomed in image, lung MIP image and the rebuilt images of nodule HFS.
- B: Function Operation Panel, provide the methods and tools of the image display window and the functions of extracting nodules, editing nodules and sending report images, etc.

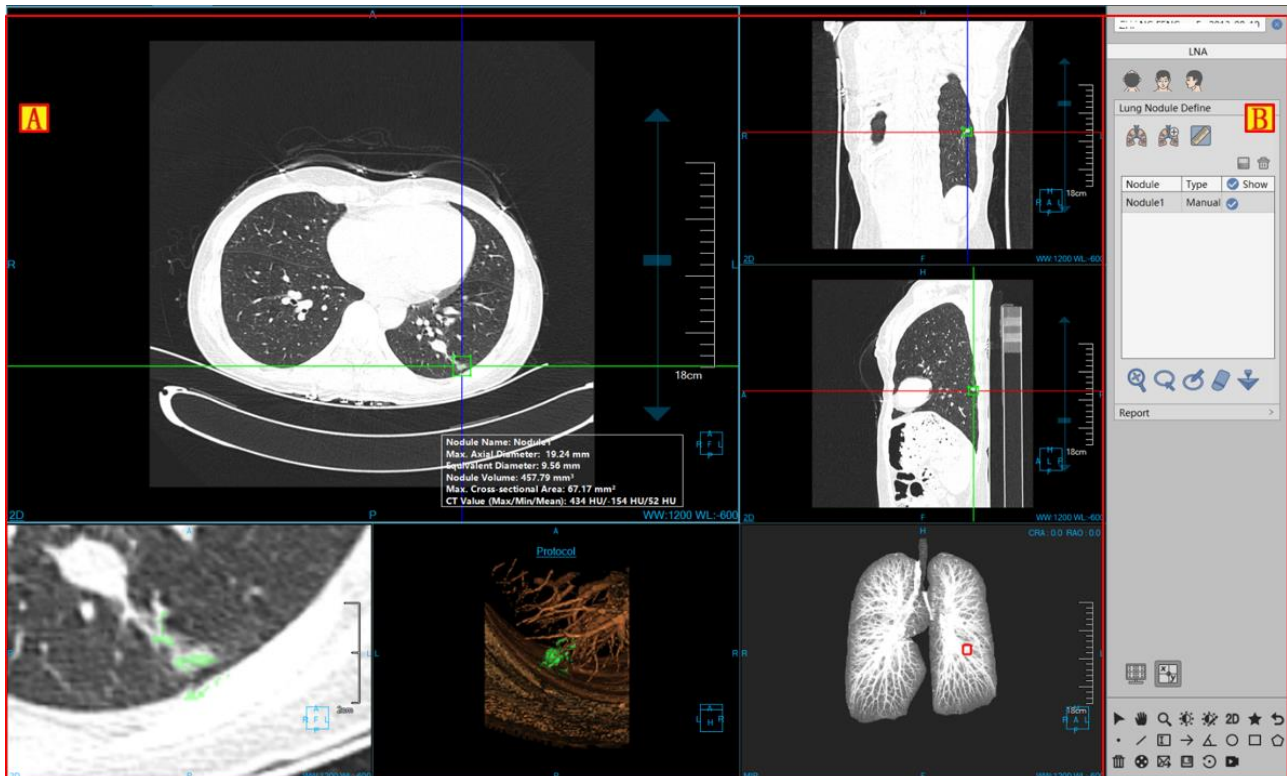


Figure 17-3 LNA Operation Interface--Extract

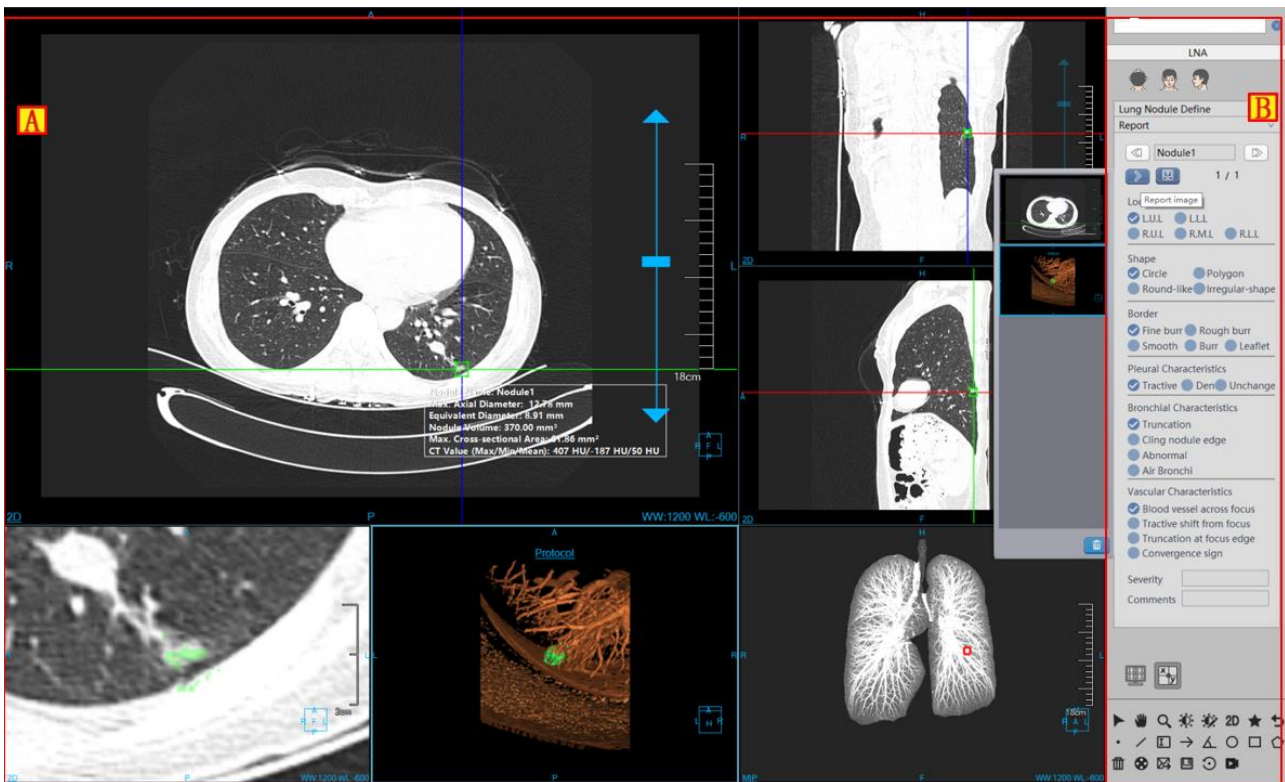


Figure 17-4 LNA Operation Interface--Edit

## 17.3 View

### 1.LNA Holistic View

The image display window implements the content output of the image display window through the combination layout of multiple basic windows, as shown in **Figure 17-5**, which displays the image with the window layout of 4\*2, Among which four basic windows are respectively: axial plane window (A), coronal plane window (B), sagittal plane window (C) and nodule locally zoomed in image (D); Two VR windows are respectively: nodular reconstruction image window (E)、lung MIP window (F); float window (G) of nodule analysis result. After you double click on any window, the window is displayed at full screen in the view area; Double click on the full-screen image again, and the view area is restored to the previous window layout of 4\*2 to display the image.

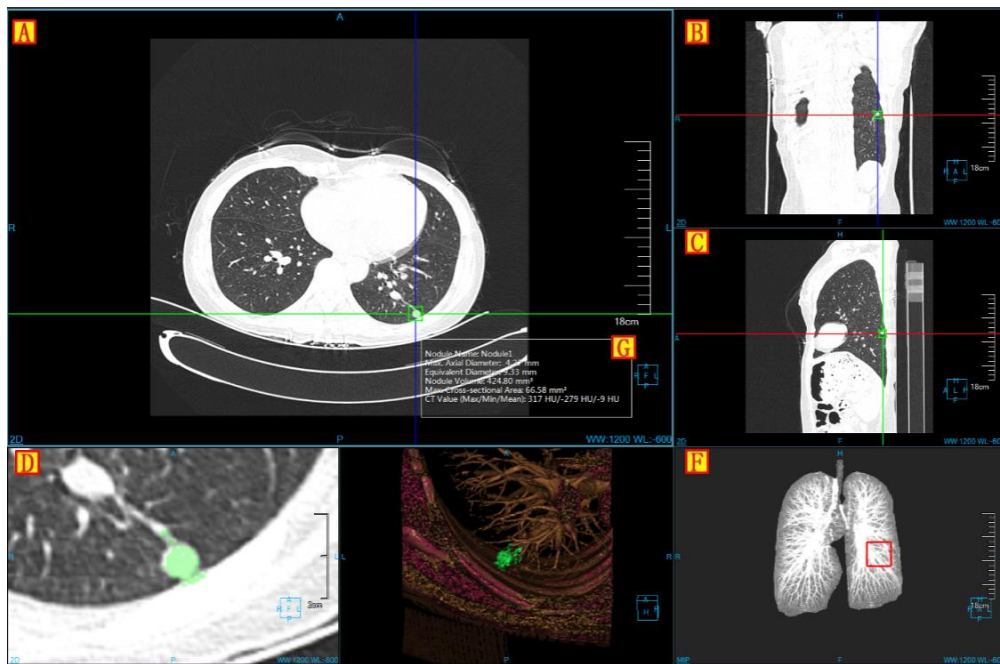


Figure 17-5 LNA View Window

## 2. Image Display View

The displayed contents that the image displays the basic window include crosshair, overlap Information, location information, display mode, ruler, location box. Nodule analysis result is shown in **Figure 17-6**.

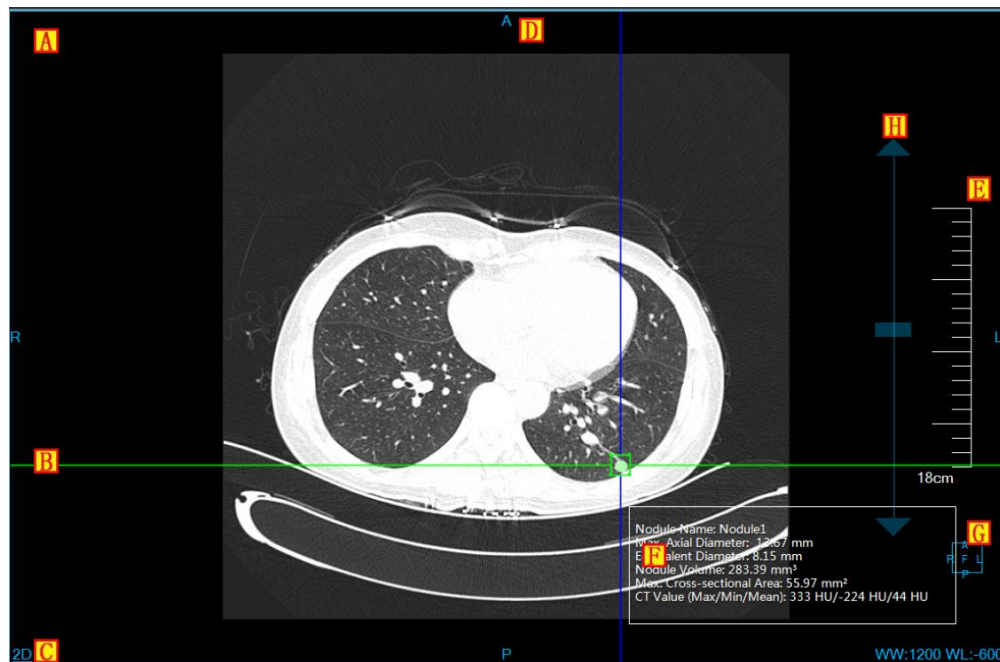


Figure 17-6 Image Display Basic Window

➤Overlap Information, display the head information, real time window width and window level of DICOM image. The information can customized display in the setting interface;

➤B: Crosshair, by moving red, green, blue crosshair, the corresponding axial plane, coronal plane, sagittal plane images can be adjusted. When zooming in the modified nodule, by dragging the four lines of the middle box,

you can adjust the size of nodule bounding box, and then extract the nodule;

➤C: Display Mode, display the display mode of the current image display window, including the contents of 2D, MIP, AIP, MinIP, etc. Click the right button on display mode text in the window, the system will pop up the display mode switch menu. Select the corresponding menu item, and the system will switch image window display mode;

➤D: Location information, synchronized with the displayed image contents, identify the current displayed image location information. The location information is displayed in the middle position of the four sides in the image display basic window in the form of character;

➤E: Ruler, output the image scale, taking the half height of the image display window as the benchmark;

➤F: Nodule Extraction Result: The information is displayed after the nodule is extracted.

➤G: Location Box, the location information box with the image synchronously adjusted;

➤H: drag the layer slider, drag the slider to the corresponding image layer;

## 17.4 Function Operation Panel

The operation panel of nodular analysis function is divided into three areas: data switching, lung nodule analysis and common function.

➤A: Data Switching, switch the image series, delete the function of study by thumbnails.

➤B: Common Function, provide the function buttons of common function operations, etc. of default operation, translation, zooming, adjusting WW/WL, restore default, etc;

➤C: Nodule Analysis Function, provide a series of function operations of processing and analyzing nodules of nodule extraction, nodule modification, nodule editing and deletion, etc.

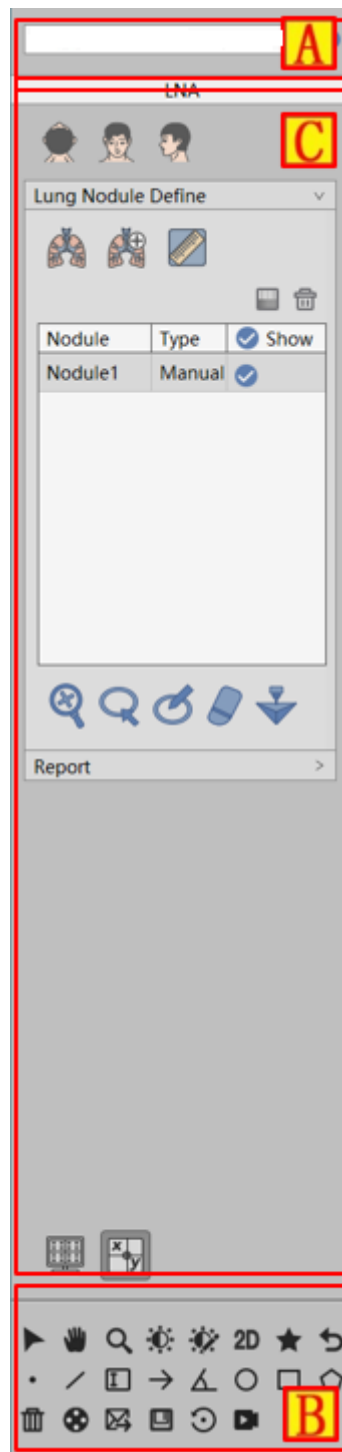


Figure 17-7 LNA Function Panel

## 1. Lung Nodule Extraction Function Panel

### 1) Image Orientation



LNA Function provides 3 default body orientation: Axial, Coronal and Sagittal. Click on the corresponding button, you can switch the window data orientation.

## 2)Extract Lung

Enter into the nodule plug-in, prompt lateral lung, and then generate lung MIP image;

On the extraction panel, click on the [manual extract lung] button and extract lung to generate the lung MIP image by drawing the closed area .

## 3)Extract Nodules

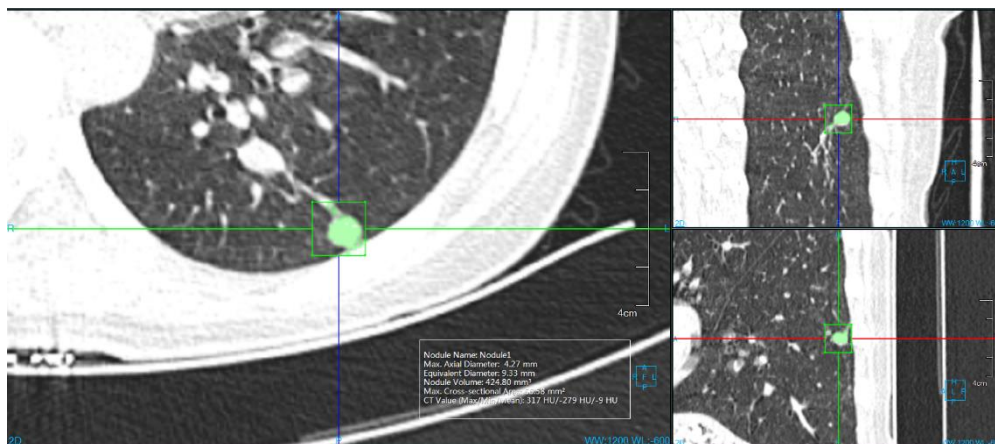


Extracting nodules can be divided into two parts: Extracting nodules for the first time and modifying nodules for the second time. Support sending to **【Printing Modeling】** .

➤The First extraction: Click on the nodule to extract it in the basic window.

➤Modifying Nodules for the Second Time: Four ways of modification are as followed: zoom in modification, contour line modification, magnetic modification and erase modification. The operations of contour line modification, magnetic modification and erase modification can be restored and undone.

**【VOIs Modification】** Zoom in the three nodule images of axial plane, coronal plane, sagittal plane and perform the second extraction of nodules by dragging the bounding box on the crosshair to adjust the size of nodules.



**Figure 17-8 Lung Nodule Zoomin Extraction Image**

**【Freehand ROIs Modification】** Modify the nodule for the second time by drawing the nodule boundary on the nodule zoomed in window.

**【Magnetic ROIs Modification】** According to the nodule boundary, change magnetism to modify the extraction of nodule for the second time on the nodule zoomed in window.

**【Erase Modification】** Erase the extracted and unnecessary tissue to modify the nodule extraction for the second time on the nodule zoomed in window.



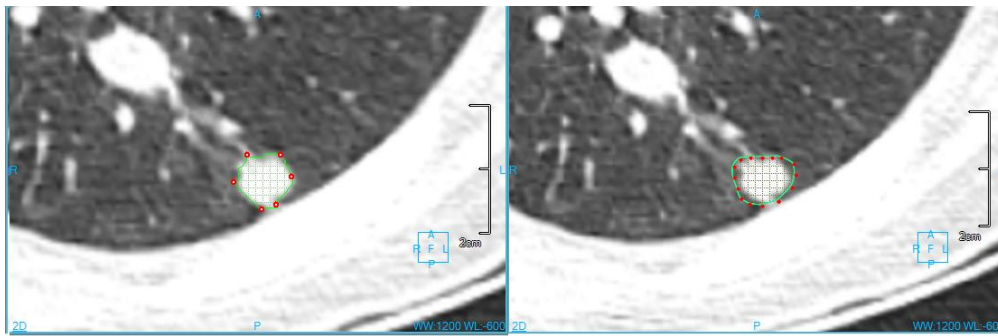


Figure 17-9 Lung Nodule Boundary & Magnetic Extraction Image

4)Nodule List

This part is to display the nodule name, type, set the visual state, set executable edit and delete operation.

Nodule	Type	<input checked="" type="checkbox"/> Show
Nodule1	Manual	<input checked="" type="checkbox"/>
Nodule2	Manual	<input checked="" type="checkbox"/>

Figure 17-10 Lung Nodule List

2.Lung Nodule Edit Function Panel

1)Edit Control Area

Lung nodule edit control area, this area can switch the nodules from the last one to the next one, edit the current name of the nodule, view, delete, add the image to the report to generate reports and then return to the extraction page.

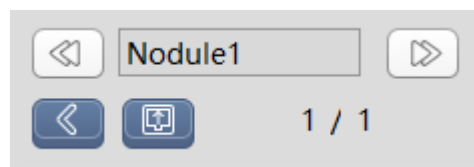


Figure 17-11 Lung Nodule Edit Control Area

- Previous: Switch to the previous nodule;
- Next: Switch to the next nodule;
- Nodule Name: Display the name of the current nodule and you can modify the name of the current

odule;

- Back: Return to the extraction interface of the lung nodule;
- Generate report: Save all the nodule information and generate reports;
- Report Images: View, delete, add the image to the report.

## 2)Nodule Edit Area

Describe a series of attributes of nodules such as form, position and boundary,etc. and then generate to the report item.

Location	
<input checked="" type="checkbox"/> L.U.L	<input type="checkbox"/> L.L.L
<input type="checkbox"/> R.U.L	<input type="checkbox"/> R.M.L <input type="checkbox"/> R.L.L
Shape	
<input checked="" type="checkbox"/> Circle	<input type="checkbox"/> Polygon
<input type="checkbox"/> Round-like	<input type="checkbox"/> Irregular-shape
Border	
<input checked="" type="checkbox"/> Fine burr	<input type="checkbox"/> Rough burr
<input type="checkbox"/> Smooth	<input type="checkbox"/> Burr <input type="checkbox"/> Leaflet
Pleural Characteristics	
<input checked="" type="checkbox"/> Tractive	<input type="checkbox"/> Den <input type="checkbox"/> Unchange
Bronchial Characteristics	
<input checked="" type="checkbox"/> Truncation	
<input type="checkbox"/> Cling nodule edge	
<input type="checkbox"/> Abnormal	
<input type="checkbox"/> Air Bronchi	
Vascular Characteristics	
<input checked="" type="checkbox"/> Blood vessel across focus	
<input type="checkbox"/> Tractive shift from focus	
<input type="checkbox"/> Truncation at focus edge	
<input type="checkbox"/> Convergence sign	
Severity	<input type="text"/>
Comments	<input type="text"/>

**Figure 17-12 Lung Nodule Edit List**

## Chapter 18 Lung Nodule Contrast (Option)

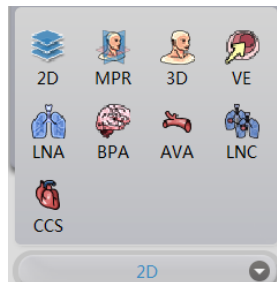
Based on the multigroup image data loaded by the patient management, taking the image series as unit, LNC plug-in can effectively evaluate the follow-up study through the operations of extracting nodule, nodule matching, describing the nodule form and calculating the volume change rate and doubling time of nodules.

For the nodules that are matched, the data of reconstructed nodules in the direction of HFS are formed, and the information of nodule volume change rate and the doubling time, etc. are calculated automatically for reference.

### 18.1 Start

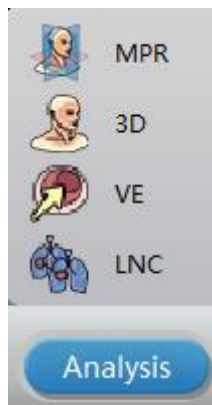
LNC plug-in as a function plug-in of the system is deployed in the advanced application module.

As shown in **Figure 18-1**, select [LNC] by the image browse in the patient information page, and then you can switch to the lung nodule contrast (LNC) plug-in.



**Figure 18-1 Lung Nodule Shortcut Start Panel**

Click on the [LNC] plug-in button on the function switch panel in the advanced application module, to switch to the lung nodule contrast (LNC) plug-in, as shown in Figure 18-2.



**Figure 18-2 Switch Panel between the Plug-ins**

## 18.2 The Description of Operation Interface

As shown in **Figure 18-3** and **Figure 18-4**, the lung nodule analysis operation interface mainly has two parts: view area and function operation panel area:

➤ **A: View Area**, display MPR section of the image data, including the images of axial plane, coronal plane and sagittal plane; locally zoomed in image of the nodule, lung MIP image and the reconstructed images of nodule HFS.

➤ **B: Function Operation Panel**, provide ways and tools of the operation image display window and the functions of extracting nodules, nodule matching, editing match nodule and sending report images, etc.

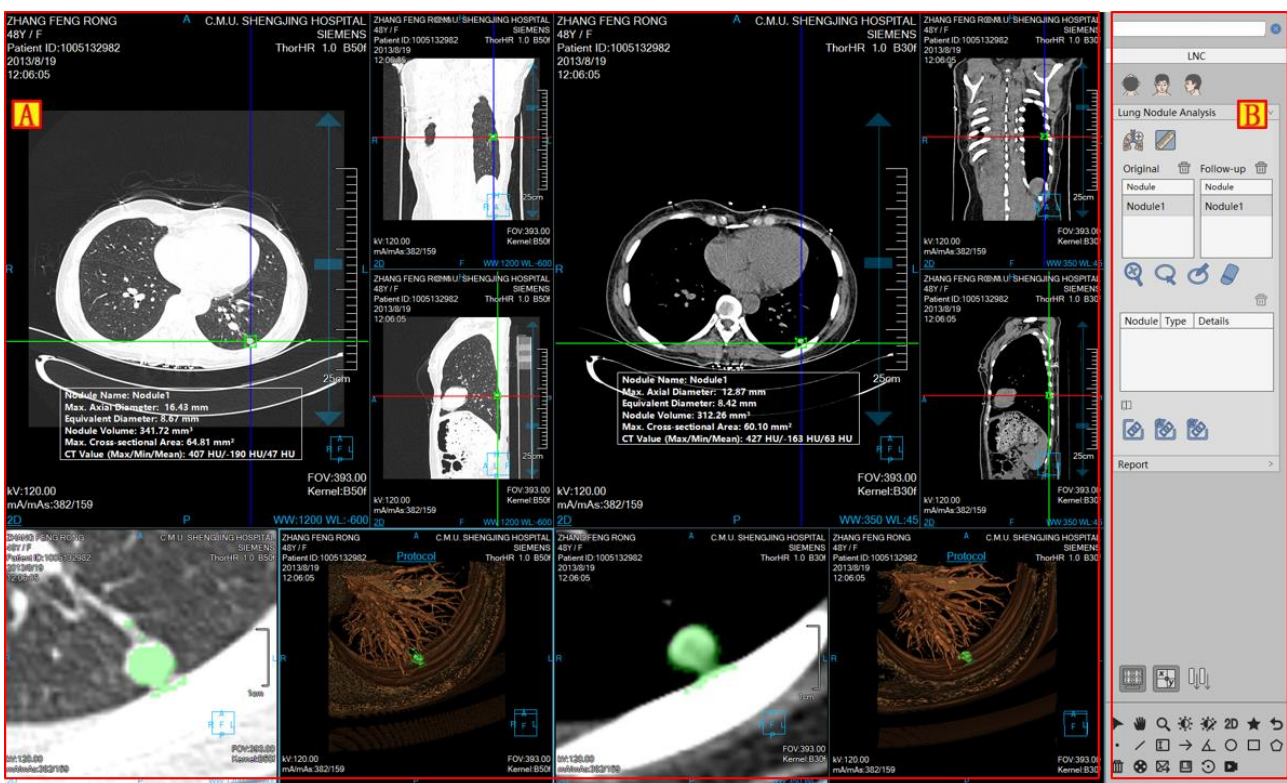


Figure 18-3 Lung Nodule Contrast Operation Interface--Match

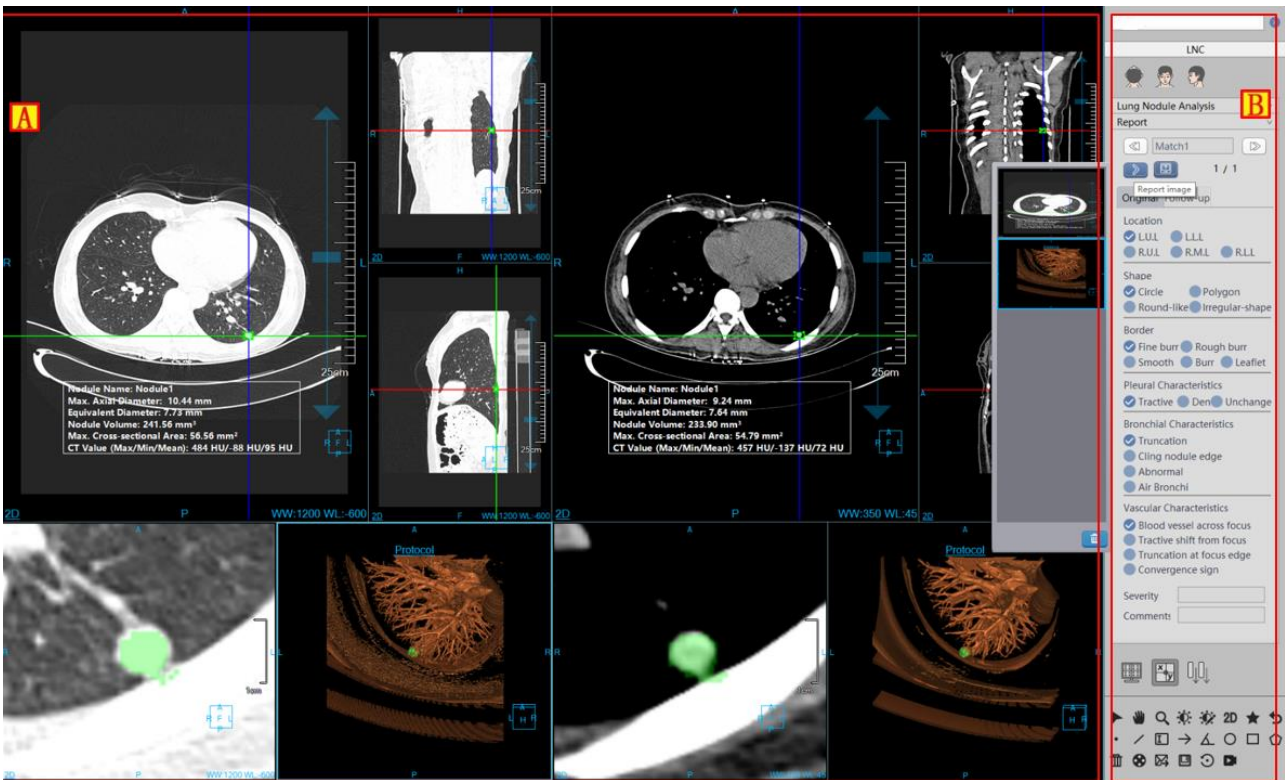


Figure 18-4 Lung Nodule Contrast Operation Interface--Edit

## 18.3 View

### 1. Lung Nodule Contrast the Whole View

The image display window can implement the content output of the image display window through multiple basic window combination layout. As shown in **Figure 18-5**, the study images of two groups are displayed with 5\*1 window layout. The windows of each group are respectively: axial plane window (A), coronal plane window (B), sagittal plane window (C) and nodule locally zoomed in window (D); nodule reconstructed image window (E), floating window of the nodule analysis result (F).

Double click on the window, and then the window is displayed in full screen; double click on the image in full screen again, the view area is restored to the previous 5\*5 window layout to display the images.

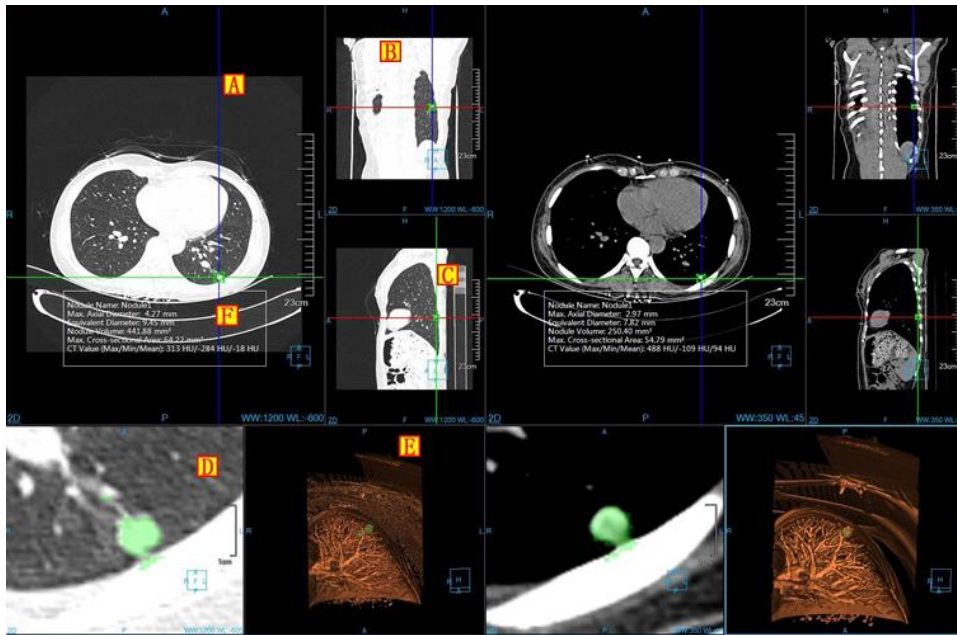


Figure 18-5 LNA View Window

## 2. Image Display View

As shown in **Figure 18-6**, the contents of image display basic window include crosshair, overlap information, location information, display mode, ruler, location box, nodule analysis result, etc.

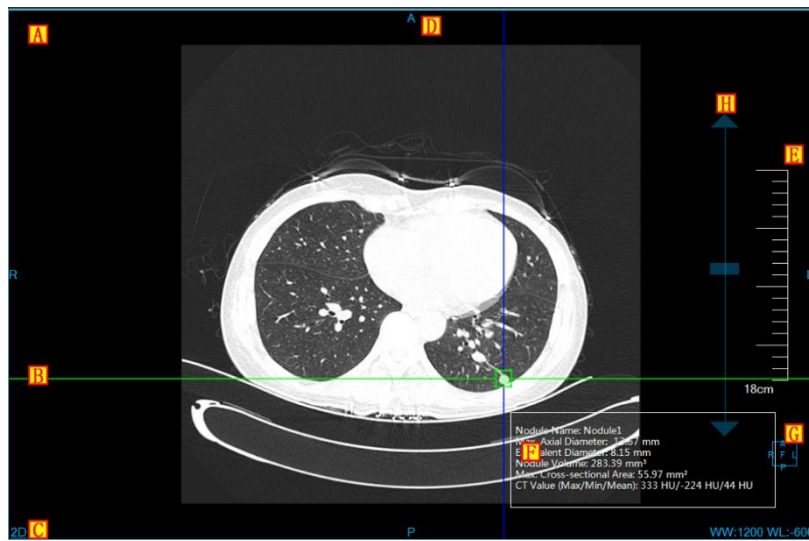


Figure 18-6 Image Display Basic Window

- **Overlap Information**, display the head information content and the real-time WW and WL information of DICOM image. The information can be custom display content in the setting interface;
- **Crosshair**, by moving the three kinds of color crosshairs of red, green and blue, the images of the corresponding axial plane, coronal plane and sagittal plane can be adjusted. When you zoom in the edited nodule, by dragging the four lines of the middle box, the size of the nodule bounding box can be adjusted to extract the nodule;
- **C: Display Mode**, display the display mode of the current image display window, including the contents

of 2D, MIP, AIP and MinIP. Click the right button on the display mode text in the window, the system will pop up the display mode switch menu. Select the corresponding menu item, and then the image window display mode can be switched;

➤ Location information, synchronized with the displayed image content, identify the location information of the current display image, which is displayed in the middle of the four lines of the four window in the form of characters;

➤ E: Ruler, output the measuring scale of the image based on the half height of the image display window, with the standard of half height of the image display window;

➤ F: Nodule Extraction Result: The information is displayed after the nodule is extracted.

➤ G: Location Box, the location information display box with the image synchronously adjusted;

➤ H: drag the layer slider, drag the slider to the corresponding image layer;

## 18.4 Function Operation Panel

The operation panel of nodular analysis function is divided into three areas: data switch, lung nodule contrast and common function.

➤ A: Data Switch, switch the image series, delete study by thumbnail image;

➤ B: Common Function, provide the common operations such as default operation, translation, zoom, adjust WW/WL, restore default function button, etc.

➤ C: Nodule Contrast Function, provide the function operations of processing a series of nodules such as the first extraction of nodules, the second time modification of nodules, nodule editing, deletion and nodule matching, etc.

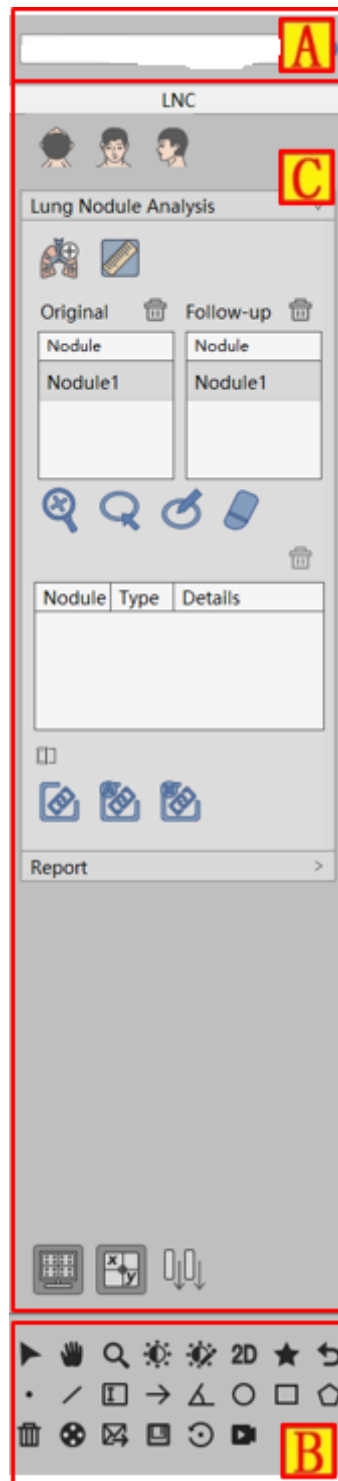


Figure 18-7 Lung Nodule Contrast Function Panel

## 1. Lung Nodule Matching Function Panel

### 1) Load Series

pop out the **Figure 18-8** window, select two groups of contrast series, and then load data into the lung nodule contrast.



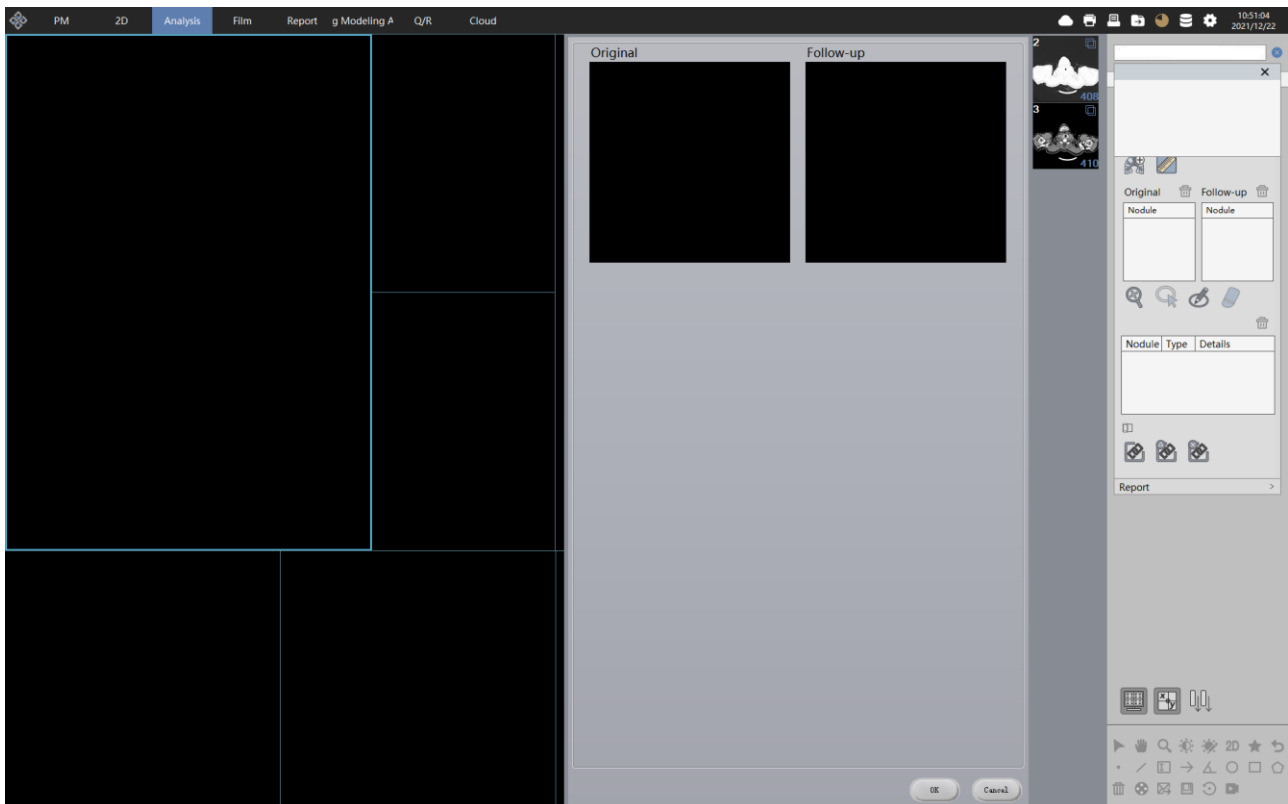


Figure 18-8 Lung Nodule Contrast Loaded Series

## 2)Image Orientation



The lung nodule contrast function provides three kinds of default body position orientation: Axial, Coronal and Sagittal. Click on the corresponding button, you can switch the orientation of the window data.

## 3)Matching Nodule



The matching nodules can be divided into three parts: manual matching nodules, automatic matching nodules, and deleting all the matches

**Manual matching:** In the original and two follow-up nodule lists, select separately one nodule in each list, click on the [manual match] button, and you can directly match these two nodules into the matching list. And at the same time calculate the data of the growth rate of the matched nodule, etc.

➤ **Automatic Matching:** After clicking on the button, the matched nodules automatically appear in the matching list. And at the same time calculate the data of the growth rate of the matched nodule, etc.

➤ **Delete All the Matchings:** Delete all the nodule matching results of manual and automatic matchings.

## 4)Extract Nodules



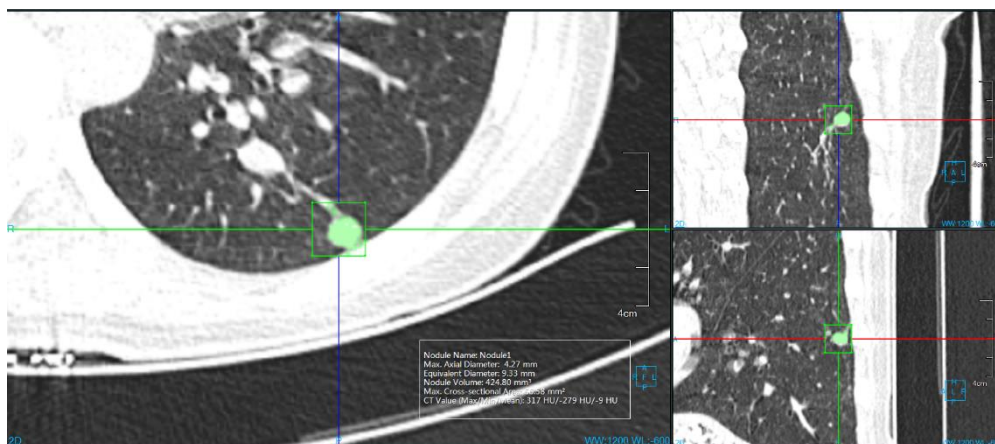
parts of extracting nodule:

Extracting nodules can be divided into two parts: the first extraction of nodules and the second modification of nodules

➤The First Time Extraction: Click on the nodule to extract in the basic window.

➤The Secondary modified Nodules: There are four kinds of modification ways of Zooming in modification, contour line modification, magnetic modification and erasing modification. The operation of the contour line modification, magnetic modification and erasing modification can be restored and undone.

**【Zooming in Modification】** Zoom in the nodule images on the axial plane, coronal plane, sagittal plane and the second time extraction is done by dragging the bounding bow on the crosshair to adjust the size of the nodule.



**Figure 18-9 Lung Nodule Zooming in Extraction Nodule**

**[Contour Line Modification]** In the window of nodule zooming in, the nodule boundary is drawn, and the second time modification of nodules is extracted.

**【Magnetic Modification】** In the nodule zooming in window, according to the contour boundary of nodules, draw the boundary of nodule, the magnetic adsorption is changed, and the secondary modification extraction of nodules is made.

**【Erasing Modification】** In the nodule zooming in window, erase the part of the extracted extraneous tissue and the secondary modification extraction of nodules is made.

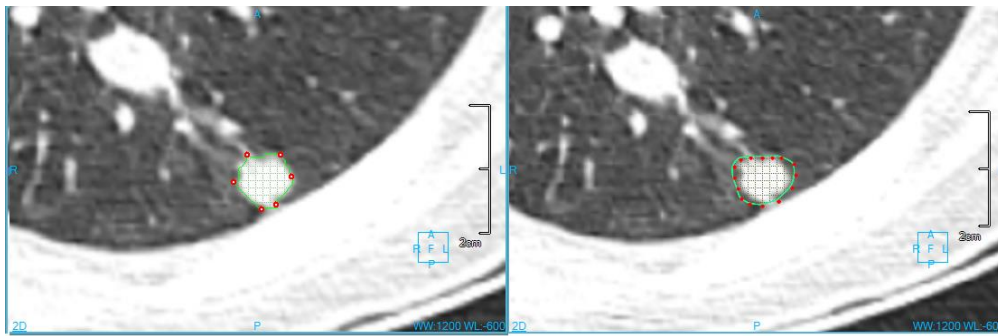


Figure 18-10 Lung Nodule Contour Line & Magnetic Extraction Nodule

5) Nodule List

There are two kinds of nodule lists. One is the nodule list after extraction only marking the nodule name, which can delete nodules.

Original	Follow-up
Nodule	Nodule
Nodule2	Nodule2

Figure 18-11 Lung Nodule Extraction List

The other is nodule matching list marking nodule name, type, which the nodule state can edited and deleted.

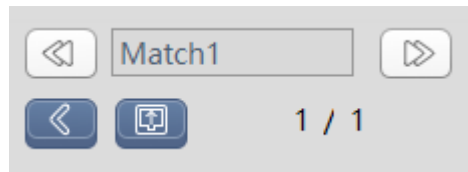
Nodule	Type	Details
Match1	Man...	Nodule1 And ...

Figure 18-12 Lung Nodule Matching List

2.Lung Nodule Edit Function Panel

1) Edit Control Area

Lung nodule edit control area, this area can switch nodules between the last one and the next one. Edit the name of current nodule. View, delete and add the images sent to the report to generate the report, and then return to the extract pages.



**Figure 18-13 Lung Nodule Editing Control Area**

- Previous: Switch to the previous nodule;;
- Next: Switch to the next nodule;
- Nodule Name: Display the name of the current nodule and you can modify the name of the current nodule;
- Back: Return to the extraction interface of the lung nodule
- Generate report: Save all the nodule information and generate reports;
- Report Images: View, delete, add the image to the report.

## 2) Nodule Edit Area

Describe a series of attributes of nodules such as form, location, edge and then they are generated to the report item.

Original	Follow-up	
Location		
<input checked="" type="radio"/> L.U.L	<input type="radio"/> L.L.L	
<input type="radio"/> R.U.L	<input type="radio"/> R.M.L	<input type="radio"/> R.L.L
Shape		
<input checked="" type="radio"/> Circle	<input type="radio"/> Polygon	
<input type="radio"/> Round-like	<input type="radio"/> Irregular-shape	
Border		
<input checked="" type="radio"/> Fine burr	<input type="radio"/> Rough burr	
<input type="radio"/> Smooth	<input type="radio"/> Burr	<input type="radio"/> Leaflet
Pleural Characteristics		
<input checked="" type="radio"/> Tractive	<input type="radio"/> Den	<input type="radio"/> Unchange
Bronchial Characteristics		
<input checked="" type="radio"/> Truncation	<input type="radio"/> Cling nodule edge	
<input type="radio"/> Abnormal	<input type="radio"/> Air Bronchi	
Vascular Characteristics		
<input checked="" type="radio"/> Blood vessel across focus	<input type="radio"/> Tractive shift from focus	
<input type="radio"/> Truncation at focus edge	<input type="radio"/> Convergence sign	
Severity	<input type="text"/>	
Comments	<input type="text"/>	

Figure 18-14 Lung Nodule Editing Control Area

## Chapter 19 CT subtraction angiography (Option)

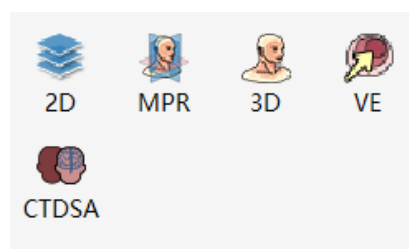
CT subtraction angiography, CTDSA in the following for short, is an application program plug-in using CT and CTA data, using a series of medical image analysis algorithm such as the means of abstraction, vessel extraction, vessel center line extraction and vessel analysis, etc. to generate the vascular anatomical site information and physical information of vascular lesions, which is used to assist doctors with the diagnosis of vascular diseases and evaluation.

### 19.1 Start

First, the requirements for the loaded patient data are as followed: the patient's study data at least include CT and CTA two groups of series, which can both be reconstructed; The maximum number of images in the two sequences is 5 errors; The thickness and spacing of the two series must be consistent.

Then, if it is the first time to start the application, the data that meets the requirement can only be selected from patients management module. Click the [CTDSA] icon as shown in figure 19-1 to start [CTDSA].

Second, if it is the first time to launch the application plug-in, you can only select the data that meets the requirements from the patient management, and then click on the [CTDSA] icon shown in figure 19-1 to launch the CTDSA application plug-in.



**Figure 19-1 First Start CTDSA**

If CTDSA is not the first time to start CTDSA, but instead but instead migrates to other application plug-ins and migrates back, click on the [CTDSA] icon as shown in figure 19-2 to return the CTDSA application plug-in.

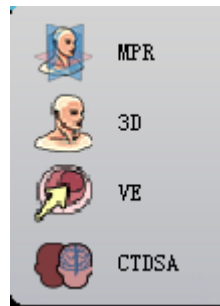


Figure 19-2 Return CTDSA

According to the operation process of vascular analysis, CTDSA has 5 steps: data loading, vascular subtraction, vascular extraction, vascular center line extraction and vascular analysis.

## 19.2 Data Loading

Select the data from the patient list of the patient management of and click on [CTDSA] to load the data. Select CT and CTA the two groups of series in the pop-up series selection dialog box, as shown in figure 19-3, and click on [OK] to load the data to CTDSA application plug-in.

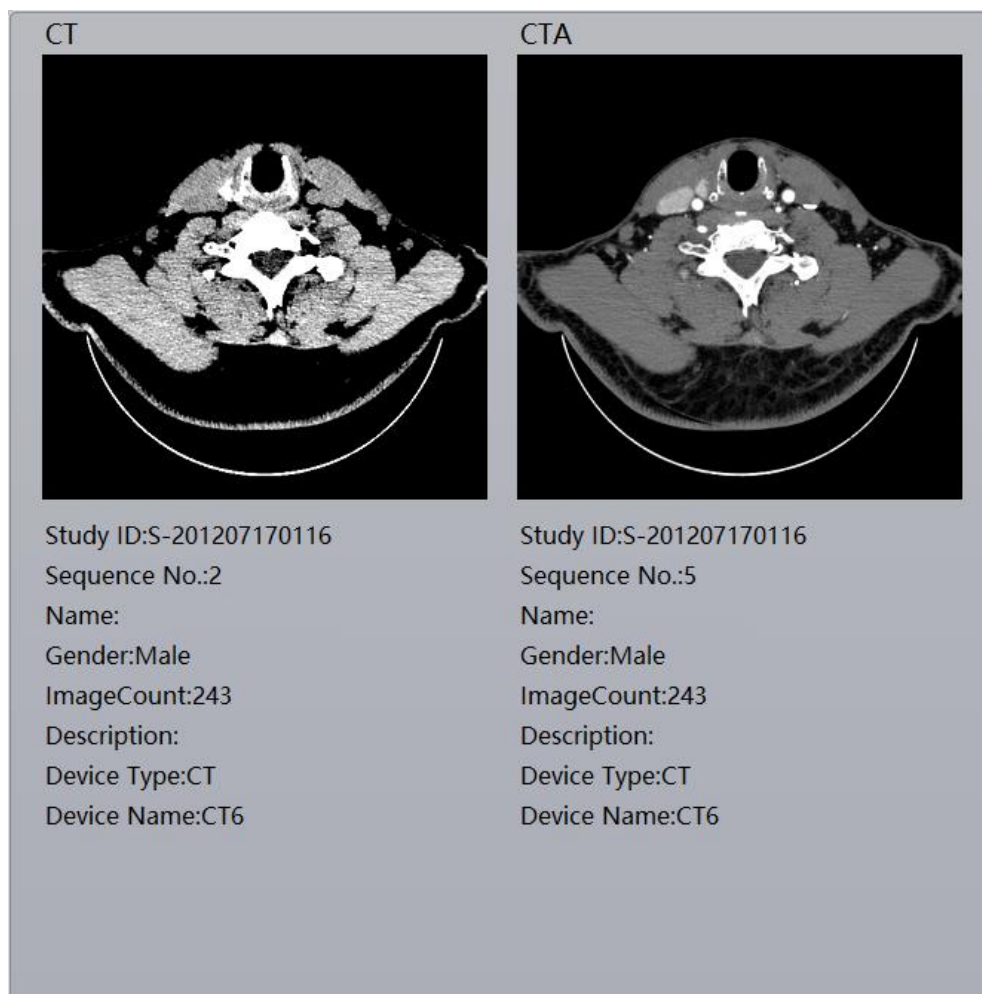


Figure 19-3 Series Selection Dialog Box

## 19.3 Vascular subtraction

For the CT image before the injection of the contrast agent and the CTA image after the injection of the contrast agent, the digital information of the two sets of data is subtracted to obtain the subtraction image with the bone, muscle and other soft tissues removed, leaving only the blood vessel image.

### 1.Interface

The left side is the CT data image. The right side is the CTA data image.

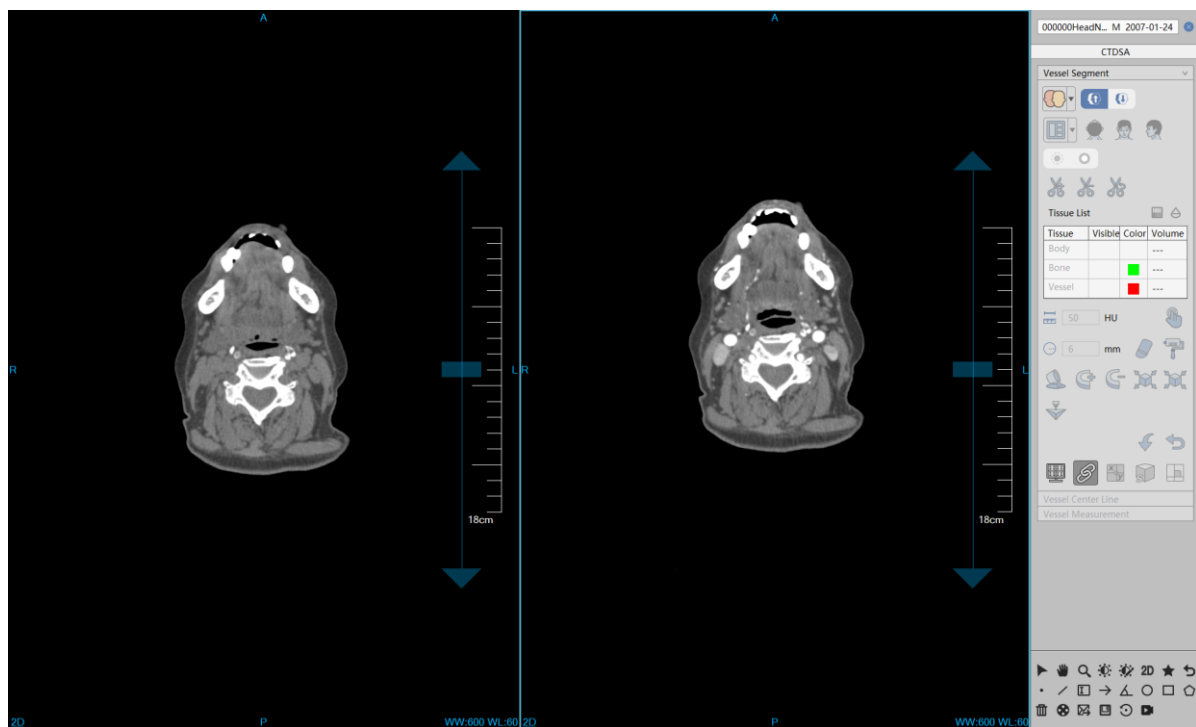


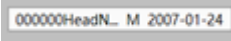


Figure 19-4 Vascular Subtraction

### 2.Function

-  Registration subtraction: perform the operation of subtraction, to provide the data of the segmented bones and vascular tissues for vascular extraction steps. When the subtraction parameters are strong, bones increase and vessels reduce; When the parameters are weak, bones reduce and vessels increase.
-  Point to Point subtraction: The CT data is subtracted from the CTA data (the form of CT value subtraction), and then the silhouette result data is used for blood vessel extraction and centerline extraction.
-  Select Series. Select the sequence. If you want to reselect the series for vascular



analysis, click on the button to pop up the dialog box as shown in figure19-3 to select new data to load.

## 19.4 Vascular Extraction

### 1. Interface

As shown in figure19-5, the left side is the image view area and the right side is the function panel area.

The images in the area are VR image, MPR axial plane, MPR coronal plane and MPR sagittal plane.

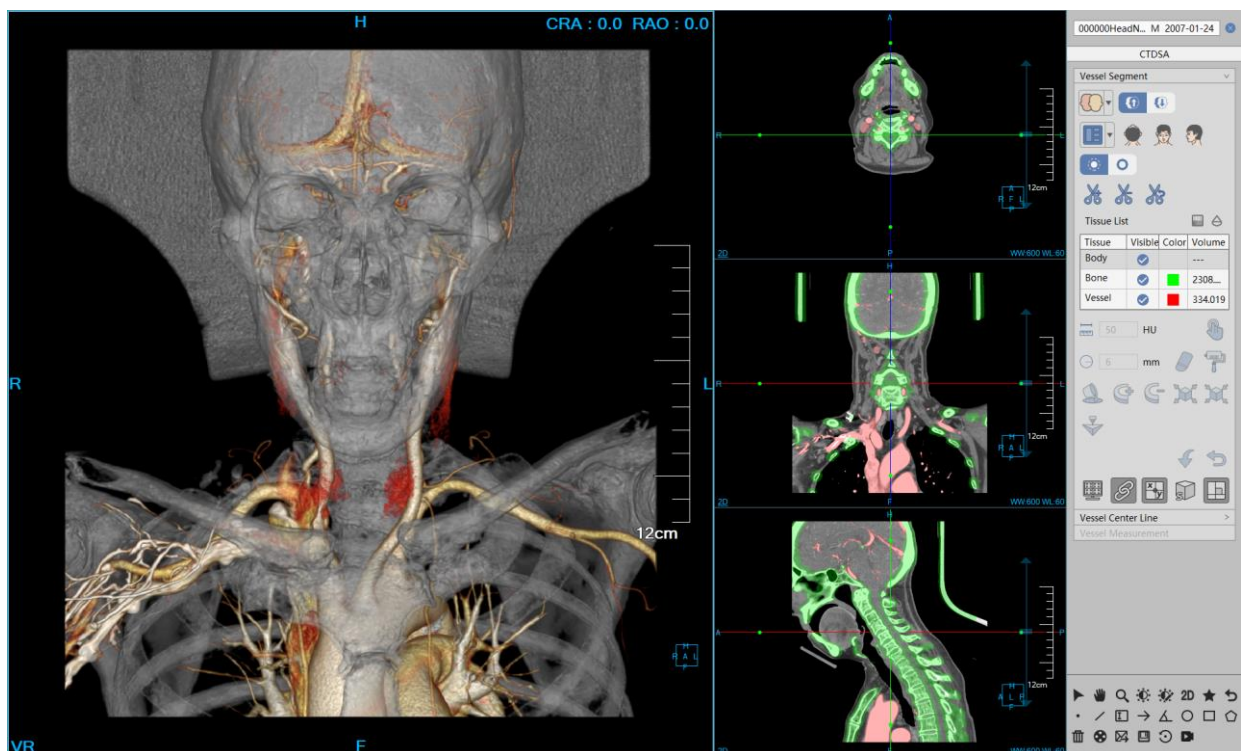


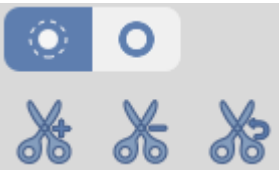
















Figure 19-5 Vascular Extraction

### 2. Function

-  : Two kinds of images area layouts, 2\*2 and 1+3.
-  : Switch the orientation information of VR images, axial plane, coronal plane, and sagittal plane,.
-  : Cut the VR image.
-  : Opacity Setting. Set the opacity of the selected tissue in the tissue list.

- : Permeability Setting. Set the permeability value of the selected tissue in the tissue list.
- : Manual Extraction: Hold down the left mouse button to extract the tissue in the area that you are interested in any of MPR window. You can set the step parameters () to designate the growth rate of the manual extraction tissue.
- : Hole Filling: If the extracted tissue is not fully extracted. When there are other tissues within the volume, you can use the function to fill the tissue with the internal tissue.
- : 3D Staining: A 3D sphere is used to perform the function of Extraction on MPR image. The radius of the 3D sphere can be set through the [Radius]parameter.
- : 3D Erasure: A 3D sphere is used to perform the function of erasing the extracted tissue. The radius of the 3D sphere can be set through the [Radius]parameter.
- : Projection addition is suitable for the tissue extraction. Hold down the left key to demarcate a closed area, and the closed area is projected layer-by-layer from the upper and lower ends to form a volume area, which is the extracted tissue.
- : Projection deletion is suitable for the tissue extraction. In contrast, the function is used to delete a closed area from the extracted tissue formed by projecting the tissue layer-by-layer from the upper and lower ends.
- : Inflation is suitable for the tissue extraction. A morphological algorithm is applied to the extracted tissue to combine the other tissues of the tissue boundary into the function that the issue is extracted.
- : Corrosion is suitable for the tissue extraction. The difference with inflation is the function to delete part of the boundary of the extracted tissue.
- : Printing Modeling: Send selected segmentation to the Printing Modeling plugin if the plugin is available.

-  : Undo, go back to the tissue state to the last extracted result state.
-  : Reset. Empty the extracted tissue area.

## 19.5 Vessel Center Line Extraction

### 1. Interface

As shown in figure 19-6, image view area includes:

- VR Image. Display the vessel VR image, center line path and defined seed point.
- B: Axial Plane. Display the image position generated by the reference points on the center line path.
- C: Coronal Plane. Display the image position generated by the reference points on the center line path.
- D: Sagittal Plane. Display the image position generated by the reference points on the center line path.
- E: Vascular Section. Display the image position generated by the reference points on the center line path.
- F: CPR Image/Longitudinal Section. CPR image is generated by the center line path; The longitudinal section image is determined by the center line curvature of the reference point position.

Whether to display CPR image or longitudinal image in F area is controlled by menu in the upper left corner.

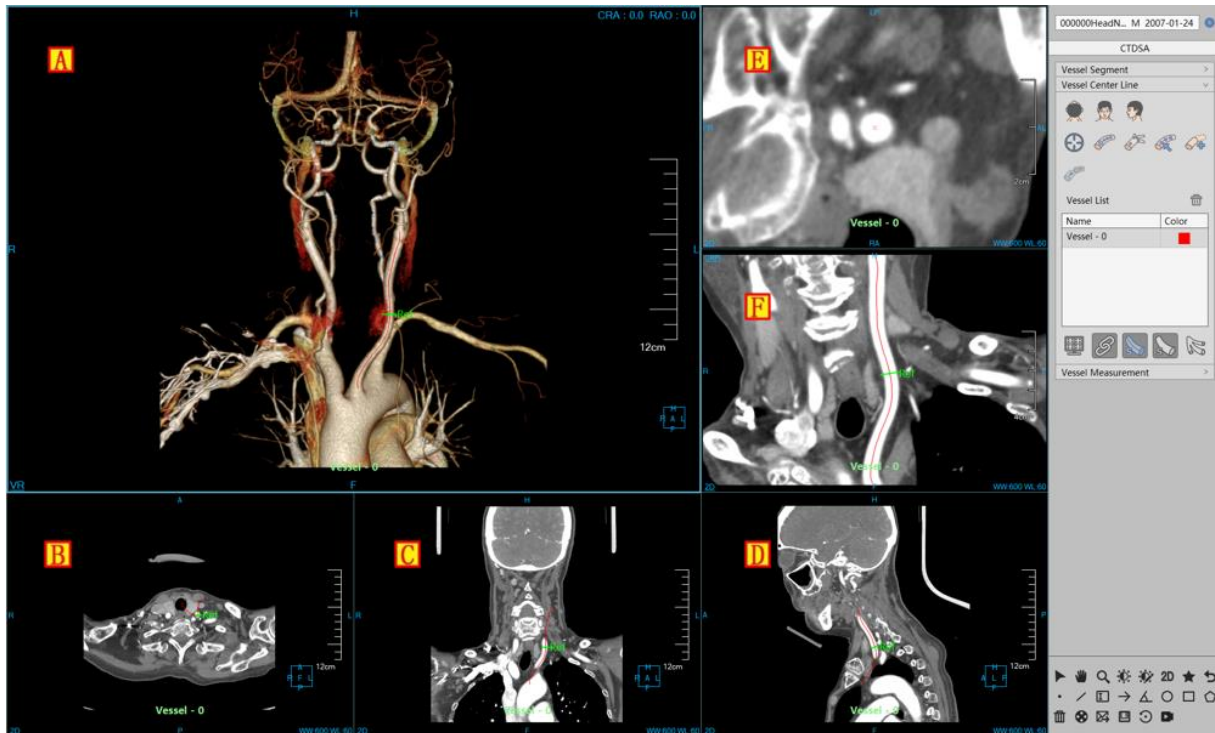






Figure 19-6 Vessel Center Line Extraction

## 2.Function

### 1)Center Line Extraction

Two extraction ways: Extracting single root and extracting tree.

➤Process of Extracting Single Root: click on the  button to define single or multi seed points. Then click on the  button to extract one single center line, which will be added in the center line list of the panel.

➤Process of Extracting Tree: click on the  button to define single or multi seed points. Then click on the  button to extract center line tree, which will be added in the center line list of the panel.

### 5)Center Line Editing



: By default, the gray edit button is displayed, which means that the editing function is invalid.





: When pressing down the button, the black edit button font black is displayed, which means the editing function is valid.

The center line can be edited in Window B, C, D, F

Editing Process: Use the mouse to click on the center line, and then hold down the left button dragging to edit the center line path. After you lift the left button, the path will be recalculated. The reference point is also recalculated and the display of the image will also be refreshed according to the new path and reference point position.

### 3)Center Line Extension

First, select a center line to be extended in the panel center line list. Then click on the  button and the destination point for extension in any window of A, B, C, D. At last, click on the  button to perform the operation of center line extension.

### 4)Center Line Connection



: When a center line is selected in the center line list, the button is in the invalid state.



: Only when two center lines are selected, the button becomes valid and allows the center line to be connected. After a successful connection, a new center line is generated and added to the center line list, and the two lines that are connected are retained.



: When the button is in the selected state, the vessel with the center line identity can only be displayed on the VR window. Otherwise all the vessels are displayed.

## 19.6 Vascular Analysis

Vascular measurement analysis is to make the quantitative analysis and narrow and plaque detection for the extracted vessel center line and the related measurement indexes are calculated.

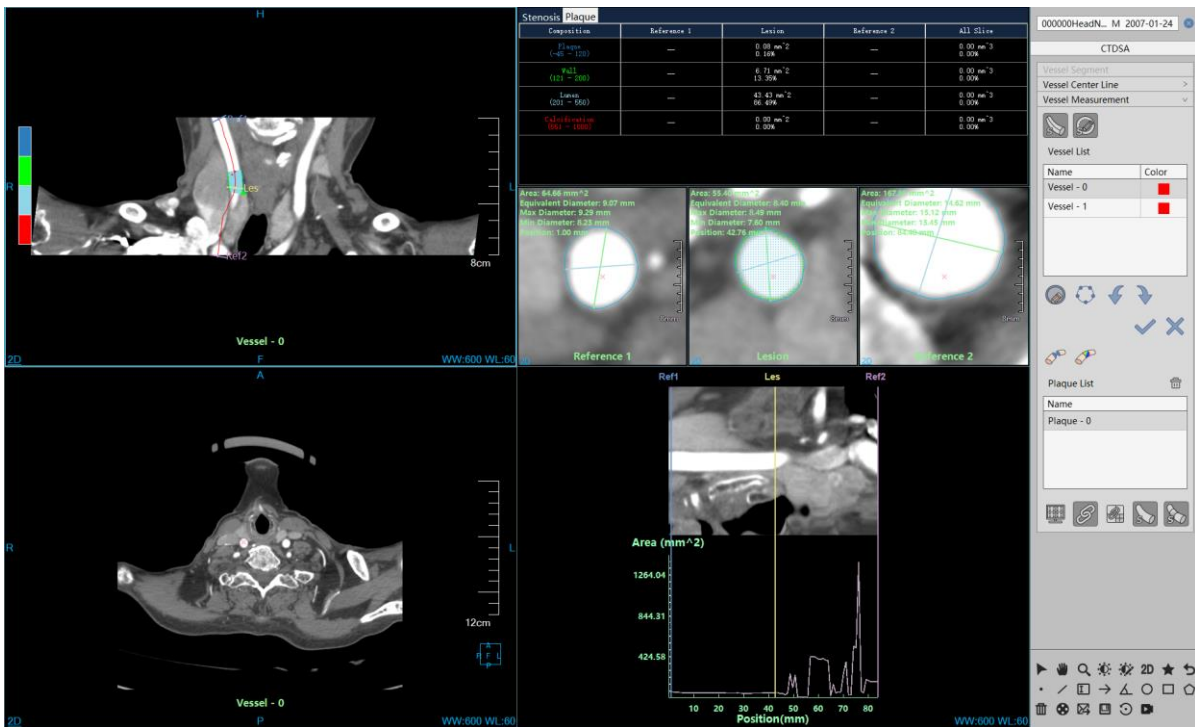
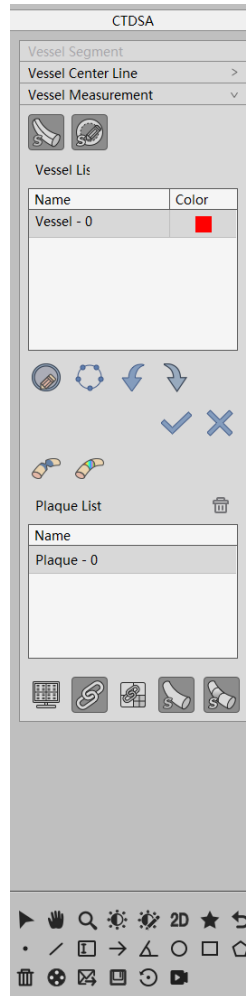


Figure 19-7 Vascular measurement Operation Interface

## 1.Measurement Analysis Panel



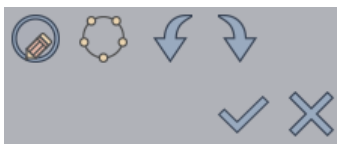
**Figure 19-8 Measurement Analysis Tools Panel**

The following functions are mainly included in the measurement analysis tools panel:

- Center Line: Display/Hide the center lines in all the windows and reference position marks.
- Contour Line: Display/Hide the contour lines and quantitative index of the three vessels cross section

windows;

- Vessel Center Line List: It is used to switch different center lines.
- Contour Operation



- a)Contour Drawing: Redraw the contour line in three vascular cross sections windows, and the vascular contour can be drawn freely.
- b)Contour Editing: Edit the vessel contour in the three vessel cross section windows. and drag different control points to precisely edit the vessel contour. At the same time, the maximum and minimum

diameter can be edited.

c)Undo: In the process of contour editing, the editing operation can be undone to return the previous state of the current contour.

d)Restore: In the process of contour line editing, the editing operation can be restored and the next state of the current contour is returned.

e)Confirmation: Recalculate all quantitative parameters according to the current contour scope. Redraw the contour line and the longest and shortest diameter. If there is plaques information, update the plaques information after confirming the contour editing result.

f)Cancellation: Do not make any changes to restore to the existing state;

➤Stenosis Analysis: Automatically detect the current position of vascular stenosis, and the position of three reference lines will be recalculated after the calculation, Les positioned in a narrow place, Ref1 and Ref2 positioned in the narrow two ends;

➤Plaque Analysis: The quantitative analysis is conducted on the plaque in the vessels. The different components of plaques are marked with different colors in CPR and vessel interface view. Update the plaque statistical analysis table and switch to the plaque statistical table. The defined plaque will be added into the plaque list.

➤Plaque List: Display the defined plaque in the current vessel center line. The operation of switch and deletion can be performed.

➤Contour Line: Display the contour line and quantitative index in the three vessel cross section windows.

➤Plaque (Display): Display/Hide plaque identification in the image window.

➤Last Step: Return to the center line to extract the workflow, and clear all the results of the current

Measurement;

➤Linkage: the zooming of three vessel cross sections is synchronized with the WW and WL.

➤Reference Line Linkage: Reference line moves simultaneously. Move any one of the reference lines, the other reference lines will move together. But the state among reference lines remains the same as the former state;

➤Overlap Information: Display/Hide the overlap information of the image window;

➤Center Line Name: Display/Hide the center line name of the image window;

## 2.CPR Image Window

The CPR image window is located on the upper left side of the measurement and analysis interface, which is used to display the information of the current vessel center line, reference point, name, plaque, etc.

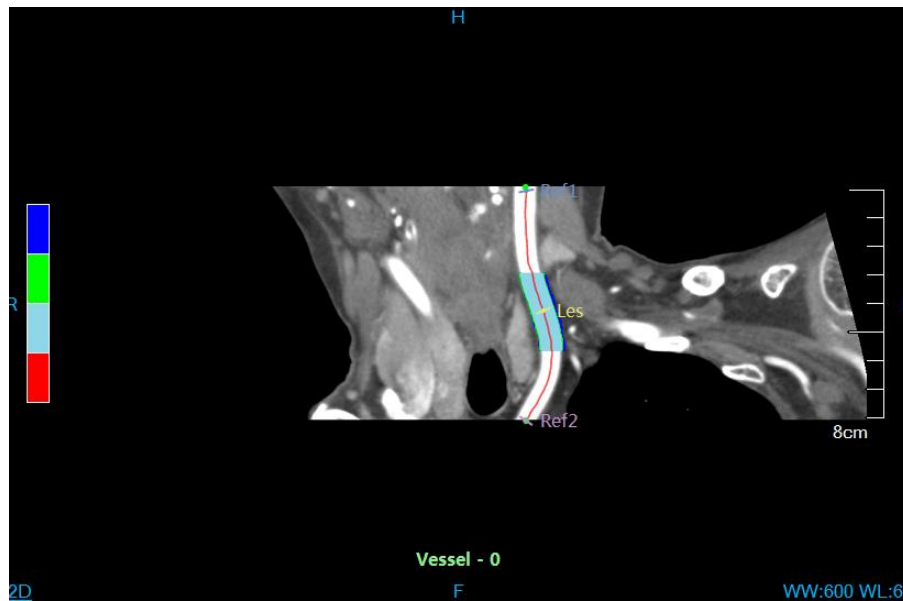


Figure19-9 CPR Vessel Image

### 3.Quantitative Analysis Statistical Table

Quantitative analysis statistical table includes two parts of information: stenosis analysis and plaque analysis, which can be manually switched to view and automatically switched when the stenosis analysis or plaque analysis is clicked. The interface can be switched automatically. The information in the table can be updated according to the location of the current reference point.

Composition	Reference 1	Lesion	Reference 2	All Slice
<b>Plaque</b> (-45 - 120)	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>3</sup> 0.00%
<b>Wall</b> (121 - 200)	1.85 mm <sup>2</sup> 16.49%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>3</sup> 3.00%
<b>Lumen</b> (201 - 550)	9.36 mm <sup>2</sup> 83.51%	37.49 mm <sup>2</sup> 100.00%	57.76 mm <sup>2</sup> 100.00%	0.00 mm <sup>3</sup> 97.00%
<b>Calcification</b> (551 - 1000)	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>3</sup> 0.00%

Figure 19-10 Quantitative Analysis Statistical Table

### 4.Cross Section View of Reference Point

The analysis interface contains three reference points section, a narrow reference point and two common reference points, which are used to view vessel section information where the reference point is, including contour, maximum and minimum diameters, quantitative index, vessel center point, reference point name, etc. The contour and diameter can be manually edited. Turning page up and down in the window of the cross



section of reference points can also view the information about other positions. At the same time, the information in other associated windows as well as the corresponding reference point position on CPR image is updated.

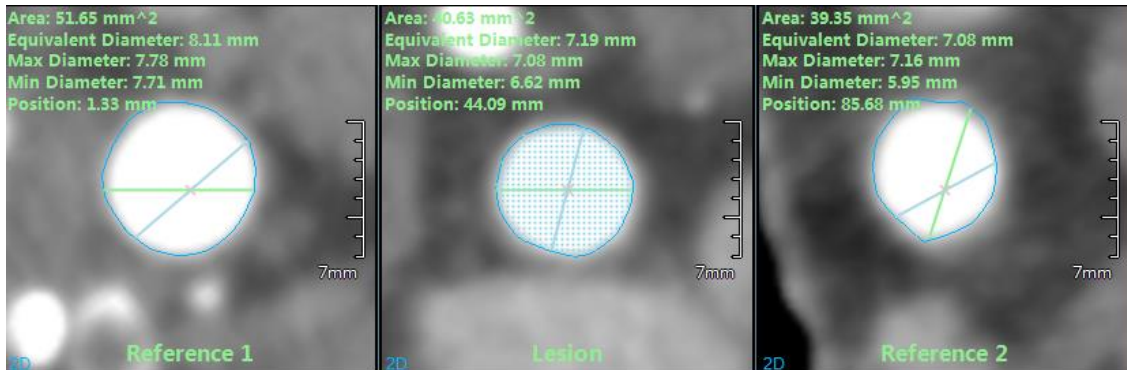


Figure 19-11 Cross Section of Reference Point

### 5. Axial Plane View of Stenosis Reference Point

The axial plane view of stenosis reference point is used to display the axial plane image of the stenosis position. The image will be updated as the position of stenosis reference points changes. Turning page up and down in the window can view the information of vessel other positions. At the same time, the information in other associated windows as well as the stenosis reference point position on CPR image is updated.



Figure 19-12 Axial Plane of Narrow Reference Point

## 6.Vessel Straightening View

The vessel straightening window includes two parts of straightening vessel image and curving view, which can intuitively display the inside information of the current vessel. The curve view can select and view elements by clicking right menu according to the displayed distribution information of area, diameter, maximum diameter and minimum diameter inside the vessel.

The three reference lines correspond to the three reference points on the center line, which can be moved manually to update the information of the associated window.

## Chapter 20 Advanced Vascular Analysis (Option)

Advanced vascular analysis is called as AVA for short. The plug-in is mainly used to observe the anatomic sites and pathological features of head and neck, chest and abdomen and double lower limb blood vessels through CT images. It is used to evaluate the information such as the vascular size, abnormal area size, area, narrow position, calcified indicators and so on to provide the auxiliary diagnosis basis for the doctor by using automatic and manual tools.

### 20.1 Start

The AVA plug-in, as a functional plug-in for the system, is deployed in advanced application modules. In the PM function switch panel in figure 20-1, click the [AVA] button to enter the application module.

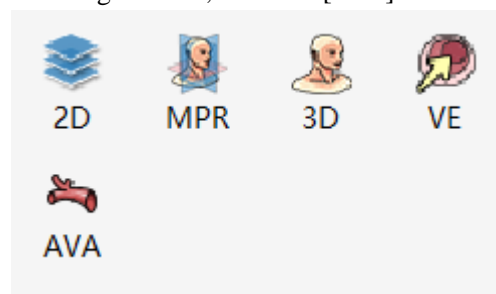


Figure 20-1 Start the AVA Plug-in

After startup, if you switch to other advanced plug-ins, click the [AVA] icon as shown in figure 20-2 to return to the AVA plug-in.

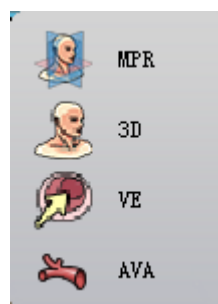


Figure 20-2 Switch to the AVA Plug-in

### 20.2 Data Loading

AVA only allows CTA data to be loaded, and all the vascular analysis results are based on CTA data calculation. When the scanning parts of the data are the head and neck, chest and abdomen and double lower limbs, the correct analysis results can be obtained. And when they are other parts, the automatic analysis can still be performed, but the meaningful results can't be obtained.

## 20.3 Description of Operation Interface

As shown in figure 20-3, the function button layout on the operation panel is from top to bottom according to the process of vascular analysis, which is mainly divided into three parts: automatic analysis and common operation area, removing bones and vascular analysis area, common information control area.

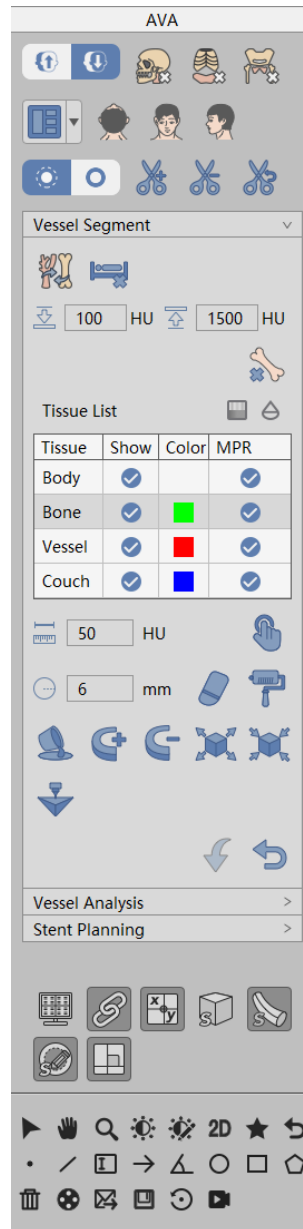





Figure 20-3 AVA Panel


## 20.4 Automatic Analysis and Common Operation

Head and neck analysis : Analyze and extract carotid tissues, to generate vascular central lines, assess the vascular diameter and area, and locate the narrow position.


Chest and abdomen analysis : Analyze and extract abdominal aorta tissues, to generate vascular central

lines, assess the vascular diameter and area, and locate the narrow position.

Lower limb analysis : Only analyze and extract lower limb arterial tissues, and the vascular central lines and vascular evaluation operation are not generated.

Analysis type : Contains two types: strong and normal. The default analysis is [Normal]. When the blood vessel CT value is strong, automatic analysis will be performed in the **【strong】** type. This option is only applicable to head and neck vessel analysis.

After the automatic analysis function is correctly performed, the function area of removing bones is hidden, and the analysis function area becomes displayed. In this way, it is convenient for the user to conduct the vascular analysis operation of manual interaction. If the automatic analysis has been performed, the prompt dialog box will pop up to indicate whether the previous results will be cleared or not when it is analyzed again.

Layout : seven kinds of layout are provided in all, each of which is the common combination of windows.

1X3: four windows in all, including axial plane, coronal plane, sagittal plane, VR.

2X2: four windows in all, including axial plane, coronal plane, sagittal plane, VR.

1X2: there are two windows in all. The one on the left side is the VR of bone tissue, and the other on the right side is the VR of all the tissues.

Measurement layout 1: nine windows in all, including CPR/longitudinal section, axial plane /VE, straightening CPR, vascular section, vascular analysis results. Vascular section contains three windows, which are narrow section, left reference and right reference sections.

Measurement layout 2: eight windows in all, including VR, CPR/ longitudinal section, axial plane /VE, vascular section.

Measurement layout 3: eight windows in all, including VR, CPR/ longitudinal section, axial plane /VE, vascular section (stenosis position), coronal plane, sagittal plane.

2+1: five windows in all, including VR, CPR/ longitudinal section, axial plane /VE.

Note: between CPR and longitudinal section and between axial plane and VE, they can switch window display status through the menu.

## 20.5 Bone Remove

To remove bones is mainly to extract tissues through the way of automatic, semi-automatic and artificial interaction, which can effectively separate blood vessels and bone tissues. The main functions described are as

follows:



Tissue replacement: as shown in figure 20-4, the function of tissue replacement is to extract and separate tissues on VR to obtain the desired vascular tissues. This function can switch the view area to the 1X2 layout. The extracted tissues on the left side of the window can be replaced into blood vessels and the body, the extracted ones on the right side of the window can be replaced into bones, blood vessels and the body. After the replacement, it doesn't take effect until clicking the "accept" button and the extraction operation can be cancelled by clicking the "cancel" button. When this function is effective, the operation of tissue extraction such as removing couch, removing bones and manual extraction.

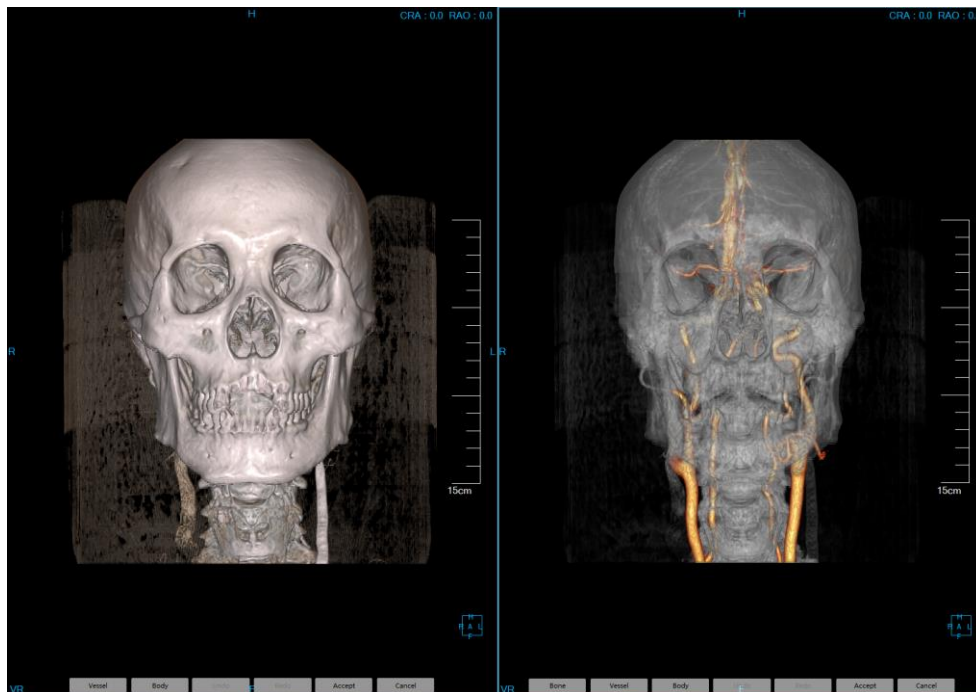




Figure 20-4 Tissue Replacement View

Protocol : there are two cases. When it is 1X2 layout at present and the left window is the focus, only the left VR protocol can be set. In other cases, the VR protocol is normal.

Opacity : it is the same as the operation of opacity.

Tissue extraction: it includes functions such as manual extraction, hole filling, erasure, dyeing, projection addition/deletion, corrosion, expansion and so on. Please refer to VR plug-in for detailed description.

Printing Modeling: Send selected segmentation to the Printing Modeling plugin if the plugin is available.

## 20.6 Vascular Analysis

Through the semi-automatic tools and manual interaction mode, the operations such as the definition of

vascular center lines, editing, blood vessel contour drawing, editing, narrow definition and plaque definition and so on can be done. And the relevant result information in the left view area can be displayed. The overall view area is shown in figure 20-5:

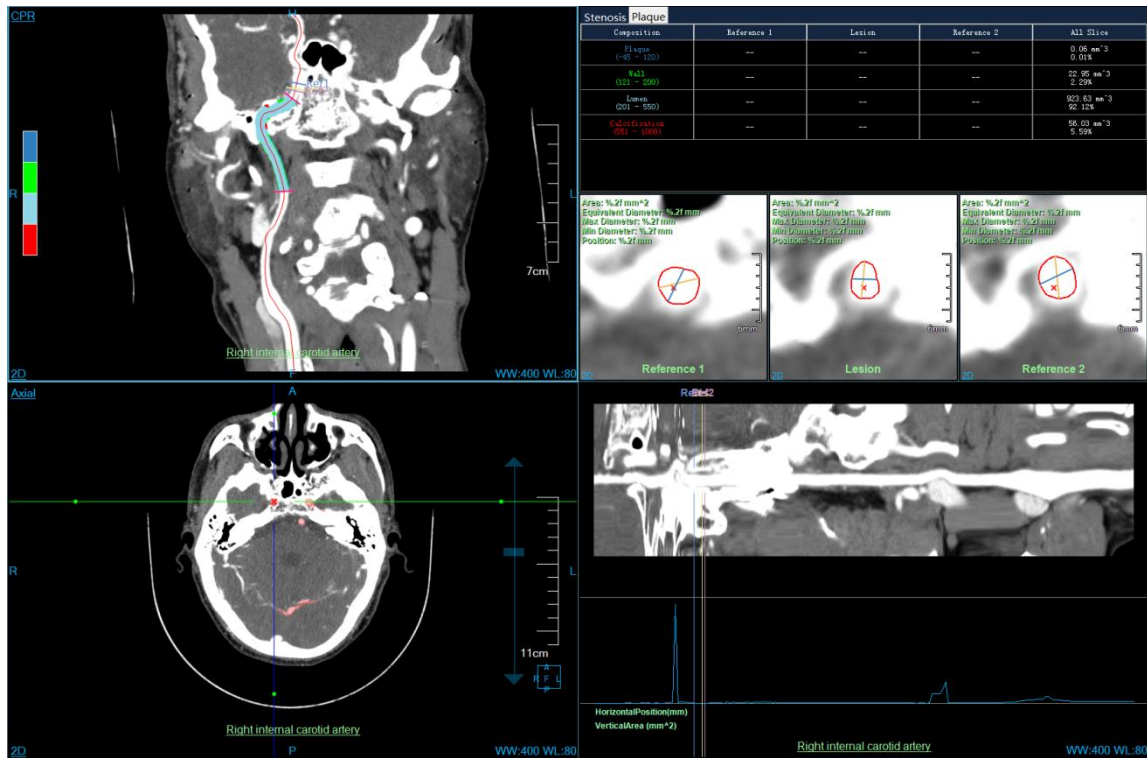


Figure 20-5 Vascular Analysis View

### 1.View

CPR: as shown in figure 20-6, which displays the current vascular CPR image. Click the right mouse button on the CPR text on the upper left of the view area, which can be switched between the CPR and the longitudinal section view. The three reference lines Ref1, Les and Ref2 shown on the center line respectively correspond to the three small windows on the vascular section. When dragging the reference line, the reference line of CPR is straightened and the window of vessel section is followed and refreshed. The lower part of the view area shows the name of the vessel center line. Double click on the name, and the name can be changed in the pop-up window.

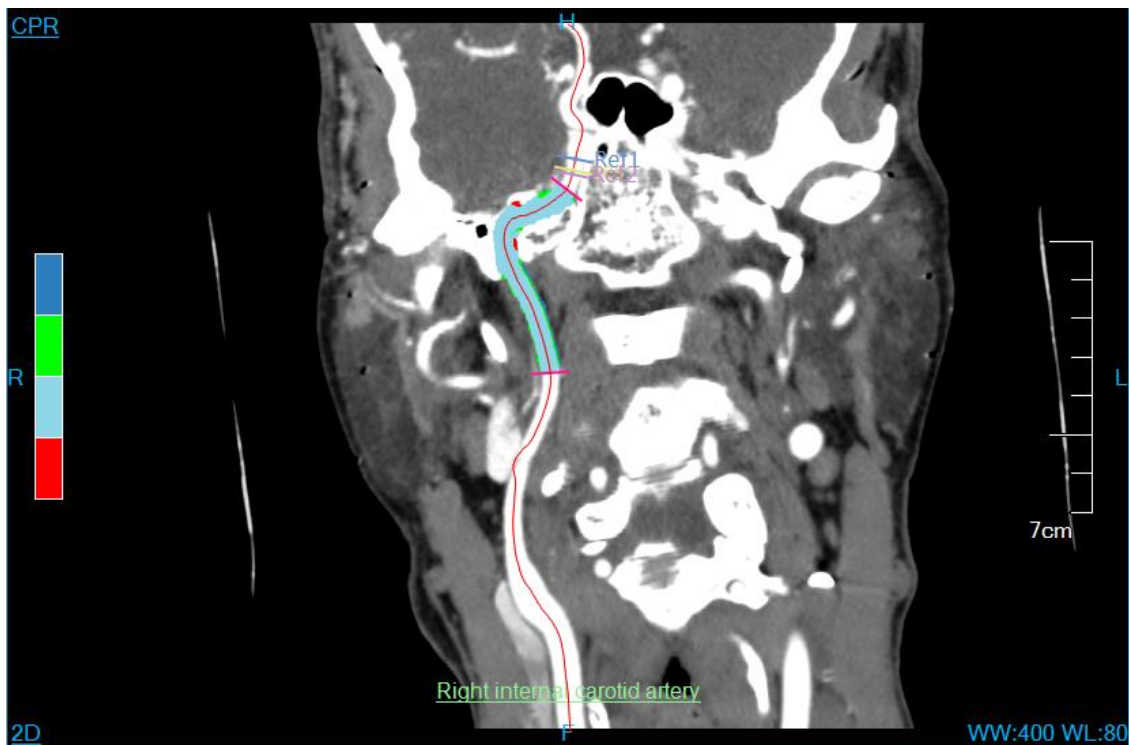


Figure 20-6 CPR View

VR: as shown in figure 20-7, only the vascular tissue is shown. The common operation supported: click the center line to conduct the switching operation; When the mouse slides over the center line, the center line is shown in yellow. Multiple center lines are simultaneously displayed by pressing the combination key of the Ctrl+ left mouse button. The right click menu of the center line performs the operations of deleting, renaming, flipping. When the current blood vessels are only displayed, the VR window only displays the currently selected center line.

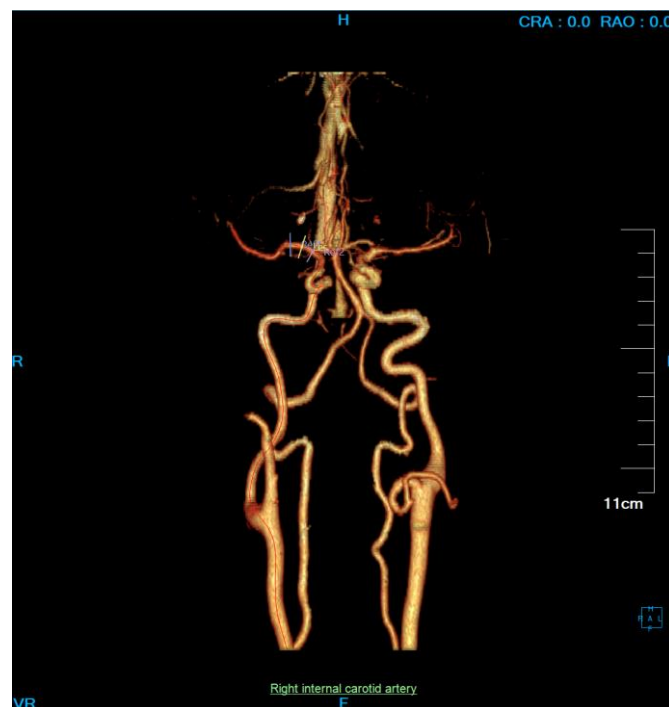


Figure 20-7 VR View



Cross section: as shown in figure 20-8, the view is determined by the location of the Les reference line, and when the crosshair is default, the Les location is located. By default, the vascular tissue is marked in red region. Click the right mouse button on the cross-section text on the upper left of the view area, you can switch between the cross section and the endoscope view.

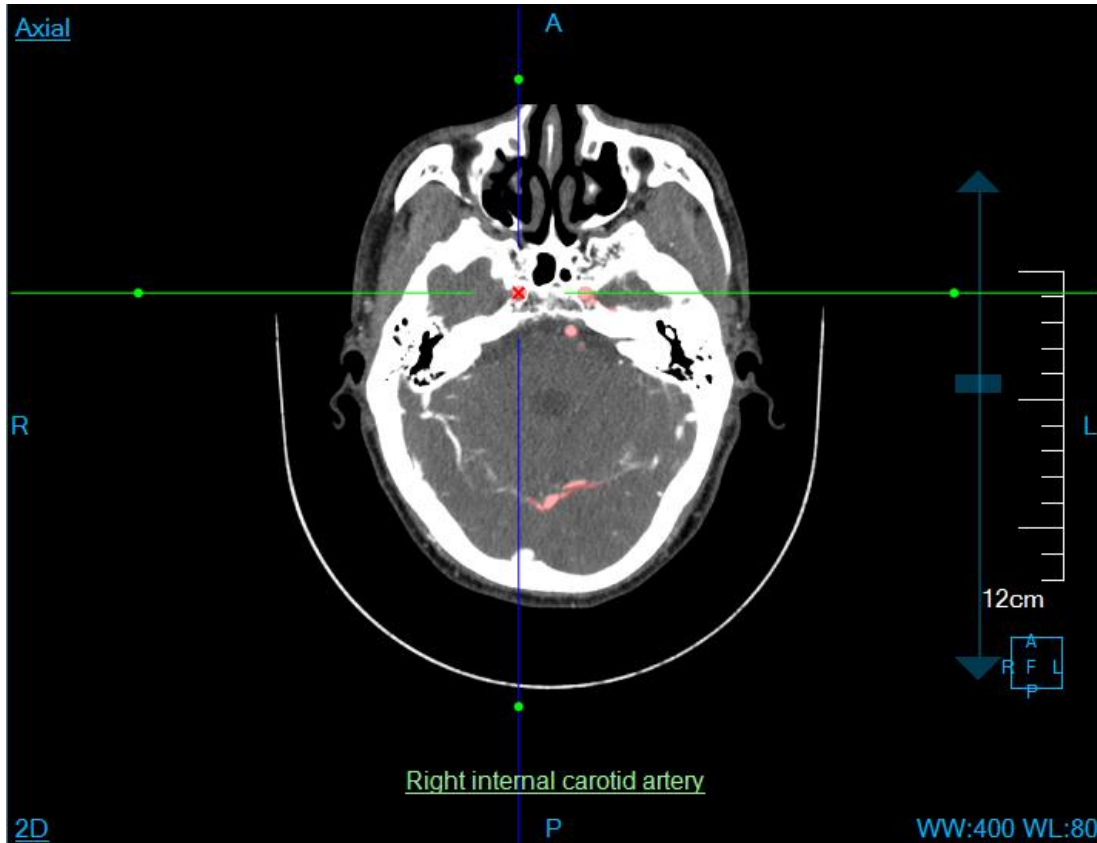


Figure 20-8 Cross Section View

VE: see figure 20-9. VE is the endoscope view. The current view position is also the position of Les. Hold down the left mouse button dragging, you can adjust the angle of view. VE supports four modes of play: previous, reverse play, play, next

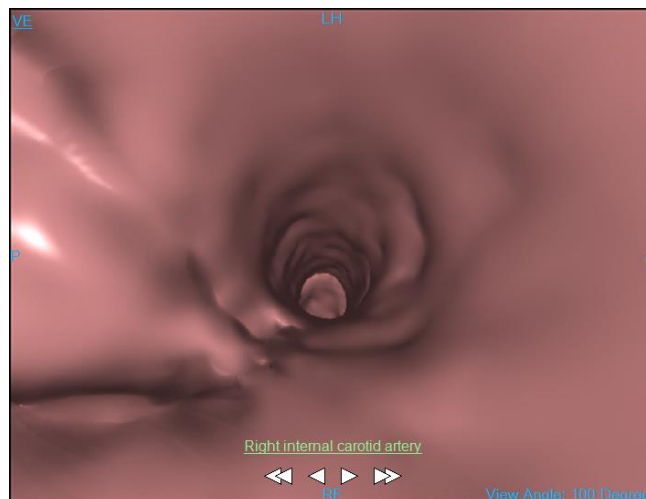


Figure 20-9 VE View

Straightening CPR: there are two modes of display: displaying curve image (shown in figure 20-10) and not displaying curve image (see figure 20-11), which are controlled by right click menu.

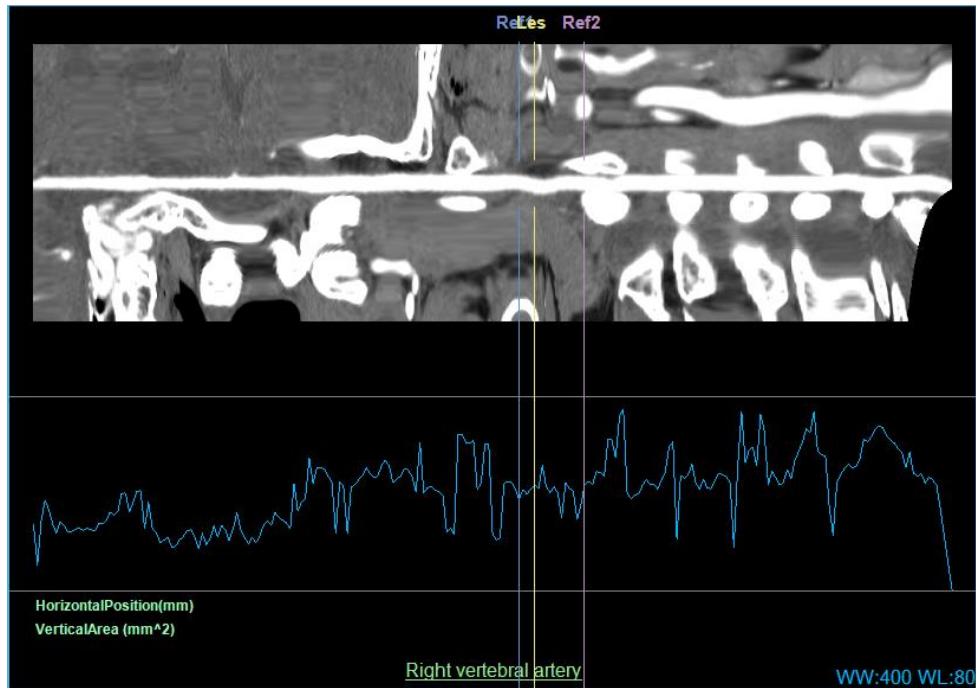


Figure 20-10 Straightening CPR View (Displaying Curve Image)

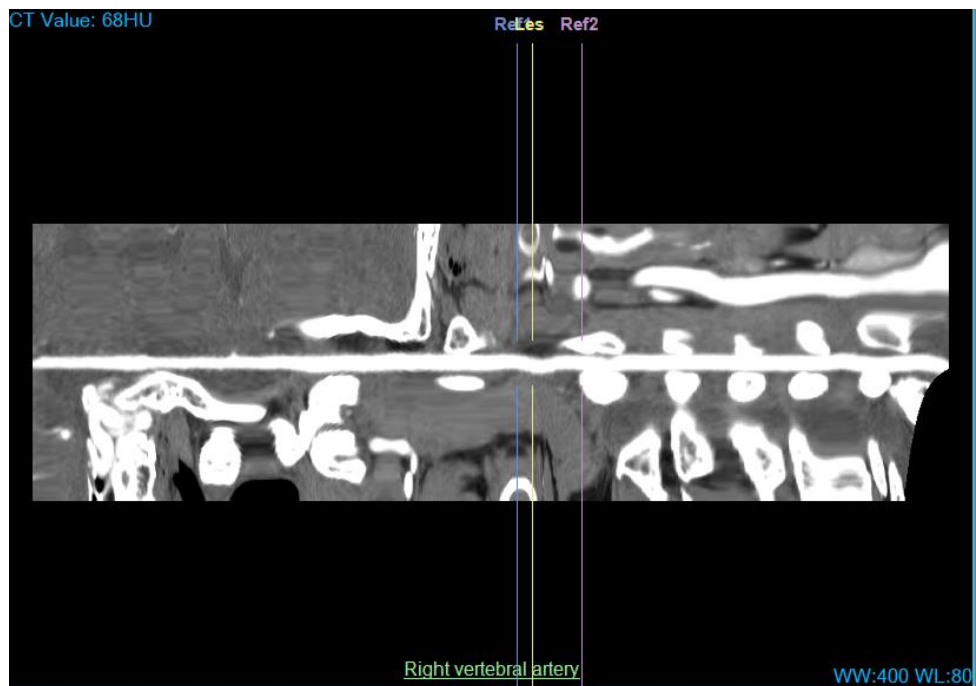


Figure 20-11 Straightening View (No displaying Curve Image)

The curve image shows four kinds of contents: area, equivalent diameter, maximum diameter and minimum diameter, which can be switched by the right click menu item.

The Ref1, Les, Ref2 of the view are corresponding to the reference line of CPR view. When you drag the reference line, the reference line of CPR and the window of the vascular section are also refreshed with it.

Vascular Section: as shown in figure 20-12. Reference1, Lesion and Reference2 respectively correspond to the placed vascular section images of Ref1, Les and Ref2. In addition, the displayed information is the area, equivalent diameter, maximum diameter, minimum diameter, location, reference position name, contour line of the vascular section, etc.

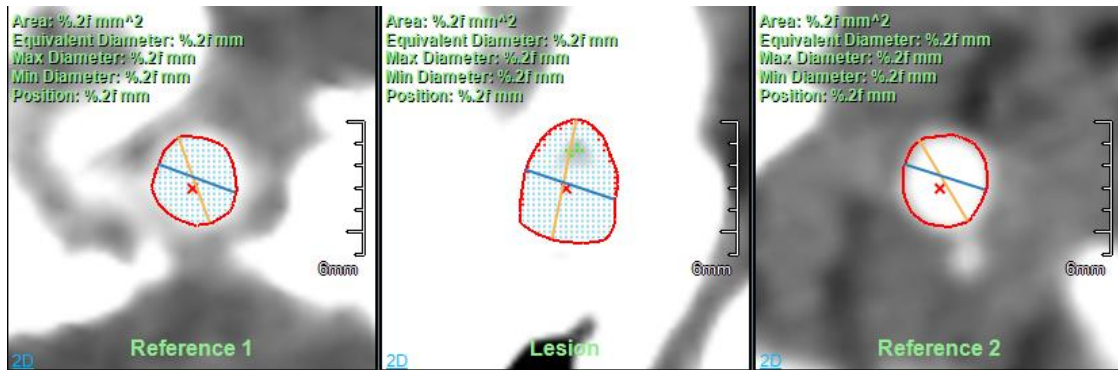



Figure 20-12 Vascular Section View


Evaluation results: as shown in figure 20-13, narrow and plaque evaluation results are included.


Composition	Reference 1	Lesion	Reference 2	All Slice
Plaque (-45 - 120)	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>3</sup> 0.00%
Wall (121 - 200)	1.01 mm <sup>2</sup> 3.66%	0.30 mm <sup>2</sup> 0.33%	0.95 mm <sup>2</sup> 1.27%	75.76 mm <sup>3</sup> 2.32%
Lumen (201 - 550)	28.70 mm <sup>2</sup> 96.34%	75.40 mm <sup>2</sup> 99.61%	73.81 mm <sup>2</sup> 98.73%	3191.17 mm <sup>3</sup> 97.68%
Calcification (551 - 1000)	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>2</sup> 0.00%	0.00 mm <sup>3</sup> 0.00%

Figure 20-13 Evaluation Result View

## 2.Function

Single point extraction center line  : it supports on the window of VR and cross section that the vascular center line is defined by clicking on a point on the vascular part. And after it is named, the information of the vascular size, section diameter and area and narrow are automatically evaluated.

Multi-point extraction center line  : it supports on the window of VR and cross section that the vascular center line is defined and evaluated by clicking on multiple consecutive points.

Aorta and iliac vessels  : Support to define three seed points in the order of the aorta, left iliac or right iliac on VR and cross-sectional windows, extract the center line according to the position of the seed points and perform vascular evaluation.



Manually drawn center line: it supports on the three windows of VR, cross section, coronal image and sagittal plane that a vascular center line is defined by continuously clicking on the mouse. After name it, blood vessels can be automatically evaluated.



Edit center line: it supports on VR window that control points are added by holding on Ctr clicking on the left mouse button. Delete control points by using the right-click menu item on the control points. Edit the control points by dragging them to any arbitrary position. On the windows of the cross section and vascular section, edit them by dragging control points. The recovery and revocation functions of editing operation are supported.



Extended center line: it supports on the cross section, coronal plane, sagittal plane and VR that a point is defined and a center line is extended to the position. Simultaneously vascular evaluation can be automatically performed.



Connect the center line: it supports that the two selected vascular center lines are connected into the new center line, and the original center line function is deleted.



Contour drawing: it supports that contour drawing is performed in three windows of Reference1, Lesion, Reference2, and during the course of which the functions of revocation and recovery are supported. After drawing is confirmed, the information of vascular patches will be automatically calculated.



Contour editing: it supports that contour control points are edited in three windows of Reference1, Lesion and Reference2, and the functions of revocation and recovery are also supported. After editing is confirmed, the information of vascular patches will be automatically calculated.



Stenosis analysis: according to the size information of vascular section, calculation is automatically made and Les position is located to the narrow position.



Plaque definition: it supports that plaque information is evaluated within the designated area of CPR center line. The designated area can be adjusted by dragging the mouse. After the plaque is defined successfully, it can apply the current fake color scheme and other fake color schemes can also be replaced.

Fake color: as shown in figure 20-14, the fake color scheme currently applied is displayed on the left side of the CPR window. Double click on the fake color bar, the fake color scheme can be changed, added, deleted and

edited.

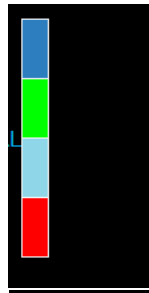


Figure 20-14 Fake Color



Plaque histogram: as shown in figure. 20-15, the horizontal axis is the CT value data type, and the vertical axis is the statistical distribution of CT value volume. According to the fake color scheme of the plaque application. Different colors identify different CT value distribution range.

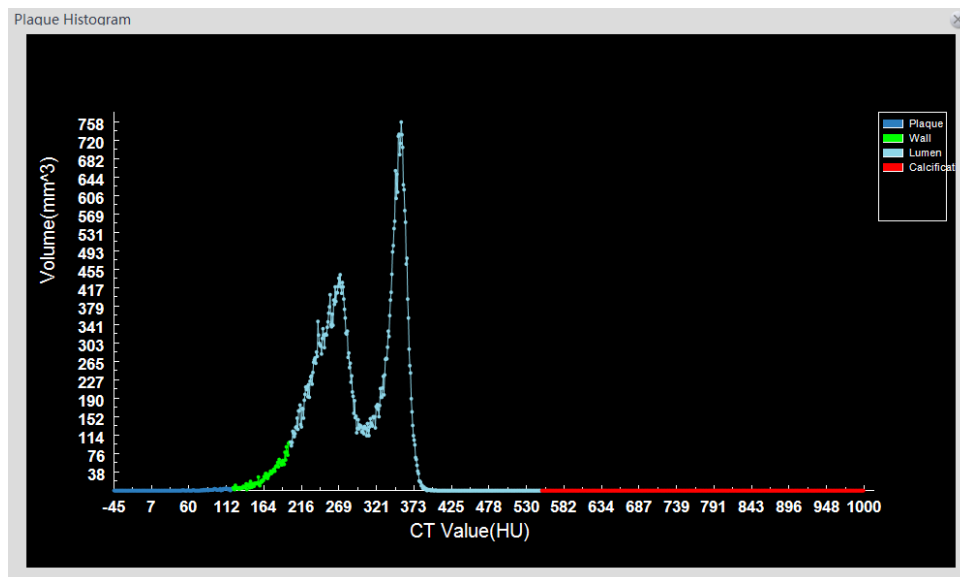


Figure 20-15 Plaque Histogram

Center Line right click menu: as shown in figure 20-16, it supports the functions of deletion, renaming and reversal. When the center line is deleted, the corresponding center line in the center line list of the panel is also deleted. When the name is changed, the names on all view windows and the names in the center line list of the panel are updated in sync.



Figure 20-16 Center Line Menu

## 20.7 Stent Planning

The stent phase is used to define the stent surgery plan. According to the requirements of stent manufacturers, specific stent protocols can be customized, and then stent measurement information can be obtained by applying the stent protocol in the target vessels to provide reference for the stent plan. The precondition for implementing this plan is that the vascular center line has been correctly extracted, and the vascular contour information (including diameter and area) has been correctly calculated.

### 1. Basic Concept

#### 1) Protocol

A protocol is a set of default protocol items. You can add, edit, and delete protocols manually in the "Protocol Settings" dialog box, and save them locally in the form of a configuration file.

#### 2) Protocol Item

Protocol item is the basic unit of protocol, and each one is equivalent to a measurement parameter, including vascular section diameter, area, statistical information, vascular length between two vascular sections, lesion location angle, and vascular branch angle. Like the protocol, the operations of adding, editing, deleting are supported. There are two types by definition:

Default protocol item: measurement parameters are provided by the stent manufacturer and must be defined and added in accordance with the requirements of the manufacturer. It is a part of the protocol and can be applied to any stent.

Custom protocol item: It does not belong to a protocol. Users can add, edit, delete the custom protocol item to the specified stent, which is only valid to the specified one.

There are three categories by type:

Diameter: The diameter of the vascular cross section.

Length: It is determined by two diameters, indicating the centerline length between them. It must be satisfied that two diameters are on a center line.

Angle: It is determined by three diameters, for example (D1, D2, D3) denotes the angle formed by side D2D1 and side D2D3. There are two kinds of angles. One is branch angle, which is composed of proximal cross section, bifurcated cross section and branch cross section, and must be such that D1 and D2 on a center line, or D2 and D3 are on a center line. The other is the lesion angle, which is composed of the proximal cross section, the

lesion cross section, and the distal cross section. All three diameters must be on the same centerline.

For example, for AAA the following protocol can be defined: proximal stenosis diameter (D1), proximal stenosis distal diameter (D2), aneurysm diameter (D3), aortic bifurcation point diameter (D4), distal diameter of right iliac crest (D5), distal diameter of left iliac crest (D6), proximal stenosis length (L1), stent length (L2), angle of artery stenosis (An1), left and right iliac artery angle (An2), etc., with reference to figure 20-17.

## 2.View

CPR: As shown in Figure 20-17. Display the current vascular CPR image. The switching between CPR and longitudinal section window is not supported. All defined protocol items are displayed on the center line. The currently selected protocol item is shown in red, such as diameter D1.



Figure 20-17 CPR View

Vascular section: The currently selected vascular section image, as shown in Figure 20-18, indicates that D2 is currently selected. The area, equivalent diameter, maximum diameter, minimum diameter and position information of the vascular section are displayed in the upper left corner of the window.

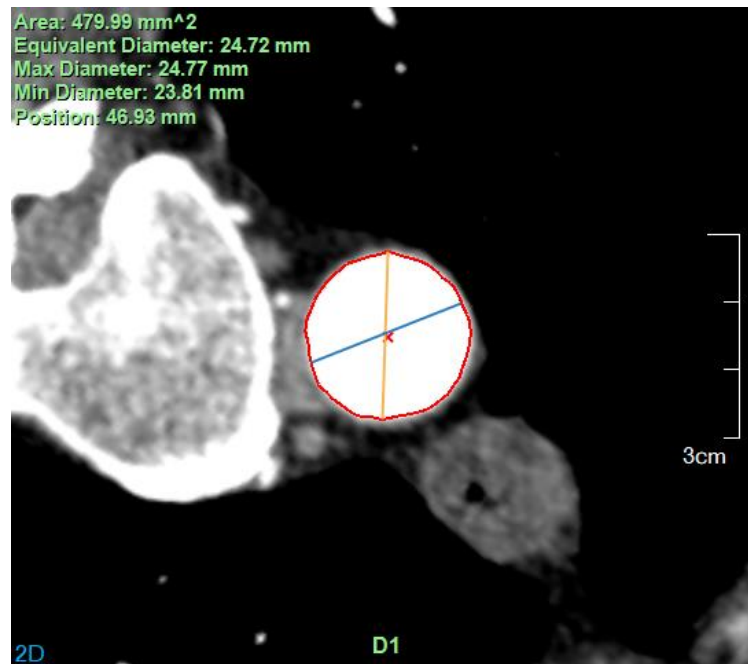
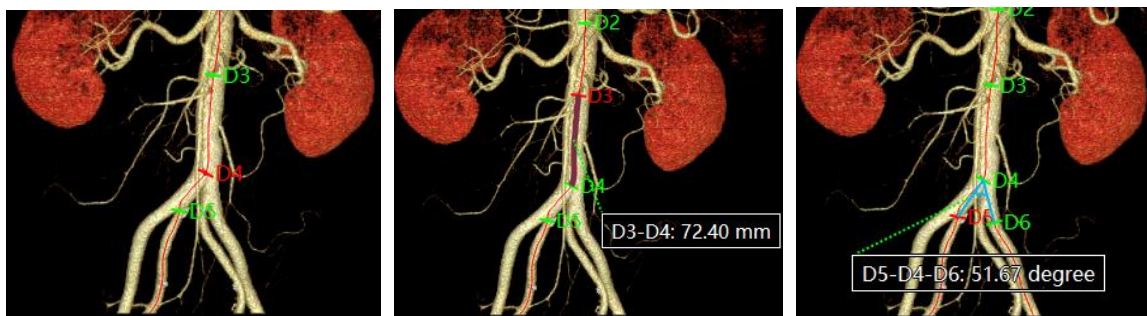


Figure 20-18 Vascular Section View

VR: In addition to displaying the currently selected center line, different information will be displayed depending on the currently selected protocol item. For example, as shown in Figure 20-19, (a) when the diameter protocol item is selected, the diameter is red;(b) When the length protocol item is selected, the center line between D3 and D4 is shown in brown and red, and the length measurement value is displayed with TIP; (c) When the angle protocol item is selected, the included angle between side D4D5 and side D4D6 is represented in blue, and the angle measurement value is displayed with TIP, as shown in Figure 20-19.



(a) Select the Diameter

(b) Select the Length

(c) Select the Angle

Figure 20-19 VR View

Straighten CPR: It is the same as shown in the [Vascular Analysis] phase, as shown in Figure 20-20.



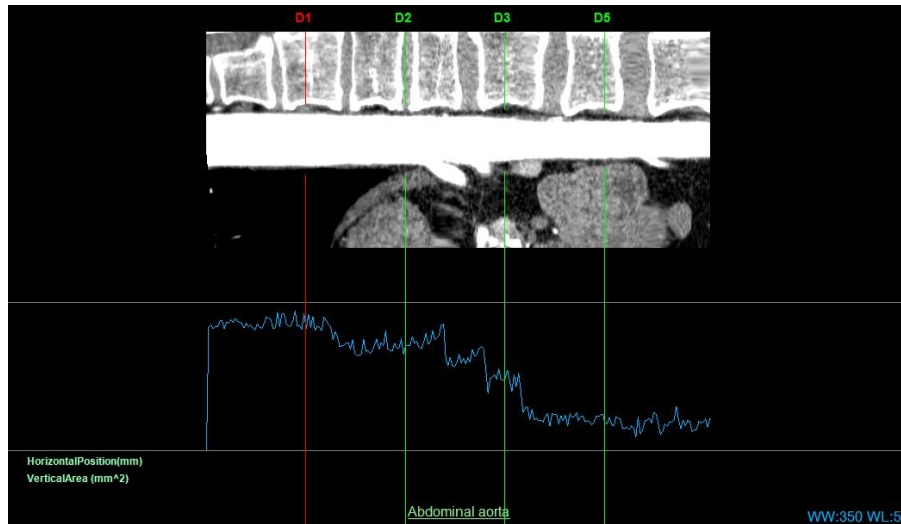


Figure 20-20 Straighten CPR View

Statistical table: It displays the parameter values of the currently selected stent protocol in the form of a table. The selected protocol items are displayed in red, and the others are displayed in green by default. The table contains three columns: protocol item name, protocol item description, and protocol item measurement value, as shown in Figure 20-21.

Name	Result	Description
D1	Eff:24.72 mm Max:24.77 mm Min:23.81 mm Area:479.99 mm <sup>2</sup>	Proximal part of proxi...
D2	Eff:23.62 mm Max:24.07 mm Min:22.17 mm Area:438.31 mm <sup>2</sup>	Distal part of proxima...
D3	Eff:21.41 mm Max:25.02 mm Min:19.37 mm Area:359.87 mm <sup>2</sup>	Aneurism
D4	Eff:23.08 mm Max:23.35 mm Min:21.62 mm Area:418.45 mm <sup>2</sup>	Proximal part of dista...
D5	Eff:17.87 mm Max:17.71 mm Min:17.02 mm Area:250.91 mm <sup>2</sup>	Distal part of distal ...

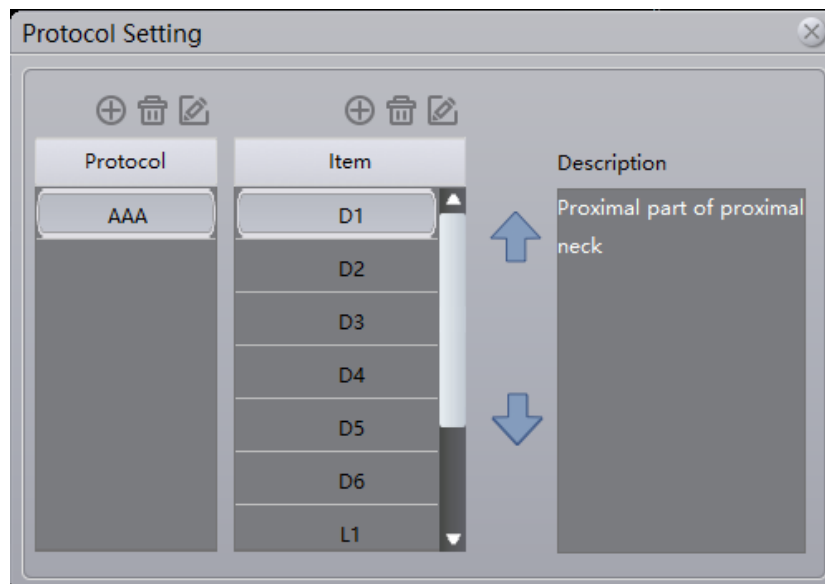
Figure 20-21 Table View

### 3.Function

#### 1)Protocol Setting



Support the operations of browsing, adding, editing and deleting default protocol/protocol items. The measurement parameters defined in this protocol item are provided by the stent manufacturer. Once saved successfully, the protocol will be locally saved in the form of a configuration file as shown in Figure 20-22.



**Figure 20-22 Protocol Setting**

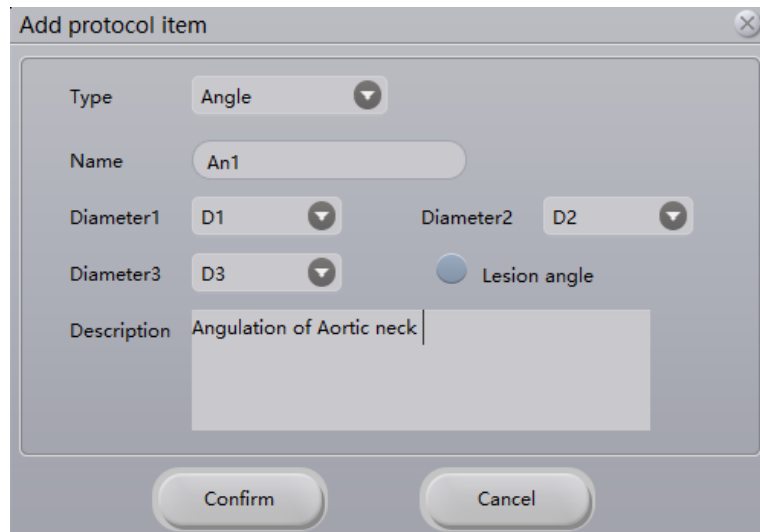
Specific protocol Settings are as follows:

**Add protocol:** Add a protocol item in the protocol list. Its name must not be empty or repeated.

**Edit protocol:** Change the name of the selected protocol. If the protocol has been applied by the stent, the stent list of the panel should be updated synchronously.

**Delete protocol:** Delete the selected protocol. If the protocol has been applied to the stent, all the measurement data of the stent should be deleted simultaneously.

**Protocol item to add:** Protocol item can be divided into three kinds. One is to add diameter, which needs to specify diameter name and diameter description information. The second is to add the length, which needs to specify the length name, two diameters referenced by the length, length description information; The third is to add the angle, which needs to specify the angle name, the three diameters referenced by the angle, the description information of the angle, and also specify whether the angle is the pathological angle. After a successful addition, the protocol item position of the protocol item is automatically defined in the window and the measured value is calculated as shown in Figure 20-23.



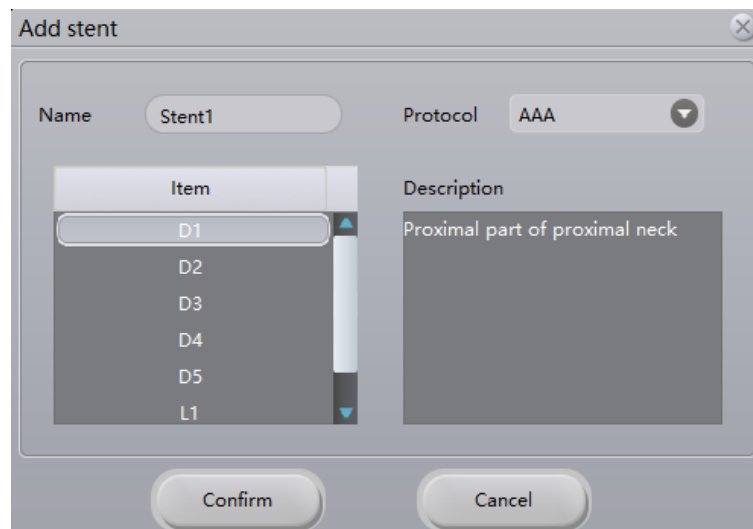
**Figure 20-23 Add Angle Protocol Items**

Protocol item to edit: The type information of the ethe other information is allowed to be edited. The protocol list of the panel is updated and the parameter values of the protocol items are recalculated.

Delete protocol item: If the owning protocol has been applied by the support, the user-defined protocol that references the protocol is also deleted. Update the support protocol list and protocol list on the panel.

**2)Add Stent**

Define a new stent on the selected center line. In the dialog box in Figure 20-24, you can add a new stent by specifying the stent After successful addition, a new stent item is added to the stent list of the panel, and the position of the protocol item is automatically defined and the measurement parameter value is calculated, as shown in Figure. 20-25.



**Figure 20-24 Add Stent**

Stent	Protocol
stent1	AAA

Item List ⊕ 🗑️ ✎

Item	Status
D1	OK
D2	OK
D3	OK
D4	OK

Description

Proximal part of proximal neck

Figure 20-25 Panel

### 3)Edit stent

Edit the stent name and the stent protocol. After the protocol is changed, the old custom protocol items are all deleted and the stent protocol items list is updated synchronously.

### 4)Delete Stent

Delete stent, and delete the report picture of the stent simultaneously.

### 5)Add Custom Protocol Item

Users can add custom protocol items to the protocol item list. The operation steps are as follows:

1.Select any stent first.

2.Click the [+] button above the list of protocol items to pop up the "Add Protocol Items" dialog box, as shown in Picture 20-26.

3.Fill in the protocol name, type, and description in the dialog box.

Add protocol item ✕

Type  ▼

Name

Description

Figure 20-26 Add Custom Protocol

#### 6)Edit Custom Protocol Item

Only custom protocol items are allowed to be edited. Click the "Edit" button, and the "Edit Protocol Item" dialog box pops up. Then you can edit the name and description, and the type of the protocol item is forbidden to edit.

#### 7)Delete Custom Protocol Item

Only custom protocol items are allowed to be deleted. Default protocol items are forbidden to. After deletion, the previous protocol item is in the selected state. If the deleted diameter protocol is referenced by other protocol items (length, angle), the referenced protocol item is deleted simultaneously.

#### 8)Redefine Diameter



Support resetting the diameter selected in the protocol item list in the CPR/VR window. After successful definition, the values of all associated protocol items are recalculated.

#### 9)Redefine All Diameters



All the diameters of the selected stent are defined on the currently selected center line, and all protocol items values are recalculated.

#### 10)Add Image to the Report



Save the contents of the selected window in the form of a picture. The image window saves the screenshot area of the window, while the report window saves all report items, including those that are not displayed in the current window, as shown in Figure 20-27.



Figure 20-27 Stent Report Image Window

#### 11)Send to Report



Send to the report using the stent report image window and automatically generate the PDF report.

## 20.8 Send to the Film

### 1.Measure Layout 1

The selected window is the vascular section or the straightened CPR, and when the window is not in the enlarged state, the image that is sent to the film is the window composition, as shown in figure 20-17; when the window is in the enlarged state, only the selected window image is sent to the film.

When the selected window is the one outside of the vascular section or the straightened CPR, only the selected window image is sent to the film.

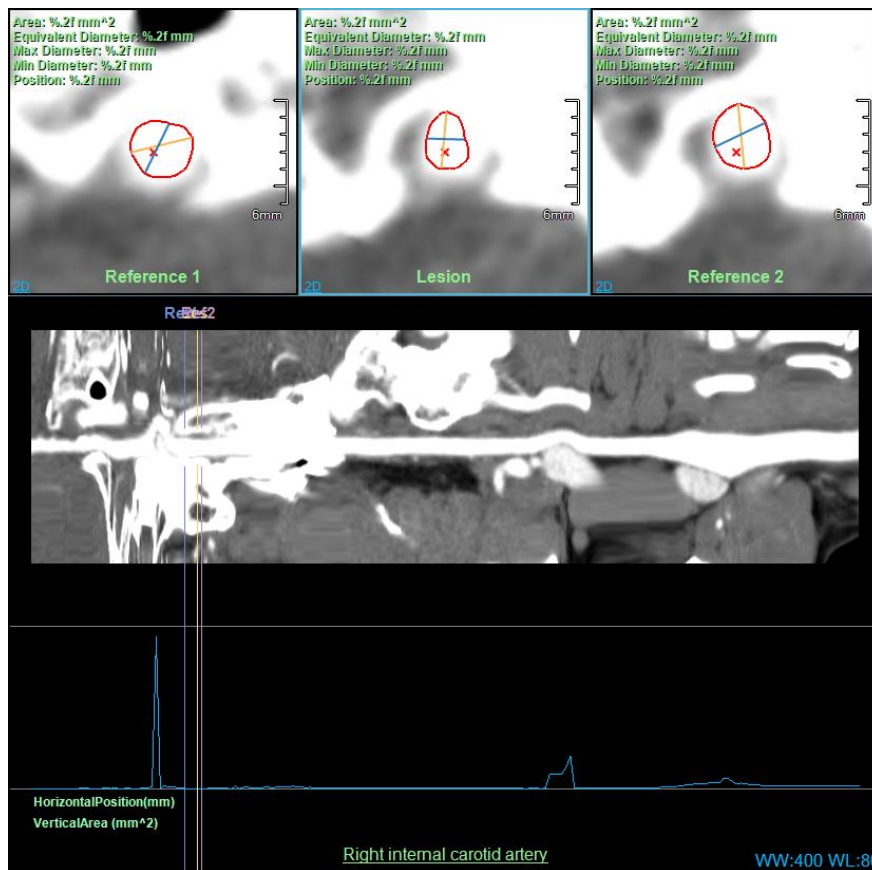


Figure 20-17 Composition Window

## 2.Measure Layout 2

The selected window is the vascular section, and when the window is not in the enlarged state, the image that is sent to the film is the window composition, as shown in figure 20-18. When the window is in the enlarged state, only the selected window image is sent to the film.

When the selected window is the one outside of the vascular section, only the selected window image is sent to the film.

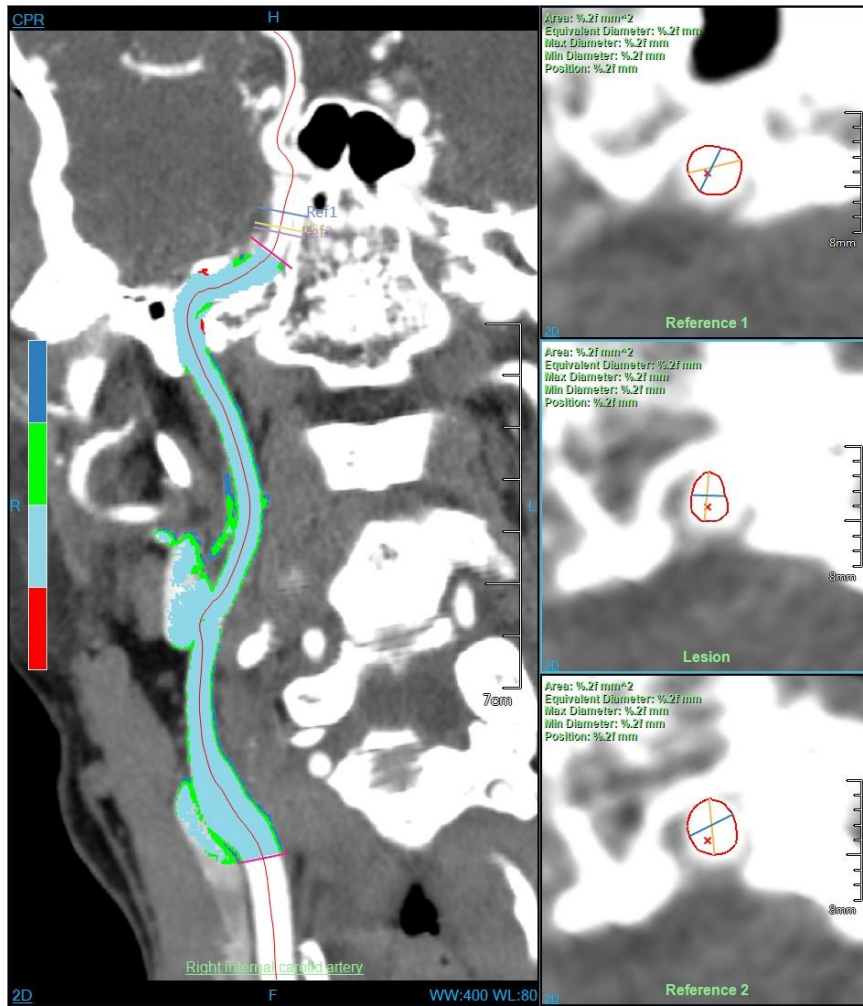


Figure 20-18 Composition Window

## 20.9 Send to the Report

Please refer to 22.7 Send to the film in the chapter.



## Chapter 21 Cardiac Coronary Artery Analysis (Option)

Cardiac coronary artery analysis, called as CCA for short in the following, is an application program plug-in which mainly uses CT data, utilizes a series of medical image analysis algorithms, and assists doctors in the diagnosing and evaluating the diseases related to cardiac coronary artery, which provides an intelligent one-stop diagnostic service. Fully automatically segmenting heart and coronary artery tissues, extracting vascular contours, locating narrow positions and calculating narrow results help doctors to quickly understand patients' lesions. Meanwhile, the variety of convenient, fast and interactive tools provided assist doctors to finely analyse and diagnose.

### 21.1 Start

The cardiac coronary artery analysis (CCA) plug-in, as a function of the system, is deployed in advanced application modules. In figure 21-1, select [CCA] through the image browsing in the patient information page and it can be switched to the cardiac coronary artery analysis (CCA) plug-in.

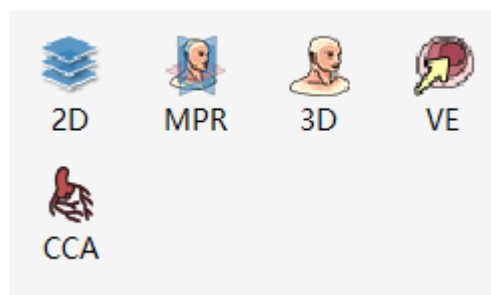


Figure 21-1 First Start CCA

If the CCA is not first started, but removed to other application plug-ins and when it is migrated back, click the [CCA] icon shown in figure 21-2 to return the CCA application plug-in.

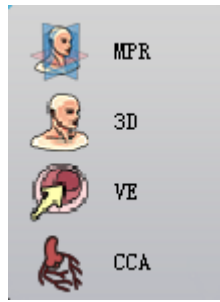


Figure 21-2 Return CCA

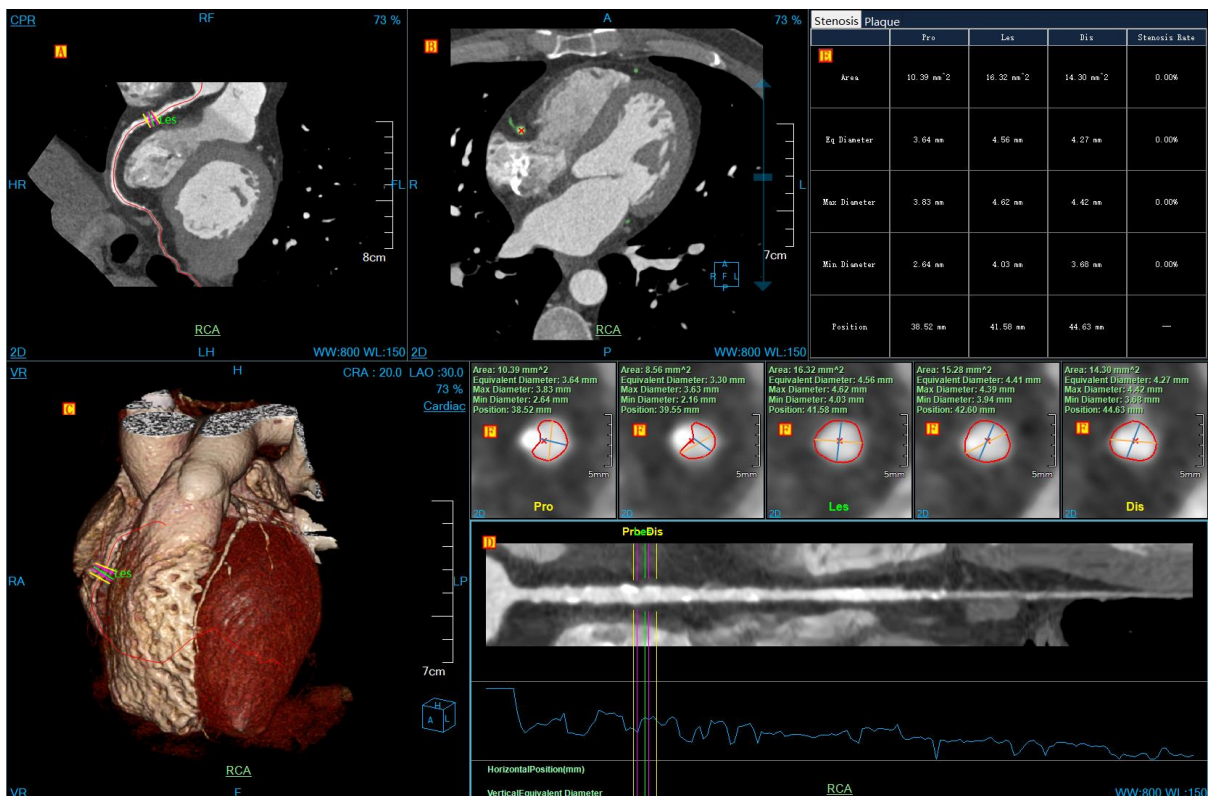
## 21.2 Data Loading

Select the data from the patient list of the patient management and click [CCA] to load. In that way, the data can be loaded to the CCA application plug-in.

## 21.3 Automatic Analysis

### 1. Interface

After data loading is completed, the system will conduct the one-stop fully automatic coronary artery analysis, including automatically segmenting heart, ascending aorta, coronary artery, automatically extracting coronary artery blood vessel center line, automatically extracting blood vessel contours, automatically locating narrow positions to calculate the relevant measurement index and the final analysis results are presented to the user, which is shown in the figure below.



**Figure 21-3 CCA Automatic Analysis Result**

- A: CPR Image, the image of a vascular curved plane. In the upper left corner, it can be switched to the longitudinal section, coronal image and sagittal plane and vascular section.
- B: the axial plane
- C: VR Image: in the upper left corner, it can be switched to the endoscopic image.
- D: Vessel Straightening Image.
- E: stenosis and plaque statistical form.
- F: vascular section corresponds to the position of the five reference lines on the center lines. When the reference line is moved, the vascular section is updated. When the section is turned over, the reference line also moves.

## 2.Function



- : five kinds of image area layouts, including 2\*2、 1+3、 horizontal layout、 horizontal layout2、 vertical layout.



- : switch the orientation information of VR images, axial plane, coronal plane, and sagittal plane.



- : cut VR images.



- : set seed point. Automatically segment and extract according to the seed point information. If the automatic analysis results are not ideal, this function can be used to improve the accuracy of automatic analysis.

[suggestion]: it is recommended that the user define the seed point at the root of ascending aorta so that the accuracy of the analysis results can be improved.

## 21.4 Segmentation Tools

### 1.Interface

As shown in figure 21-4, the segmentation tools to the organization are provided. When the automatic segmentation results are not ideal, the following tolls can be used for modification.

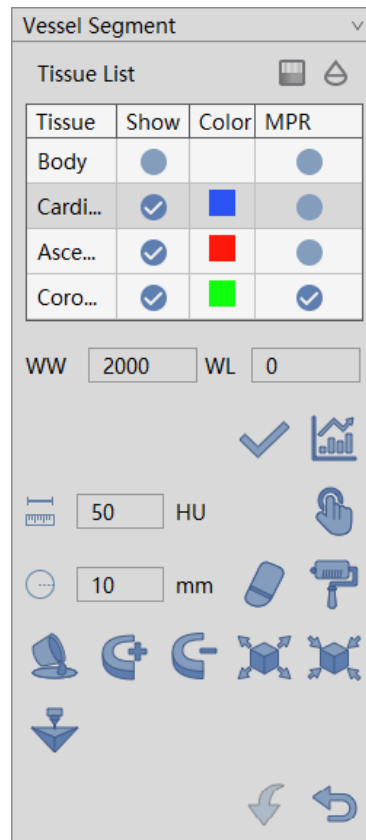







Figure 21-4 Segmentation Tool Panel









## 2.Function

- : Opacity setting function. Set the opacity of the selected tissue in the tissue list.
- : Permeability setting function. Set the permeability value of the selected tissue in the tissue list.

➤ : Manual Extraction: Hold down the left mouse button to extract the tissue in the area that you are interested in any of MPR window. You can set the step parameters to designate the growth rate of the manual extraction tissue. Step parameters can be set to specify the growth speed of manual extraction tissue.

➤ : Hole Filling. If the extracted tissue is not fully extracted, and when there are other tissues within the volume, you can use the function to fill the tissue with the internal tissue.

- : 3D Staining. A 3D sphere is used to perform the tissue extraction function on MPR image. The radius of the 3D sphere can be set through the [Radius] parameter.

-  : 3D Erasure: A 3D sphere is used to perform the erasure function of the extracted tissue. The radius of the 3D sphere can be set through the [Radius] parameter.
-  : Projection addition is suitable for the tissue extraction. Hold down the left key to demarcate a closed area on MPR image. And the closed area is projected layer-by-layer from the upper and lower ends to form a volume area, which is the extracted tissue.
-  : Projection deletion is suitable for the tissue extraction. Contrary to projection addition, the function is used to delete the tissue from the extracted tissue formed by projecting the tissue layer-by-layer from the upper and lower ends.
-  : Inflation is suitable for the tissue extraction. A morphological algorithm is applied to the extracted tissue to combine the other tissues of the tissue boundary into the tissue function to be extracted.
-  : Corrosion is suitable for the tissue extraction. The difference between inflation and corrosion is the function to delete the part of the boundary of the extracted tissue.
-  : Reverse back, go back to the tissue state to the last extracted result state.
-  : Reset: is to empty the extracted tissue area. Permeability tissue function: is the permeability value of the selected tissue in the tissue list is set.
-  Printing Modeling: Send selected segmentation to Printing Modeling plugin.

## 21.5 Analysis Tools

### 1. Interface

As shown in figure 21-5, the tools related to coronary artery analysis are provided, including extraction center lines, extraction contour, narrow analysis and patch analysis tools.

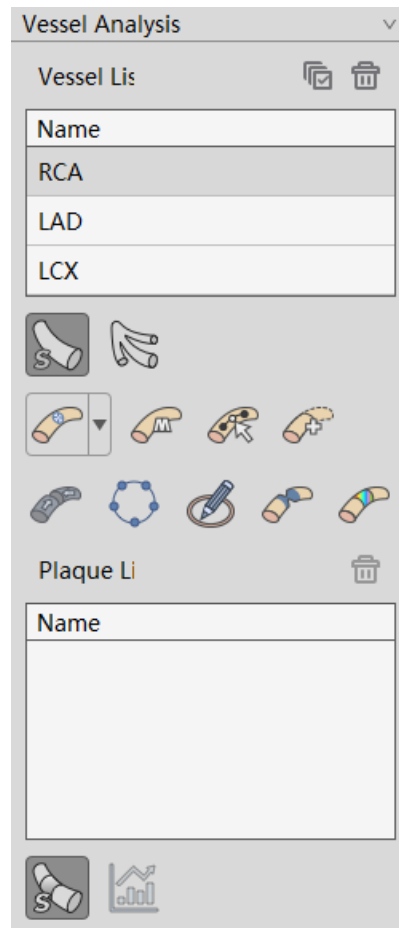



Figure 21-5 Analysis Tools Panel

## 2.Function

### 1)Vessel list

➤  : Delete the selected vessels in the list.

➤ Modify the name of vessel: Double click on the vessel in the list to modify the name of vessel.

### 2)Show hiding of blood vessels

➤ [Vessel Name]: The name of vessel is shown in the view window when the vessel is selected. The name of that isn't shown in the view window when the vessel is not selected. Refer to figure 21-6.

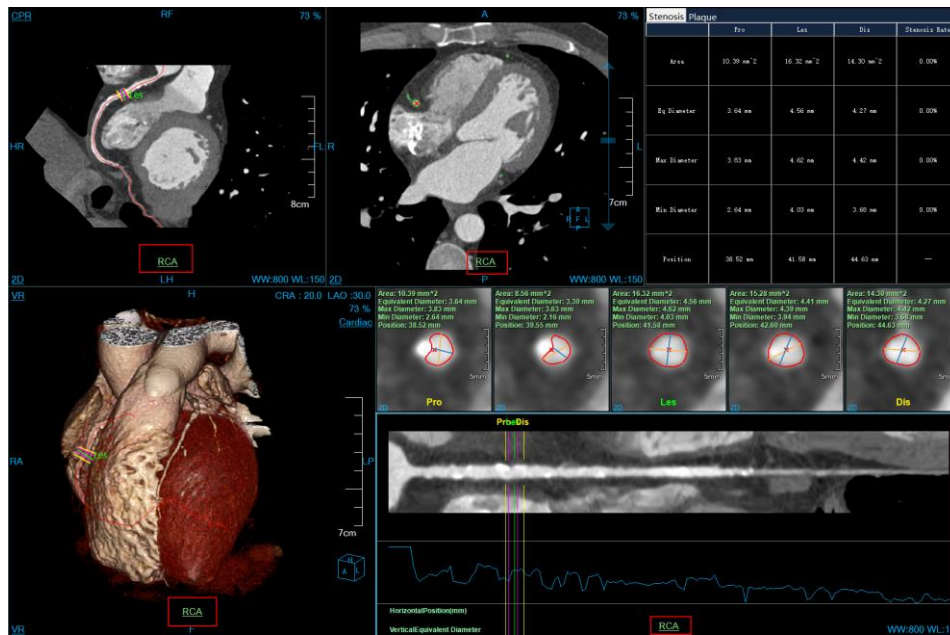


Figure 21-6 Show Vessel Name

[Only Show the Current Vessel]: When selected, only the blood vessels on the currently selected center line are shown on the VR window. Others aren't displayed. When not selected, all the blood vessels are shown. Refer to figure 21-7.

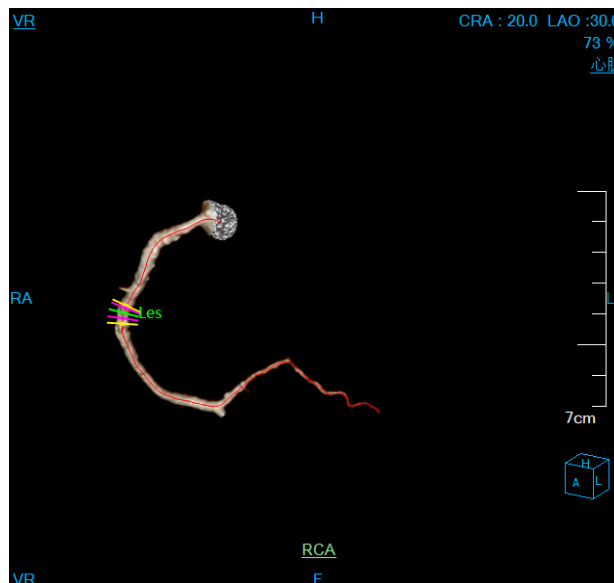






Figure 21-7 Only Show the current blood vessels

3)Vascular Center Line Editing Tools


- : Single Point Extraction Center Line. Click a point on the MPR or VR window to automatically extract a central line after the central line is named, it is automatically added to the vascular list and the vascular stenosis information is automatically calculated .
- : Multi-point Extraction Center Line. A central line will be automatically extracted after multiple


points are clicked on the different vascular parts of MPR or VR window and after the floating [OK] button on the corresponding MPR or VR window is clicked. After the central line is named, it is automatically added to the vascular list and the vascular stenosis information is automatically calculated. Click the cancel button, the central line extraction process will be exited.

- : Purely Manually Drawing Center Line. The user purely manually draws the center line path. When the drawing is completed, the center line name is prompted. After the central line is named, it is automatically added to the vascular list and the vascular stenosis information is automatically calculated.

- : Edit the Center Line. Edit the currently selected center line. The vascular stenosis information will be automatically calculated after editing center line is successful and added to the vascular list.

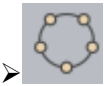
Control points can be added by holding down the Ctrl button + the left mouse button, the operations such as deleting control points can be performed by the right click pop-up menu. After editing, click the floating [accept] button on the corresponding window to complete the editing operation. Click the floating [cancel] button on the window and the center line will be restored to its original state before editing. [undo] and [restore] can perform the operation of the previous step, at most up to 7 steps.

- : Extended Center Line: extend the currently selected center line. Each time click a point to extend the center line and the extended operation can be performed repeatedly. The vascular stenosis information is automatically calculated after the extension is successful and added to the vascular list. After the extension is completed, click the floating [ok] button on the corresponding window to complete the extension. Click the floating [cancel] button on the window and the center line will be restored to its original state before the extension. After the extension is completed, the vascular stenosis information will be automatically calculated after the extension is successful and added to the vascular list.

- : Connect the Center Line. Connect the selected two center lines. After clicking the connection, the new center line is generated through the selected 2 center lines of VR or list. After the connection is successful and added to the vascular list, the vascular stenosis information is automatically calculated. Click the floating [ok] button on the corresponding window to complete the connection and delete the two previous center lines. Click the floating [cancel] button on the window, and the center line will be restored to the previous connection state.



#### 4)Vascular Contour Editing Tool



- : Contour Edit Button, realize editing the vascular contour in five vascular cross-sectional window.

Click the edit button and drag different control points to achieve the accurate editing of vascular contour.

In the meanwhile, the maximum and minimum diameter can be edited.



- : Contour Drawing Button, realize the manually drawing vascular contour in five vascular cross-sectional window. Click the drawing button to freely outline the vascular contour.

The specific functions of revocation, recovery, confirmation and cancellation as follows:

- Revocation: in the process of contour line editing, the editing operation can be undone, to go back to the previous state of the current contour, in which 7 step operation can be performed at most;
- Recovery: in the process of contour line editing, the editing operation can be recovered, to go back to the previous state of the current contour, in which 7 step operation can be performed at most ;
- Confirmation: all the quantitative parameters are recalculated according to the current contour range and the contour line and the longest and shortest paths are redrawn. If there is a plaque information, the plaque information is updated after confirming the contour editing or drawing results;
- Cancellation: don't do any change. Restore to the existing state.

#### 5)Vascular Stenosis Analysis Tool





- : automatically detect the current vascular stenosis position. The positions of five reference lines will be recalculated after calculation, among which the Les is located in stenosis. Pro and Dis are located at the two ends of stenosis. The remaining 2 reference lines are respectively shown between Pro, Les and Les, Dis.

#### 6)Vascular Plaque Analysis Tool



- : carry on the quantitative analysis to the plaques in blood vessels. In CPR and vascular interface view, different plaque components are marked in different colors. Update plaque statistical analysis table and switch to the plaque statistical table. The defined plaque will be added to the plaque list.
- Plaque List: show the defined plaque in the current vascular center lines. The operations of switch and deletion can be performed;

➤ : hidden plaques are shown;

➤ : the histogram distribution of plaques is shown.

## 21.6 Report Tools

### 1. Interface

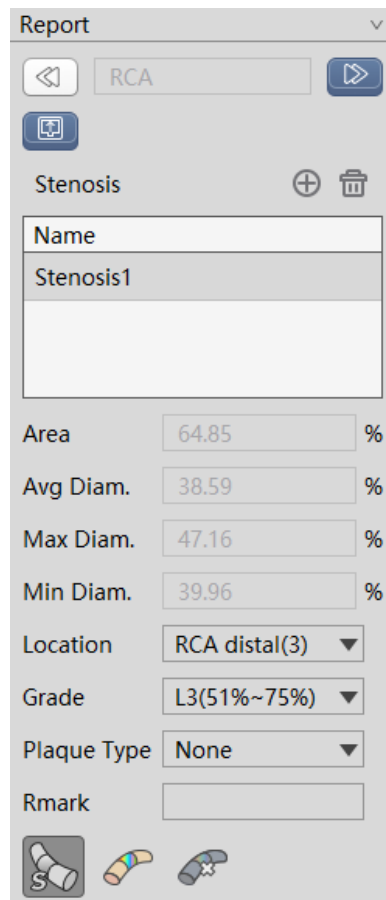




Figure 21-8 Report Interface


### 2. Function


➤ : it's used to switch blood vessels. When there are not switchable blood vessels on the left or right, the button is in gray color. When the current vascular name is shown in the middle, it cannot be edited.


➤ Stenosis List: record the current vascular stenosis information, which can be added and removed. Name modification is not supported.

➤ The Information of Stenosis Rate, etc.: record the related information of the current stenosis position, among which the stenosis rate information is automatically calculated by the system, and not allowed to modify; The location, stenosis level, plaque type, and remarks are set by the user.

➤  : The visibility of plaque of the current stenosis position

➤  : Define the plaque of the current stenosis position.

➤  : Delete the plaque of the current stenosis position.

 : After editing all the blood vessels, click the button to generate the PDF report of the coronary arteries. As shown in the figure below:

Your Hospital's Name  
Your Hospital's Address, Phone, Web

### Coronary Report

<b>Patient Id:</b>	11606642	<b>Name:</b>	YANG JING YUAN
<b>Birth Date:</b>	1973-07-16 00:00:00	<b>Age:</b>	42( years)
<b>Sex:</b>	M	<b>Ethnic Group:</b>	
<b>Exam Date:</b>	2016-05-18 09:44:27	<b>Exam No. :</b>	3684123
<b>Accession Number:</b>		<b>Content Date:</b>	2018-07-13 09:10:54

---

<b>Weight:</b>		<b>Body Surface Area:</b>	
<b>Height:</b>		<b>Body Mass Index:</b>	
<b>Allergies:</b>		<b>Cholesterol:</b>	
<b>Blood Pressure:</b>		<b>Diabetes:</b>	
<b>Smoking:</b>		<b>Overweight:</b>	
<b>Medication:</b>			

---

<b>Ordering Physician:</b>		<b>Referring Physician:</b>	
<b>Radiologist:</b>		<b>Cardiologist:</b>	
<b>Endoscopist:</b>		<b>Technologist:</b>	
<b>Registered Nurse:</b>			

---

**Scan Parameters**

Exam Date	Pixel Size (mm)	Thickness/Spacing (mm)	kV	mA	mAs	Recon Name	Manufacturer
2016/5/18		0.750 / NA	120.00	902	256		SIEMENS


**Coronary angiography**

The diagram illustrates the coronary artery system with the following components and labels:
 

- Aorta**: The main arterial trunk.
- Main LCA**: Main Left Coronary Artery.
- LAD**: Left Anterior Descending Artery, with stenosis points 6, 7, 8, 9, and 10.
- RCA**: Right Coronary Artery, with stenosis points 1, 2, 3, and 4.
- Branches**: Other labeled branches include CB, SN, AV, AM, RPD, AC, PL, PD, OM, and Clrc.
- Stenosis Points**: Numbered points 1 through 15 indicating specific areas of narrowing.

YANG JING YUAN(11606642) -1- 2016-05-18 09:44:27

Figure 21-10 PDF Report

- : Quit the report mode.








## 21.7 Major General Tools

### 1. Show/ hide tools of information

As shown in figure 21-11, it mainly includes:



Figure 21-11 General Tools

-  Show hiding of overlap information;
-  Whether the MPR image information of zooming and window width and window level is linked.
-  Show hiding of MPR window crosshair;
-  Show hiding of MPR and VR window bound box;
-  Show hiding of the vascular center line;
-  Show hiding of the vascular contour line;
-  Whether the crosshairs are orthogonal;

### 2. Drawing Mode Tool

- MPR, CPR and vascular section window: the modes of 2D/MIP/MinIP/AIP can be shown.
- VR Window: the modes of 2D/MIP/MinIP/AIP and DSA can be shown.

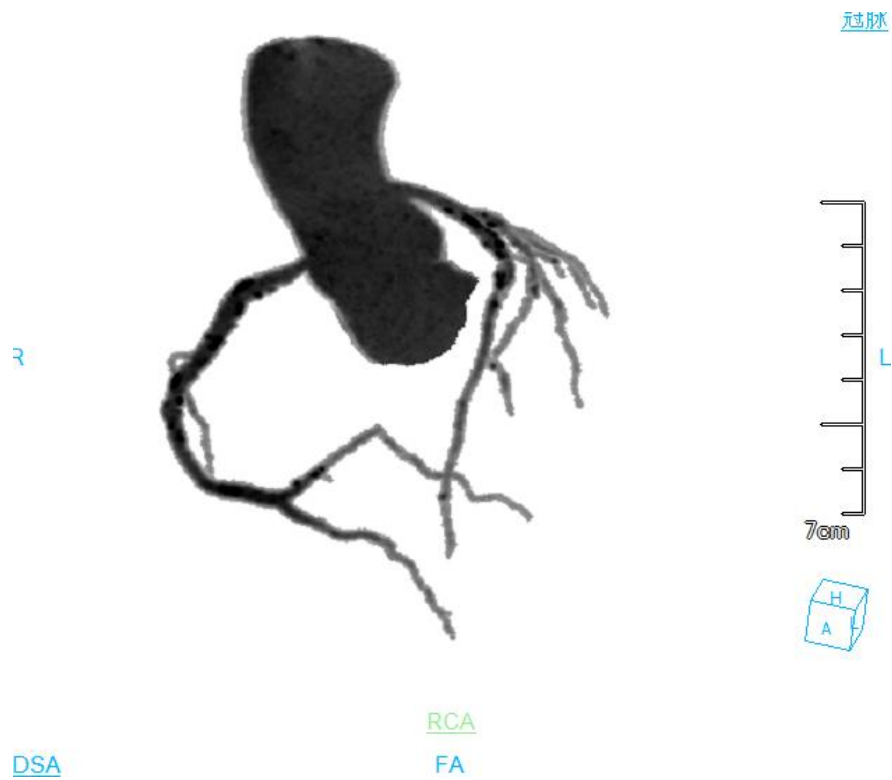


Figure 21-12 DSA Image

### 3. Coronary angiography is commonly used for body position switch

- The body position switch function commonly used by the coronary angiography is provided by the right button in VR window. Users can quickly switch to the specific place according to need.

## Chapter 22 Cardiac Calcium Score (Option)

Based on the image data loaded by patient management, taking image series as unit, cardiac calcium score (CCS) plug-in can mark highlighted area according to CT threshold value, mark the part that needs to calculate scores, calculate calcium scores and generate score result list to effectively evaluate the cardiac calcium scores.

### 22.1 Start

Select a datum to be analyzed in the patient management, and click on the drop-down button above the button in the image browse in the panel. The system will pop up the menu. Click on the menu of CCS icon, you will enter into the cardiac calcium score plug-in. See the figure below.

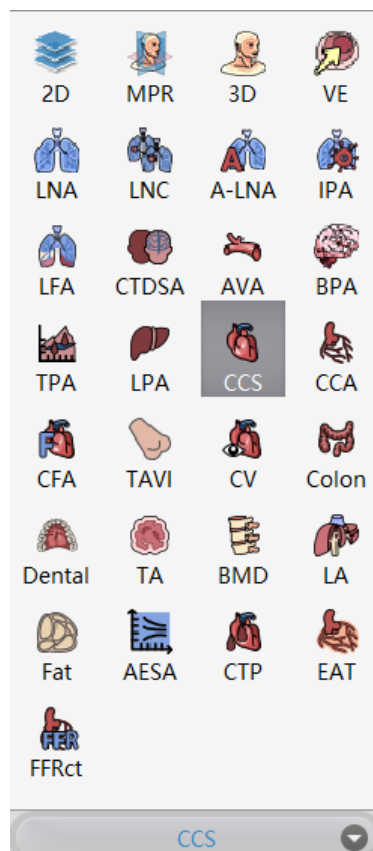


Figure 22-1 CCS Start Entry

### 22.2 Image Description

The operation interface of cardiac calcium score, shown in figure 21-2, mainly consists of three parts, the

view area, function operation panel area and score result display area:

- A: View Area: Display the axial plane, coronal plane and axial plane MIP of the image data. Mark the part that can extract vessels and the operation of vessel extraction can be performed in the marked place according to CT threshold value in the axial plane and coronal plane.
- B: Function Operation Panel: provide ways and tools of operating image display window and the setting of the attributes of the image display.
- C: Score Result Display Area: It is used to display the situation of the vascular calcium score, display the calcium score results calculated out with three kinds of methods and display the situation of the vessel calcium volume and CT value.

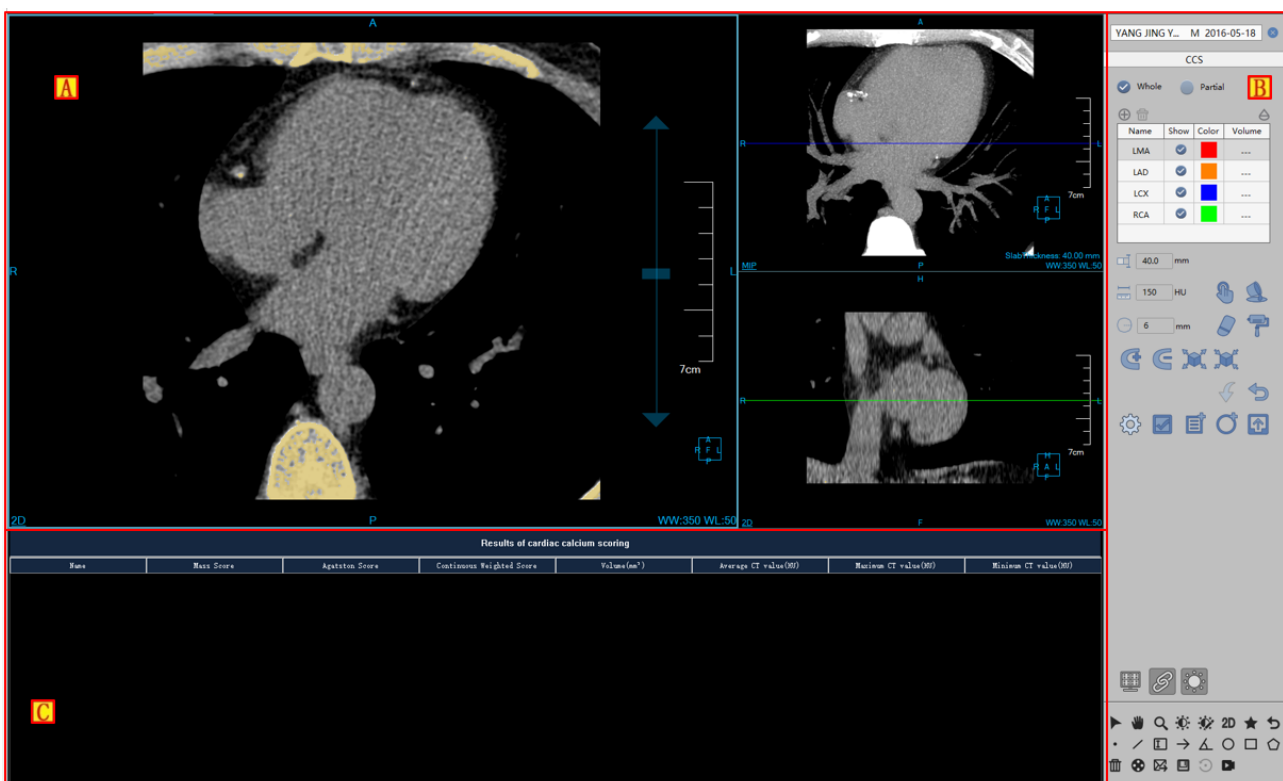


Figure 22-2 CCS Main Image

## 22.3 Function Operation Panel

The function operation panel is introduced in details as shown in figure 21-3:

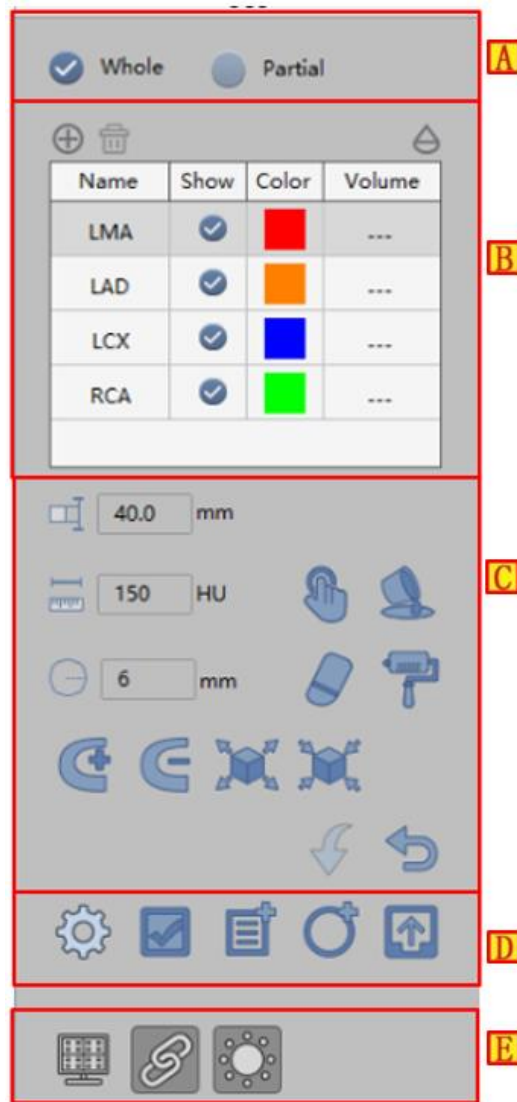


Figure 22-3 CCS Main Image

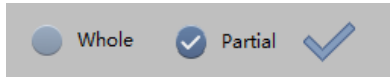
Area	Function	Description
A	Image Series Area Selection	You can adjust the selected series data or the whole series data to calculate the score. Select part of the series to calculate the calcium score, which removes the redundant data calculation, which is faster.
B	Vessel List	It is used to select and switch the vessel to be marked and it can add or delete the vessel, modify the color of the vessel name and control the display of the vessel mark.
C	Mark Vessel	The methods of providing all kinds of marked vessels are the operations of manual extraction, erasure, dye, free sketch, inflation, corrosion, hole filling, etc.
D	Score Calculation	Set score calculation parameter, calculate Calcium score, display area score, send score result to the report.



E	View Area Display Control	Control the display of CT threshold value marked area and the linkage display of the overlap information and the WW and WL of the window.
---	---------------------------	---

The common function is the same as that of the other plug-ins, so the detailed introduction is omitted.

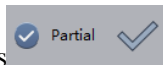
## 1. Series Selection Operation




### ➤The Whole Series

The vessel mark can be carried out in the whole series to calculate the calcium score of the whole series.

### ➤Partial Series



When the partial series are selected, the marker line for area adjustment in the coronal plane will appear. By dragging it, you can select image interval to be operated in the current series. After selecting the interval, click on the  button to finish the interval selection. After that, the vessel can be marked.

## 2. Vessel List Operation



### ➤Add Vessel

Click the add operation and the system will pop up the vessel dialog box. You can input the name of the vessel and select the color of the vessel. The vessel cannot be renamed, and the list of vessels can contain 24 vessels at most.

### ➤Delete Vessel

Select a vessel, and click on the delete operation. The vessel is deleted. The four vessels that are defaulted can not be deleted.

### ➤Transmissivity Adjustment

Transmissivity Adjustment: It can adjust the transmissivity of vessel mark area and highlight mark area so that the original image can be better observed.

### ➤Vessel Information Editing



The information of every vessel in the vessel list can be edited. Double click on the name of vessel and the name of the vessel can be modified. Double click on color, the color can be selected. Whether the current vessel is

displayed on the image can also be controlled.

### 3.Vessel Tissue Mark



➤Layer Thickness Setting: the layer thickness of MIP axial plane can be set.

➤Tissue Extraction: Provide manually setting step length for extraction. Press the left mouse button and press the [SHIFT] button at the same time. The extraction of area generation in the axial plane image is performed.

➤Partitioned Data Restoration Basic Operation: the erasing dyeing operation of the preset radius can be used;

➤Partitioned Modification Function: Add layer by layer, delete layer by layer, corrosion and inflation operation;

➤Reset and Return:Return to the previous operation (At most seven steps can be returned). The reset can be set as the original operation.

### 4.Score Value Calculation Display Operation



➤Setting: The threshold value displayed by highlight and parameters of score calculation can be set.

➤Calculation: the calcium score of vessel can be calculated.

➤Score Display: Display the calcium situation of a certain vessel in the current layer.

➤Area measurement: the calcium situation of vessels that has been marked in certain area can be measured.

## 5.Common Operation



- Overlap Information: Control whether the overlap information in the windows of the view area is displayed.
- Linkage: Control whether the operations of the WW, WL, zooming, etc. in the three windows in the view area are linked.
- Highlight Display: Whether the highlight mark met by the CT threshold is displayed.



## Chapter 23 Colon Analysis (Option)

Colon analysis (referred to as Colon in the following) plug-in creates a 3d Colon model based on the image data loaded by the patient management, which is used to analyse and locate the lesions in the colon.

### 23.1 Start

The colon analysis plug-in, as a functional plug-in to the system, is deployed in the advanced application module. Click [image browsing] in the patient management panel. Select and click [Colon] in the pop up menu, and then the system can switch to the Colon plug-in, as shown in figure 23-1.

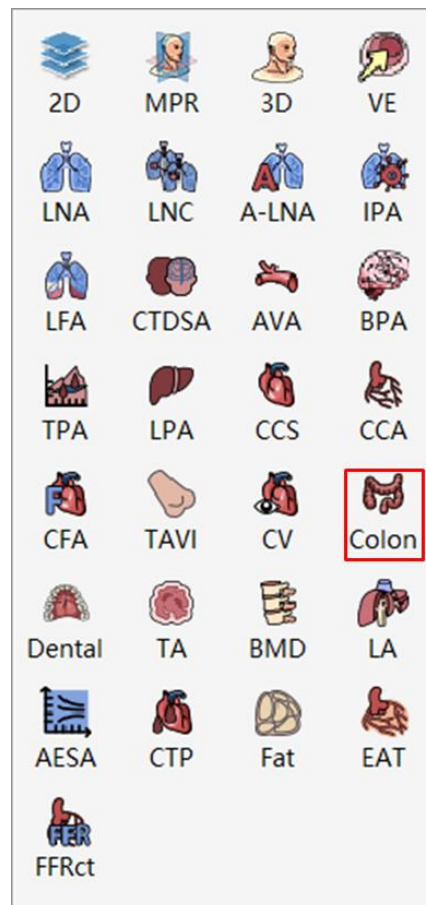


Figure 23-1 Quick Start Interface

### 23.2 Colon Operation Interface Description

Colon operation interface, as shown in figure 23-2, mainly includes two parts: function operation panel area and view area:

➤A: Function operation panel, provides the methods and common tools of extracting colon, marking polyps and multi-mode roaming.

➤B: View Area: after the data are loaded successfully, the system will automatically extract the colon.

After the successful extraction, the view area will show

is extracted successfully displayed colon VR, flat colon, colon section, MPR images, such as may, by way of positioning and roaming according to the different image requirements.

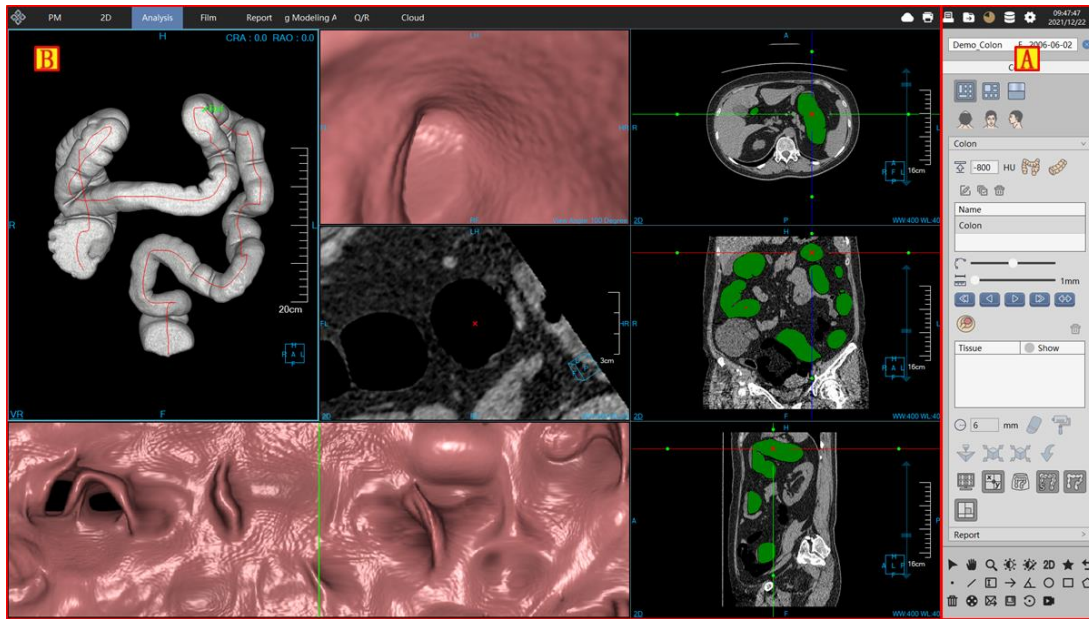


Figure 23-2 Colon Operation Interface

### 23.3 View

The Colon analysis view area consists of colon VR image(A), colon endoscopy image(B), colon cross section image(C), colon flat image (D), and cross coronal sagittal MPR image.

VR image include three parts: the extracted colon tissue image, extracted colon center line, positioned cursor and directional arrow. The arbitrary positioning (C) in the colon can be realized, the positioning cursor is perpendicular to the center line and the arrow is tangent to the center line. All the Windows support the general right - click menu function.

Endoscopic image of the current position supports the rotating viewing angle operation. The viewing angle direction corresponds to the arrow direction in the VR image.

Cross Section Image: MPR image cut out along the positioning cursor. The red POI represents the current positioning cursor position.

Flat Image: the image after being unfolded along the colon center line. The green positioning line in the center of the window represents the positioning cursor position of the VR window.

MPR image: include three MPR images of cross coronal sagittal. The green dyeing area is the colon tissue, and the red POI represents the current positioning cursor position.

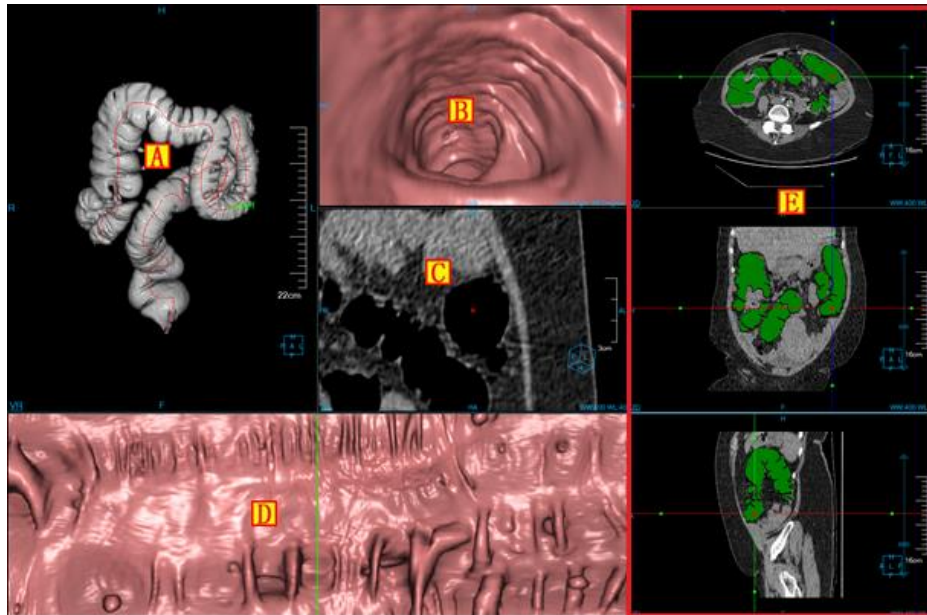


Figure 23-3 Colon View Interface

## 23.4 Control Panel

### 1)Layout Setting

Layout setting provides two kinds of page layout: the left button is flat layout ( default layout); the right button is colon layout. The difference between the two: the flat layout has one more flat image window than the colon layout.

### 2)Opacity Setting

Click the panel opacity button, and the protocol list of defined colon opacity can pop up, as shown in figure 253-6. Activate the colon VR window, and then adjust the opacity of VR window; Activate the colon endoscope window, and then adjust the opacity of the endoscope window.

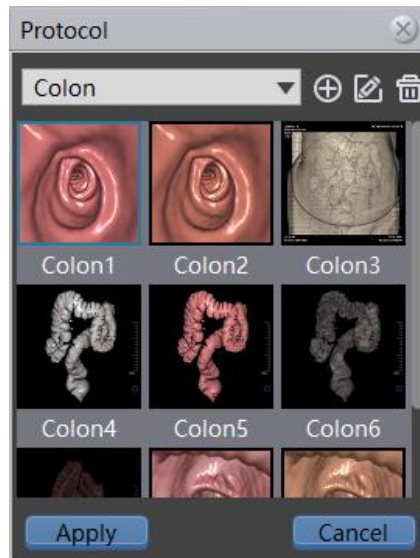




Figure 23-6 Opacity Model List

➤ Switch Opacity: double click the icon of opacity to switch the opacity.

➤ Create, Edit Opacity. Click [Create]  and [Edit] , and the corresponding opacity dialog box of [Create]/[Edit] will pop up.

### 3) VR Orientation

The orientation of axial plane, coronal plane and sagittal plane is set for the colon VR window, and the default was coronal plane.

### 4) Manually Extracted Colon


If the automatically extracting colon fails or the effect of extraction is not good, select the seed points to extract colon manually according to the set threshold.

➤ Threshold Setting  -800 HU

Set the threshold of manually extracting colon. The range can be set as -1000~-400, and the default value is -800.

➤ Manually Extracted Colon 

Click the [extraction colon] button and click the colon seed point in the MPR window to extract the colon according to the set threshold. Before manual extraction of the colon, the previously extracted colon and lesions will be removed. When the extraction is successful, the named [colon] is shown in the first line of the colon list.

➤ Manually Extracted Segment 

Extract the subsegment of the colon. Click the [Extract Segment] button to define the two seed points of the



start and end in the dyed green colon and the segment can be extracted according to the set threshold. After successful extraction, it is displayed in the colon list, which is named [Segment N] and N starts at 1.

#### ➤ Edit Center Line

The center line selected in the colon list may be edited, including the operations of insertion point (Ctrl + left mouse button pressed), deleting control points, deleting all the previous control points, deleting all the control points in the back and so on. Before editing the center line, the user will be prompted to delete the previously extracted lesions.

#### ➤ Delete Center Line

Remove the center line selected in the colon list. Note: only the segment center line can only be deleted, and the colon centre line cannot be deleted.

#### ➤ Center Line Renaming

Double click the selected item in the colon list to rename the center line. Note: the segment centre line can be renamed, and the colon centre line cannot be renamed.

### 5) Positioning

There are three quick positioning methods as follows:

➤ The optional position on the center line can be positioned by dragging the green cursor in VR window. The images in other windows are in lockstep.

➤ In the flat window, the translational flat image is positioned. The green positioning line in the flat window is positioned in the same position as the cursor in VR window.

➤ Path positioning: the optional position on the center line can be positioned by dragging panel path slider.

### 6) Roaming

➤ Set roaming step length: the range of roaming step length is 1 ~ 20 mm, and the default is 1 mm.

#### ➤ Roaming Modes:

Roaming modes are respectively divided into single step backward, reverse broadcasting, single step forward and turn around. These operations are performed either in the direction of the centre line arrow or in the opposite direction.

### 7) Mark lesions


#### ➤ Extract Lesions

Click the [new lesion] button. In the colon section window or the flat window to select the lesion position by

clicking the left mouse button. The currently selected lesion is marked yellow and the unselected lesion is marked blue. The marked lesion will appear in the lesion list, named [Polyp N], which starts at 1. The lesion information includes volume, size, CT value and location and so on. These information will be displayed in the colonic cross section window.

➤ Set the Erasure/Dye Radius 

Radius range is stipulated in 3 ~ 20 mm, and the default is 6 mm.

➤ Lesion Erasure 

Click the [erasure] button to set the erasure radius. Hold down the left mouse button and drag the mouse in the colon cross section window and axial plane, coronal plane and sagittal plane MPR windows to erase the current lesion. When all lesions are erased, the lesions are removed from the list of lesions.

➤ Lesion Dyeing 

Click the [Dyeing] button to set the dyeing radius. Hold down the left mouse button and drag the mouse in the colon cross section window and axial plane, coronal plane and sagittal plane MPR windows to dye the current lesion.

➤ Inflate Lesions 

Click the [Inflation] button to inflate the currently selected lesion. Click the button once, inflate it once, and so on.

➤ Corrode Lesions 

Click [Corrosion] button to corrode the currently selected lesions. Click the button once, corrode it once, and so on. When all lesions are corroded, the lesions are removed from the list of lesions.

➤ Undo Operations 

Undo the operations of the previous [Erasure], [Dyeing], [Inflation] and [Corrosion] and so on.

➤ Printing Modeling :

Send selected segmentation to Printing Modeling plugin.

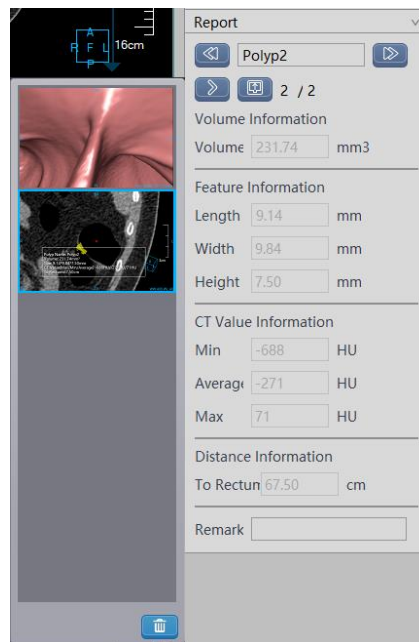
➤ Delete Lesions 

Remove the selected lesion from the lesion list.

➤ Edit Lesions 

Report and edit selected lesions. Click the [Edit Lesion] button, and the report editing window pops up as

shown in figure 23-7. Editing window includes edit control area , lesion information editing area , image editing area . Finally, all polyps are sent to the report in the form of PDF.



**Figure 23-7 Lesion Report Editing Window**

A is the editing control area.

Editing control area, polyps can be switched from the last to the next. Edit the current polyp name. View the image sent to the report, generate the report, and return to the home page.


B is the lesion information editing area.

The information of volume, feature, CT value, distance, etc.cannot be modified, and remarks can be edited.


C is the image editing area.


View and delete the images that have been sent to the report.


## 8)Display Control


➤ Overlap Information Check Box : when selected, the window shows the overlap information. When

unselected, the window doesn't show the overlap information.

➤ Crosshair Check Box : when selected, the axial plane, coronal plane and sagittal plane MPR window shows the overlap information. When unselected, the axial plane, coronal plane and sagittal plane MPR window doesn't show the overlap information.

➤ Volume Show Check Box : when selected, the 3d body tissue is displayed. When unselected, colon tissue is displayed.

➤ Center Line Check Box : when selected, VR window shows crosshair and MPR window shows POI. When unselected, it is not displayed.

➤ Tissue Marking Check Box : when selected, MPR window colon tissue is marked as green. When unselected, it doesn't mark.

## Chapter 24 Dental Analysis (Option)

Dental analysis is called Dental for short in the following. It is used to assist oral surgeon in planning prosthetic implants by using CT data to generate the film images of upper and lower jaw and neural tube. The plug-in supports the functions such as defining tooth main curve, defining left and right neural tube, and generating profile lines and profile views and so on, which can assist surgeons in positioning the location of tooth lesions rapidly and accurately.

### 24.1 Start

Dental plug-in, as a function plug-in of the system, is deployed in the advanced application modules.

In the patient management list, after selecting one of the Dental studies, select [Dental] in the plug-in list and enter into the plug-in. Shown in Figure 24-1.

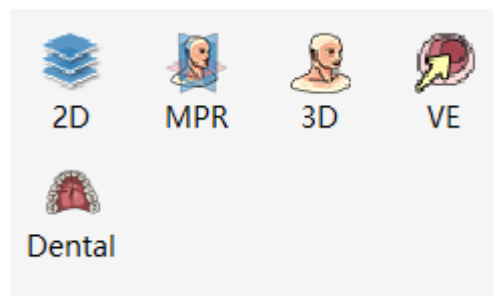


Figure 24-1 Start Dental

Click the [Dental] button on the function switch panel in the advanced application module, which can be switched to the dental analysis plug-in, as shown in Figure 24-2.



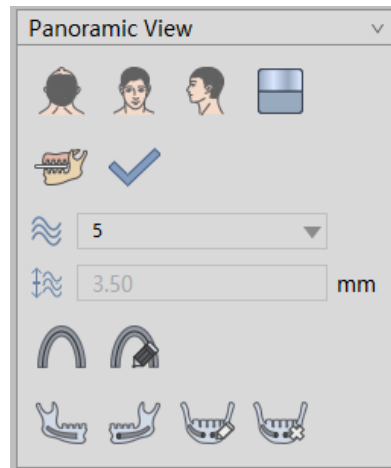
Figure 24-2 Switch to Dental

## 24.2 Operation Interface Description

Dental operation interface mainly consists of two parts: Curve/Canal operation and Profile line operation.

### 1. Curve/Canal operation

The operation panel is shown in Figure 24-3 and contains the following functions.




**Figure 24-3 Curve/Canal operation**

#### 1) Display Orientation Setting





VR visual orientation information setting provides three kinds of body position orientation by default: Axial, Coronal and Sagittal. Click the corresponding button, the orientation of VR window data can be switched.

#### 2) Opacity Adjustment Function


Click the  panel, the protocol list will pop up. Please refer to the protocol setting in Chapter 12 for specific settings.

#### 3) Define the Upper and Lower Jaw

By default, entering Dental plug-in is defining the upper and lower jaw interface. Position the reasonable image of the upper and lower jaw cross section by moving the crosshair and adjusting the layer. And then click [OK]  to enter into defining the curve interface. Select  to switch to defining the upper and lower jaw interface when defining the curve the left /right neural tubes. If the curve/ section line exists, whether it is cleared or not will be prompted.

#### 4)Curve

##### ➤Define curve

Entering the interface of defining the curve, click [Define Curves]  to start to define the curve.

1、 When there is no curve existing, the mouse clicks the seed point on the cross section to define the curve.

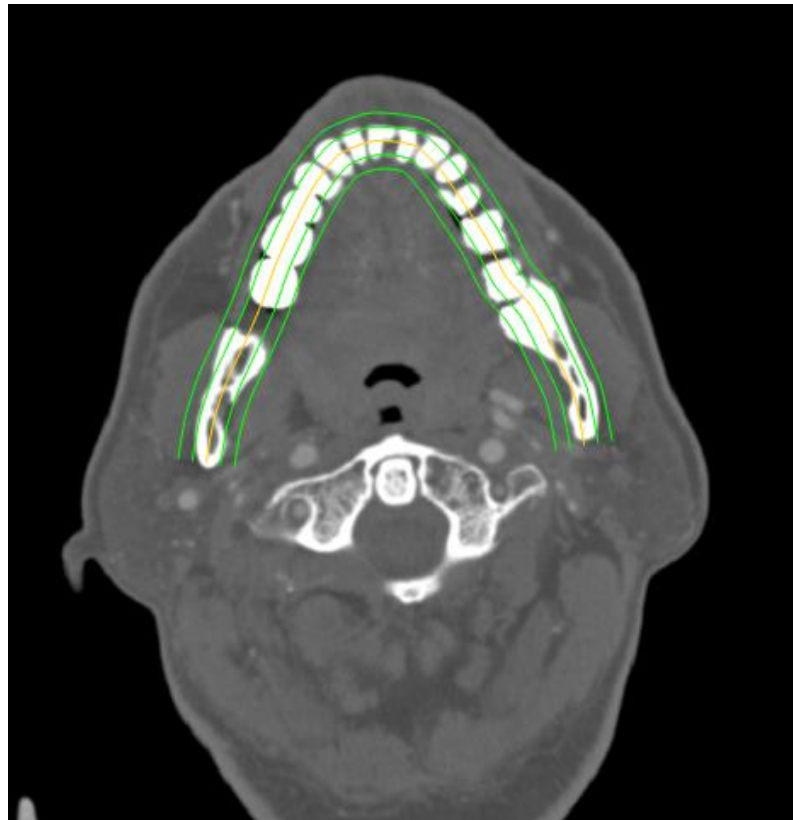
2、 hen there is a curve existing, first clear the defined curve automatically, and then redefine the new curve.

3、 After defining the curve successfully, the [next] button becomes applicable.

4、 When defining the curve, the cross-section image can not perform page turning.

5、 During the course of definition, the curve surface is updated in real time.

The curve definition results are shown in Figure 24-4.



**Figure 24-4 Define Curve**

##### ➤Edit Curve

When curves existed, select [Edit Curve]  to enter the state of editing the curve.

1、 Only show the control point of key curves

2、 Select the control point and drag it to the target position to perform the editing operation.

After the mouse is raised, the CPR image is updated (During the process of dragging the mouse, the mouse

wheel adjusting the image layer is not supported.)

3、 Add the control point (Ctrl + L Button) by pressing Ctrl + the left mouse button

4、 Click the right mouse menu on the control point to choose:

①Delete the control point: delete the selected point

②Delete all the previous control points: delete all the previous selected points (The selected points are not included.)

③Delete all the subsequent control points: delete all the points after the selected point (The selected points are not concluded.)

The control point for curve editing is shown in Figure 24-5.

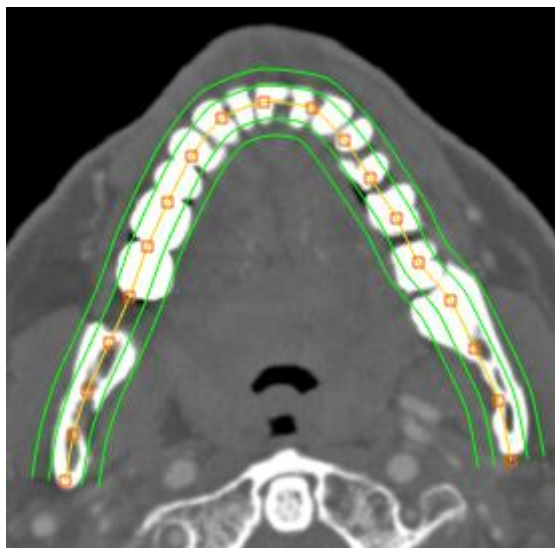
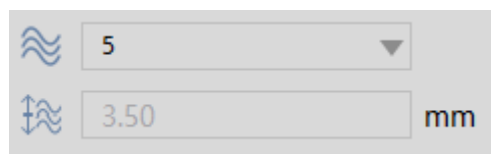


Figure 24-5 Edit curve

#### ➤Edit Curve Parameters

When curves exist, the curve number and curve spacing can be edited in the position of the following image.



#### 5)Jaw Tube

##### ➤Define the left neural tube.

When curves exist, click [Define the Left Neural Tube]  to define the left neural tube.

1、 When there exists no left neural tube, the mouse clicks seed points on the CPR window to define the left neural tube.

2、 when there exists the left neural tube, after clearing the defined left neural tube automatically, define a



new left neural tube again;

3、 During the process of definition, the neural tube is shown simultaneously on the VR window.

➤Define the right neural tube


When curves exist, click [Define the right Neural Tube]  to define the right neural tube.

1、 When there exist no right neural tube, the mouse click seed points on the CPR window to define the right neural tube.

2、 When there exist the right neural tube, clear the defined right neural tube automatically and define a new right neural tube;


3、 During the process of definition, the neural tube is shown simultaneously on the VR window.

➤Edit neural tubes

When there exist a neural tube, select [Edit Neural tubes]  to enter the state of editing the neural tube.

Select the control points and drag it to the target position to edit it. After the mouse is raised, the VR image is updated ((During the process of dragging the mouse, the mouse wheel adjusting the image layer is not supported.)

➤Clear neural tubes

When there exist a neural tube, click [Clear Neural tubes]  to clear the defined neural tube.

In addition, when the curve parameters are changed, the neural tube defined on the CPR window will be automatically deleted.

## 2.Profile line operation

The operation panel is shown in Figure 24-6 and contains the following functions:

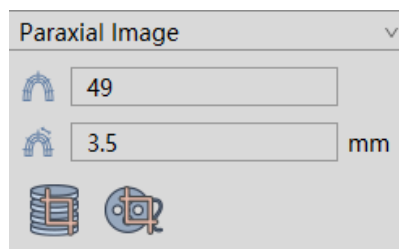


Figure 24-6 Profile line operation

When there exists a curve, click [Paraxial Image] to enter the definition interface of the profile line and the profile line is automatically generated according to profile line spacing. (3.5mm by default). As shown in Figure 24-7:

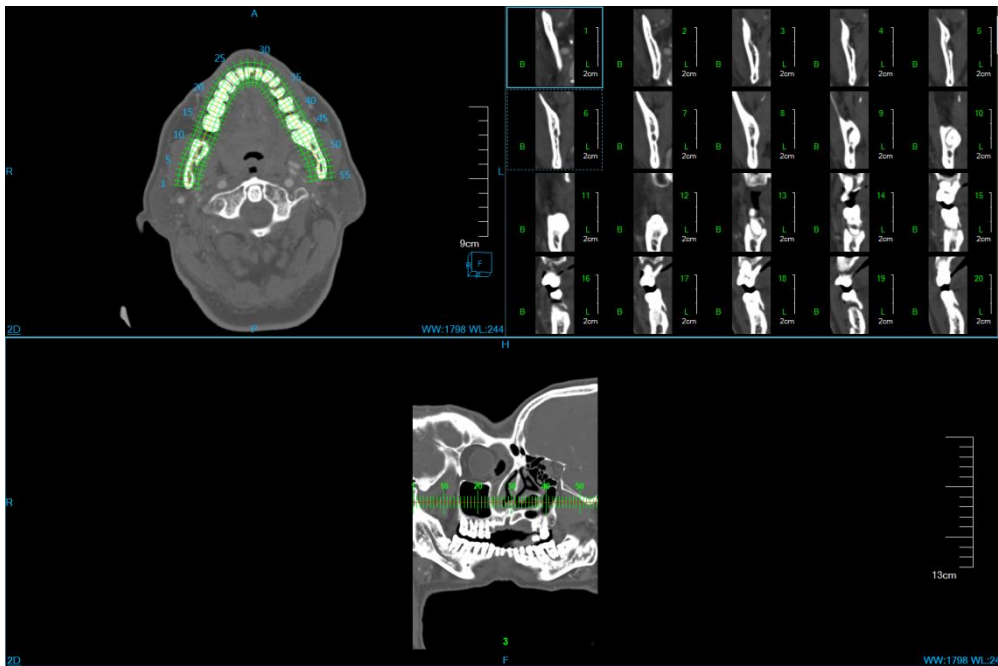


Figure 24-7 Profile line view

➤Edit profile line parameters

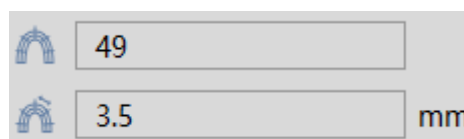
Both profile line number and profile line spacing can be edited.

1、 Edit Profile Line Number: the minimum number of profile line can be set as 2.

The maximum number of profile line can be set as (curve length/minimum spacing of profile line+1). When the product of (the number of profile line - 1) and spacing profile line is greater than the length of the curve, the spacing of profile line changes with the changing of the number of profile line. The value is (curve length/(the number of profile line-1))within the effective range.

2、 Spacing of Profile Line: the minimum number of profile line can be set as 1mm, the maximum number of profile line can be set as the curve length. When the product of (the number of profile line - 1) and spacing profile lines is greater than the length of the curve, the number of profile line changes with the changing of the spacing of profile line. The value is (curve length/(the spacing of profile line+1))within the effective range.

3、 When the spacing of profile line changes, both the profile line and profile image will be regenerated.



➤Move the Profile Line

When the profile line does not occupy all the curves, select the profile line with the mouse and then drag the

mouse, move the profile line to any position of the curve. When dragging the mouse, refresh the profile line and profile image and the ruler position are updated. As shown in Figure 24-8:

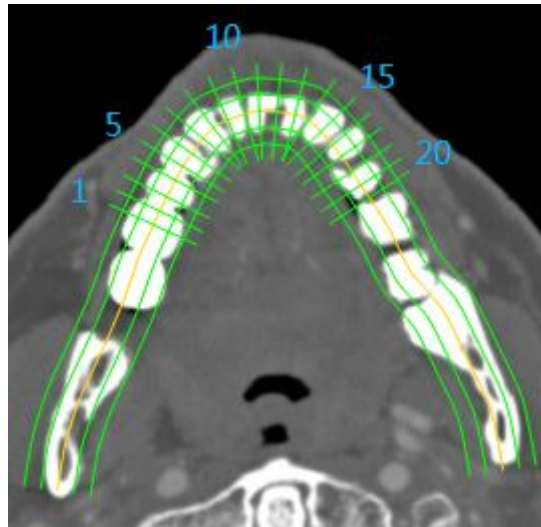


Figure 24-8 Move profile line

➤ Send to the Film



Click the icon [Send to the Film], and then select [Yes] from the pop-up prompt box. The Axial image and all the profile images can be sent to the film. In sending, there is a progress prompt in the lower right corner, and click [Cancel] to stop the current operation.

➤ Send to the Database.



Click [Send to Database] and select [Yes] from the pop-up prompt box. The Axial image and all the profile images can be saved as the new series and sent to the database. In sending, there is a progress prompt in the lower right corner, and click [Cancel] to stop the current operation. After sending, the new series will be shown in PM list.

## Chapter 25 Tumor Analysis (Option)

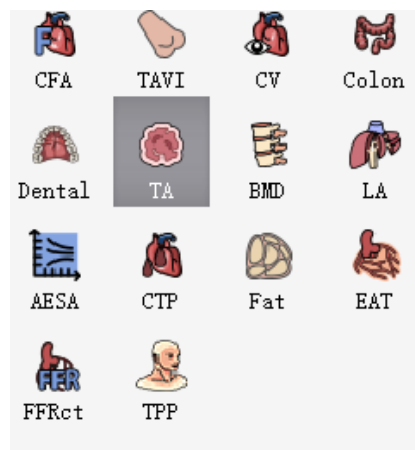
The plug-in of Tumor Analysis, based on the image data loaded from the patient's management, in the unit of image series, conduct the operations such as calculating the volume of the tumor and describing the morphology of the tumor after the tumor extraction. The extracted tumor was evaluated efficiently and then the related report can be formed.

For the specific tumors that are selected, the reconstructed tumor data have been formed in the direction of HFS and the information of the 3D volume of the tumor and the efficient diameter can be calculated automatically, which will provide efficient basis for the volume change rates and doubling time required when tumors are contrasted for the follow-up examination in the future.

### 25.1 Start

The plug-in of Tumor Analysis(TA) is deployed in the advanced application module as a functional plug-in of the system.

In **Figure 25-1**, select [TA] through the image browsing in the patient information page and the system will switch to the TA plug-in.



**Figure 25-1 Tumor Analysis Quick Start Panel**

Click the [TA] button in the function switch panel of the advanced application module, the system will switch to the tumor analysis (TA) plug-in, as shown in **Figure 25-2**.

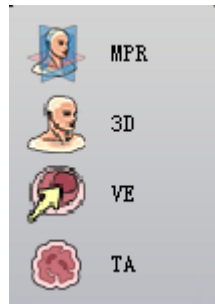


Figure 25-2 Switch Panel between Plug-ins

## 25.2 Operationa Interface Overview

The tumor analysis operation interface has two main parts: view area and function operation panel area, as shown in **Figure 25-3** and **Figure 25-4**.

- A: View area, display the MPR section of image data including the images of axial plane, coronal plane and sagittal plane; the locally zoomed image of tumors, the body VR images and the JFS reconstructed image of tumors.
- B: function operation panel, provide the way and tool of the operating image display window and the functions of extracting tumors, editing tumors and sending report images, etc.

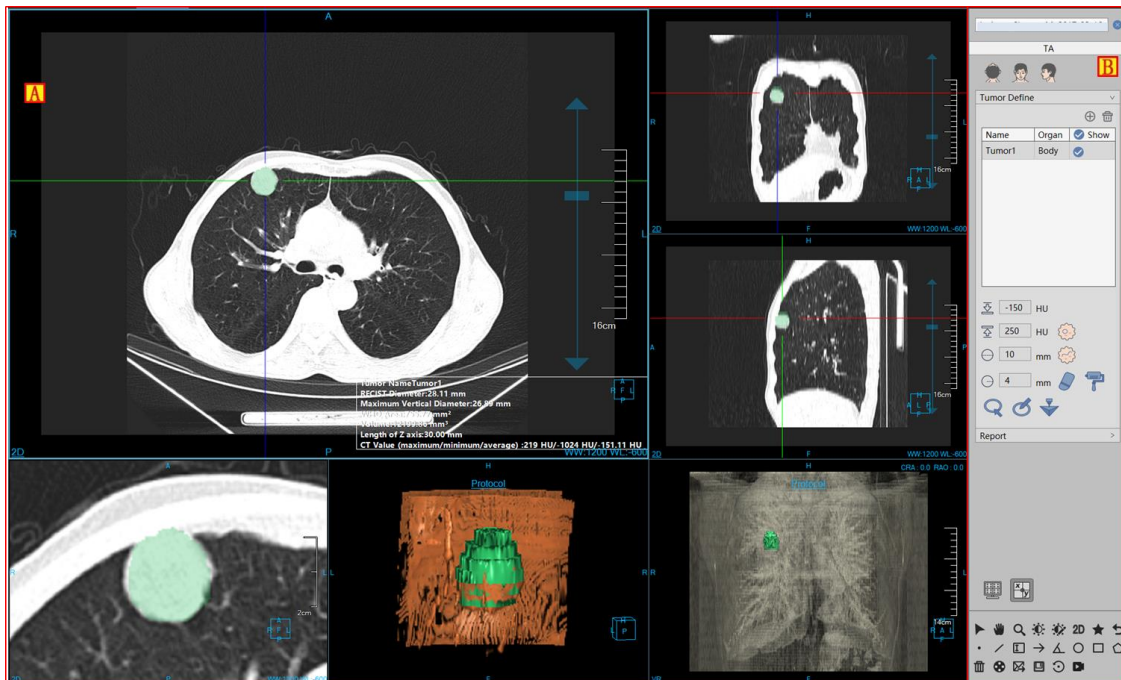


Figure 25-3 Tumor Analysis Operation Interface--Extract

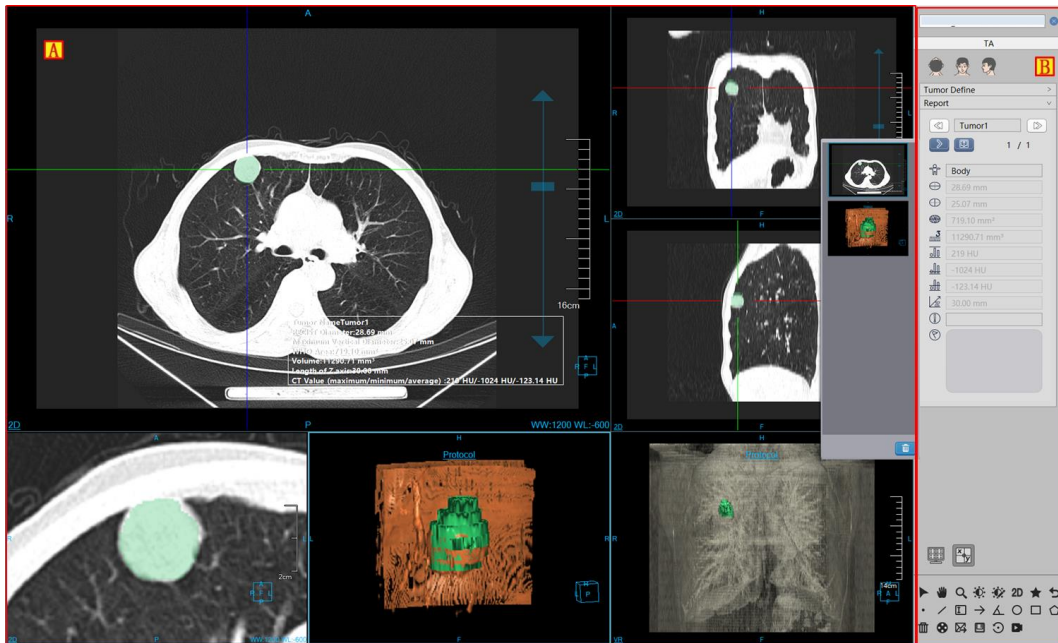


Figure 25-4 Tumor Analysis Operation Interface--Edit

## 25.3 View

### 1. Overall View of Tumor Analysis

The image display window realizes the content output of the image display window through the multiple basic window combination layouts, as shown in **Figure 25-5**. The image in the figure is displayed in the window layout of 4\*2, among which the four basic windows are respectively: axial plane window (A), coronal plane window (B), sagittal plane window (C) and nodule locally zoomed in image (D); the two VR windows are respectively: the tumor reconstructed image window (E) and the body VR window (F); the floating window of the tumor analysis result(G).

After double clicking any window, the full screen of the window is displayed in the view area. Double click the full-screen image again, and the view area will be returned to the previous 4\*2 window layout to display the image.

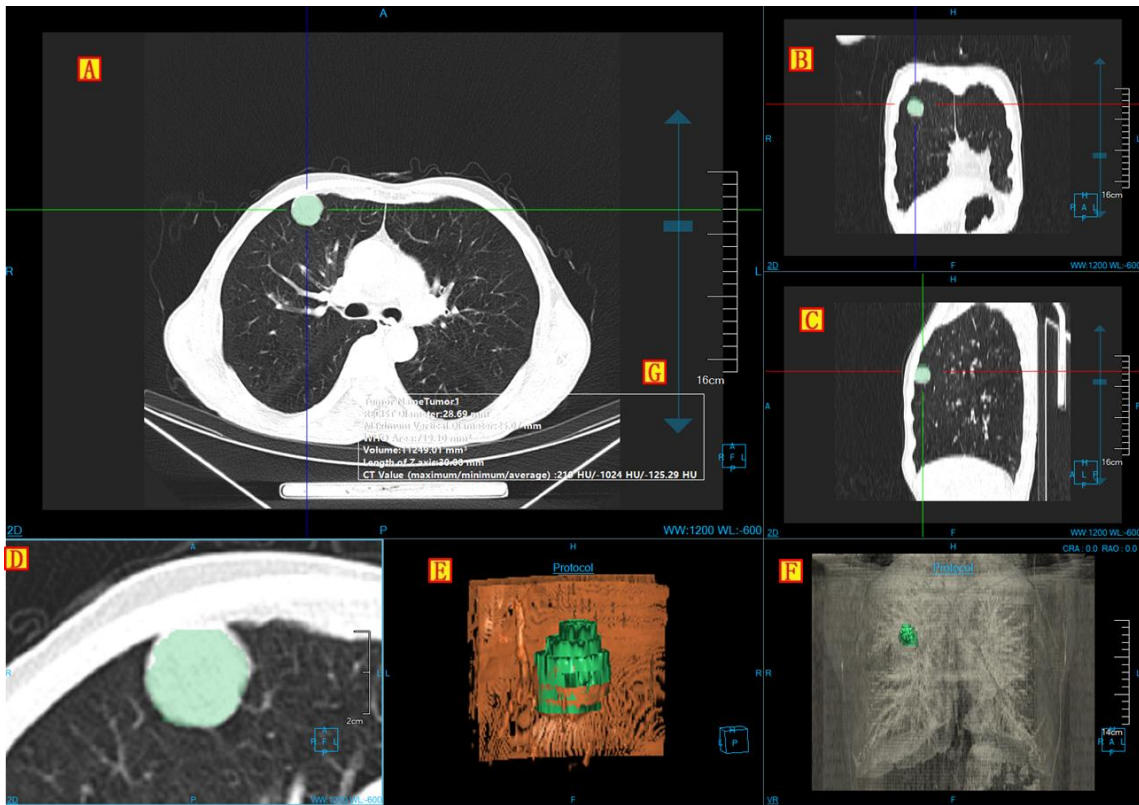


Figure 25-5 Tumor Analysis View Window

## 2. Image Display View

The content displayed in the image basic window includes the crosshair, overlay information, location information, display mode, ruler, and location box and tumor analysis results, as shown in Figure 25-6.

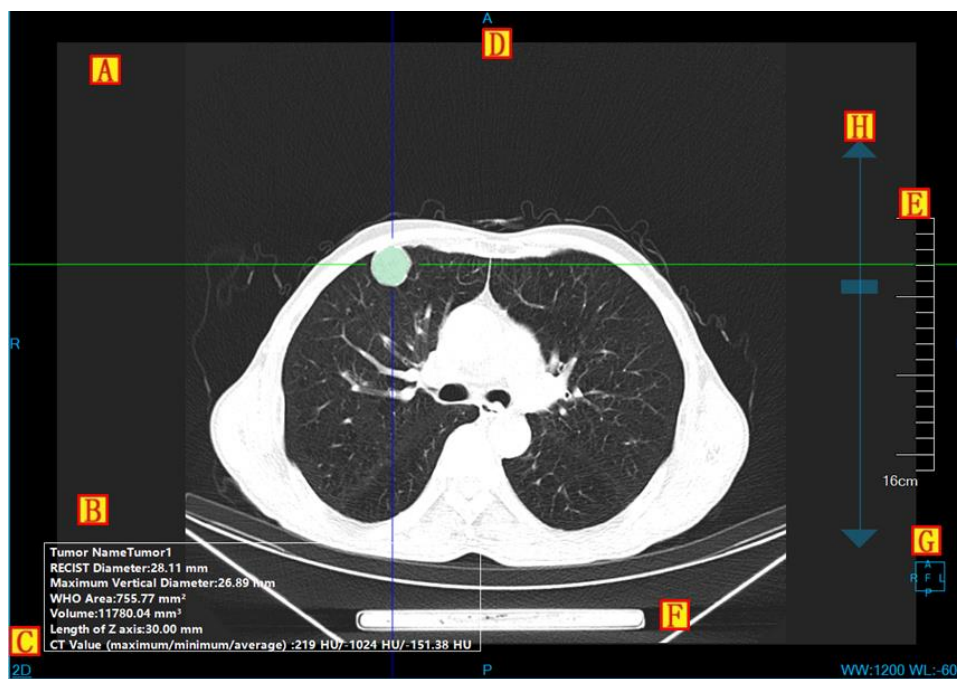


Figure 25-6 Image Display Basic Window

- A: overlap Information, display the head information content of DICOM image and the real-time information of window width and window level. The information can display the content of custom display in the setting interface;
- B: Crosshair, by moving the crosshair of red, green, blue, the three kinds of color, the corresponding axial plane, coronal plane and sagittal plane images.
- C: Display mode, display the display mode of the current image display window, including the contents of 2D, MIP, AIP, MinIP, etc. Click the right button on display mode text in the window, the system will pop up the display mode switch menu. Select the corresponding menu item, and the system will switch image window display mode;
- D: Location information, synchronized with the displayed image contents, identify the current displayed image location information. The location information is displayed in the middle position of the four sides in the image display basic window in the form of text;
- E: Ruler, output the image scale, taking the half height of the image display window as the benchmark;
- Tumor extraction result: The information is displayed after the tumor is extracted.
- G: Location box, the location information box with the image synchronously adjusted;
- H: Adjusting layer dragging slider, drag the slider to the corresponding image layer;

## 25.4 Function Operation Panel

Tumor analysis function operation panel has 3 areas: data switch, TA and common function.

- A: Data switching, switch the image series, delete the function of study by thumbnails.
- B: Common Function, provide the function buttons of common function operations of the default operation, translation, zooming, adjusting WW/WL, restore default, etc;
- C: Tumor analysis function, provide a series of function operations of tumor extraction, tumor modification, tumor editing and deletion for tumor processing and analysis.



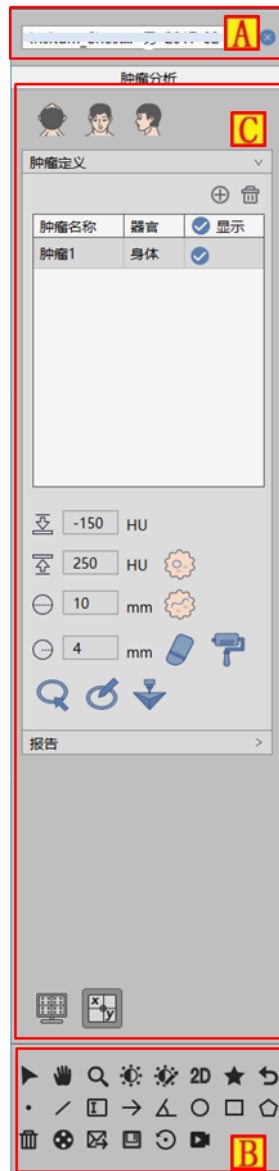


Figure 25-7 Tumor Analysis Function Panel

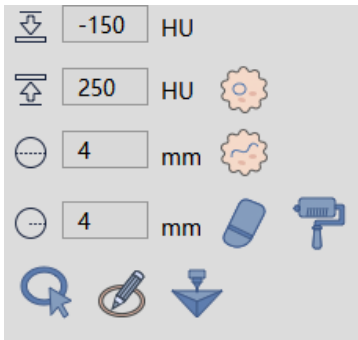
## 1. Tumor Extraction Function Panel

### 1) Image Orientation



Tumor analysis function provides 3 default body orientation: Axial, Coronal and Sagittal. Click on the corresponding button, you can switch the orientation of the window data.

## 2) Extract Tumor



Extracting tumor can be divided into two parts: Extracting tumor for the first time and modifying tumor for the second time. Support sending to **【Printing Modeling】**.

➤Extracting for the first time: there are two kinds of extraction ways: single-point extraction and line extraction.

[Single-point Extraction] by setting the maximum and minimum threshold range, separately click on the extracting tumor and calculate the tumor information through the MPR section.

[Line Extraction] by setting the diameter of the line, only after drawing the line path, extract the tumor within the region of the lines and calculate the information of the tumor.

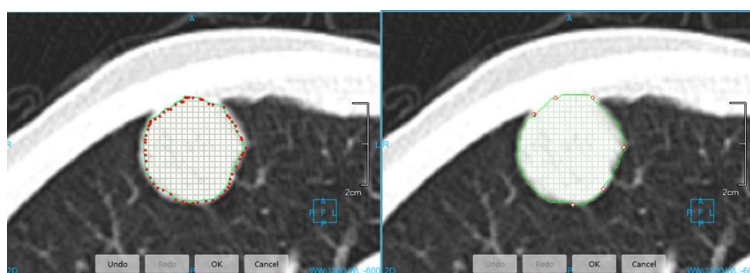
➤Modifying tumor for the second time: there are four kinds of ways: contour line modification, magnetic modification, erasing modification and dyeing modification. As for contour line modification, the operation of magnetic modification can be restored and canceled.

[Contour Line Modification] in the window of tumor zooming in, the tumor boundary is drawn, and the second time modification of tumor is extracted.

[Magnetic modification] In the window of tumor zooming in, according to the contour boundary of tumor, magnetism sucks up the side and the second modification of tumor is extracted.

[Erasing Modification] In the window of tumor zooming in window, the excess tissue is erased and extracted; the second time modification of tumor is extracted.

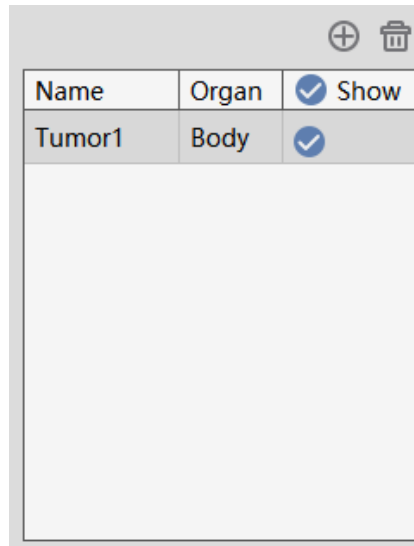
[Dyeing Modification] In the window of tumor zooming in, the new tissue is dyed and extracted; the second time modification of tumor is extracted.



**Figure 25-8 Tumor Contour Line & Magnetic Extracting Tumor Image**

### 3)Tumor List

The tumor list lists all the tumors and has the function of adding, editing and deletion. In the tumor list, it can be set whether the tumor is displayed or not and in which organ the tumor is located.



Name	Organ	<input checked="" type="checkbox"/> Show
Tumor1	Body	<input checked="" type="checkbox"/>

Figure 25-9 Tumor List

## 2.Tumor Edit Function Panel

### 1)Edit Control Area

The functions of tumor editing control area include: switching tumors, editing tumor name, viewing, deleting and appending the image of the report, generating report and returning to the extraction page.

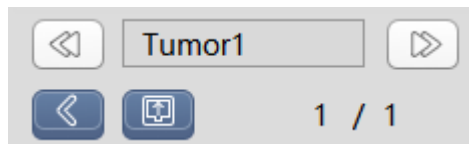


Figure 25-10Tumor Edit Control Area

- Previous: switch to the previous tumor lesion;
- Next:switch to the next tumor lesion;
- Tumor name: display the name of the current tumor, and modify the name of the current tumor;
- Back: return to the tumor extraction interface;
- Generate report: save all the tumor information and generate reports;
- Report images: view, delete, add the image to the report.

### 2)Tumor Edit Area

Display the calculating information such as the maximum vertical diameter and volume of the tumor, and meanwhile, describe the information of the severity and some special remarks of the tumor, which are generated to the report.

	Body
	48.67 mm
	41.51 mm
	2020.04 mm <sup>2</sup>
	9334.44 mm <sup>3</sup>
	168 HU
	-900 HU
	-26.28 HU
	26.88 mm

Figure 25-11 Tumor Edit List

## Chapter 26 Cardiac Function Analysis (Option)

Cardiac function analysis plug-in can assist users to analyze the cardiac function and assess whether the ventricle has the following situations such as hypofunction and dysfunction, etc. by automatically dividing the heart and ventricles, automatically calculating the ventricle function parameters (mainly including the parameters such as ejection fraction, stroke volume and cardiac output, etc.), automatically calculating ventricular contour and automatically calculating the bull eye diagram, etc. Meanwhile, the plug-in can provide multiple convenient interactive tools to support the basic window operations such as image rotation and zooming and support the WL adjustment and the adjustment of opacity, etc, which can assist doctors to conduct the more sophisticated analysis and diagnosis.

### 26.1 Start

CFA plug-in, as a functional plug-in of the system, is deployed in the advanced application module.

In the figure below, click [CFA] through the image browsing in the patient information page, the system will switch to the cardiac function analysis plug-in.

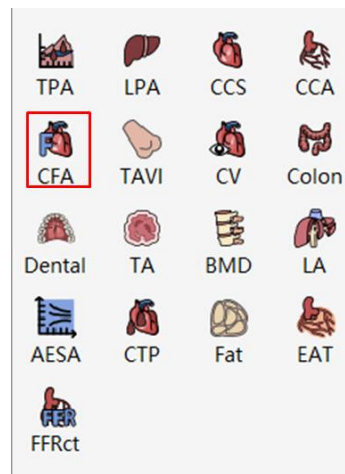


Figure26-1 CFA Quick Start Panel

Click the [CFA] button in the function switch panel of the advanced application module, the system will switch to CFA plug-in.

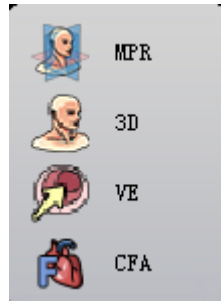


Figure26-2 Switch Panel between Plug-ins

## 26.2 Operation Interface Overview

the CFA operation interface mainly has two parts: view area and function operation panel area:

- A: View Area, display MPR image of the image data: including short axis image, horizontal long axis image, vertical long axis image, body VR image, ventricular function parameter table, ventricular volume curve and 3 bull's eye diagrams: ventricular wall thickness, ventricular wall motion and ventricular thickening rate.
- B: Function operation panel, provide the operations such as the methods and tools of operating image display windows, ventricular analysis tools, 4D RealPlayer and sending report images, etc.

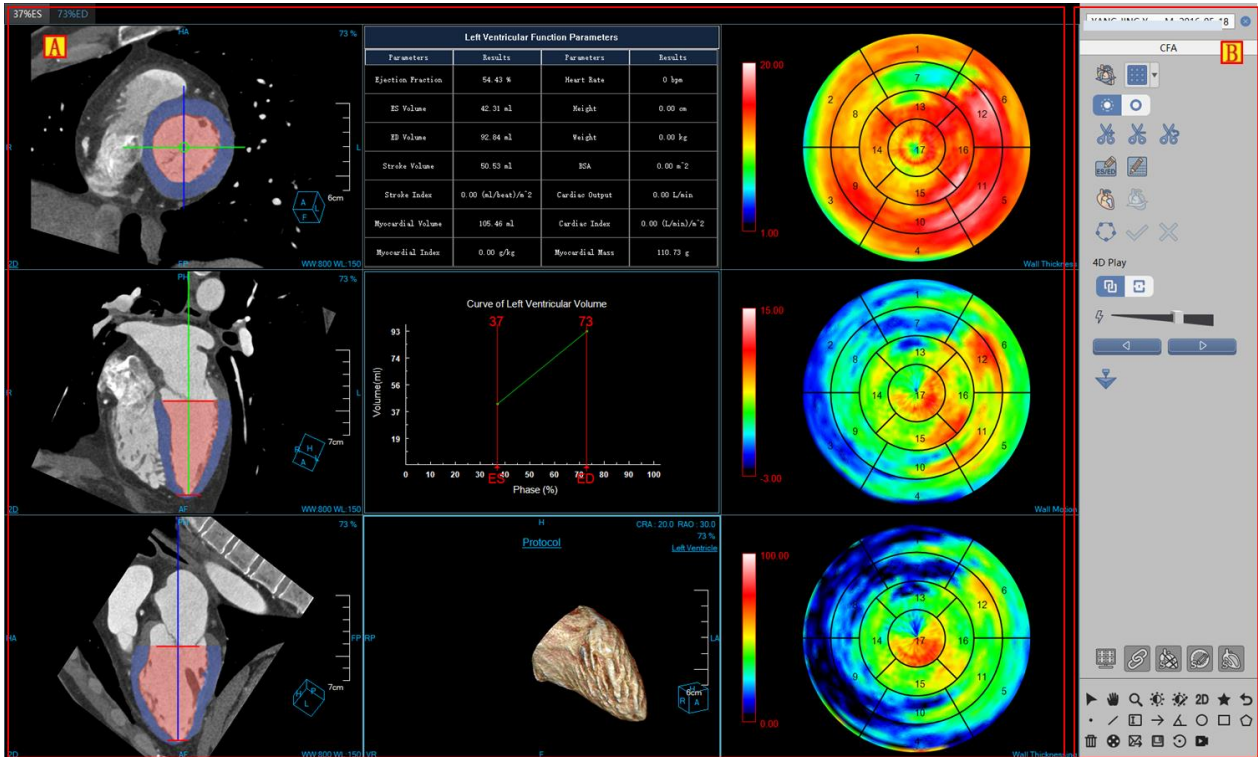


Figure26-3 Cardiac Function Analysis Operation Interface

## 26.3 Image Display View

### 1. Overall View

The image display view realizes the content output of the image display window through the combined layout of multiple image windows and multiple table image views. As shown in the following figures, each window of which is: short axis image window (A), horizontal long axis image window (B), vertical long axis image window (C), VR image window (D), ventricular function parameter table window (E), ventricular volume curve window (F), and bull's eye diagram (G).

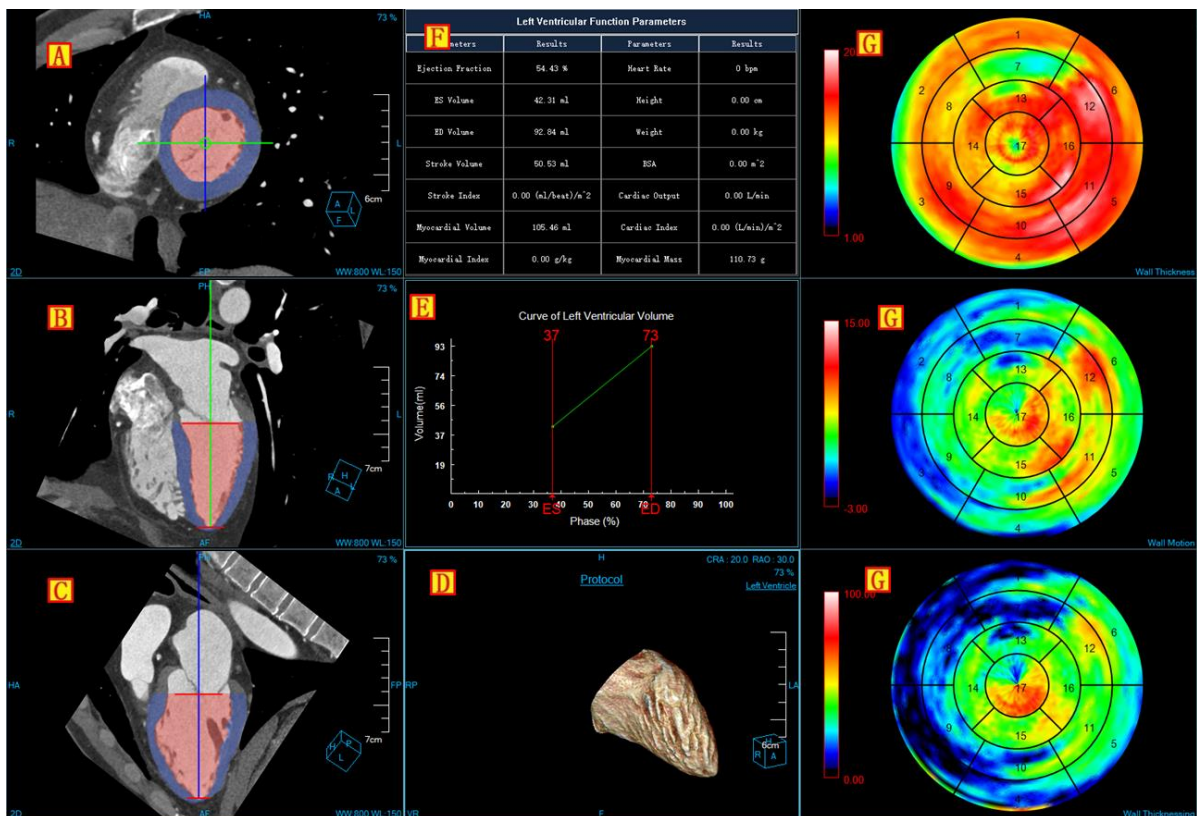


Figure 26-4 CFA View Window

## 26.4 Function Operation Panel

### 1. Introduction of the Overall Function Panel

The operating panel of CFA plug-in is divided into three areas: data switch, cardiac function analysis, and common functions.

- A: data switch, through the thumbnail, the functions, such as switching image series, deleting studies can be conducted;
- B: common function, provide the common function operations, such as default operation, translation,

zooming, adjusting WW/WL and restoring default function buttons, etc;

- C: Cardiac function analysis, provide provide a series of function operations for the processing and analysis of ventricular function, such as layout switching, ventricular resetting, modifying ESED and patient information, segmenting and calculating ventricular function parameters again and 4D .

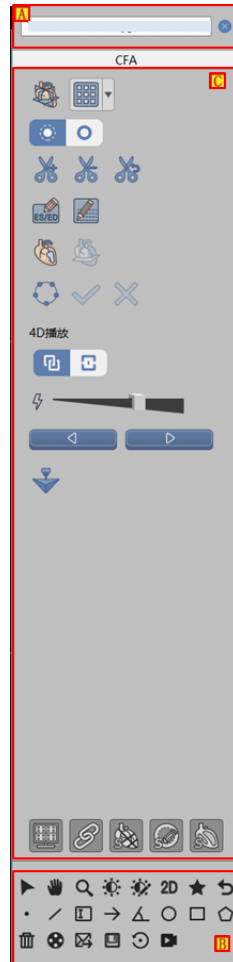


Figure26-5 CFA Function Panel

## 2.CFA Function Panel


### 1)Restore Cardiac Default Location




This button is used to restore the positions before modification of cardiac base and cardiac apex during the currently selected phase.


### 2)Layout Switching


it provides 4 kinds of layout:

3\*3 layout  : display 3 cardiac axis image, 1 VR image, cardiac function parameter table, cardiac volume curve and 3 bull's eye diagrams.



 2\*2 layout: display short axis image, 2-chamber image, 3-chamber image and 4-chamber image.

 2+2 layout: display 3 ventricular axis image and 1 VR image.

 3\*n layout: display multiple short axis images used to edit the contour.

### 3)Cut Tools



The tool has the same function as the VR plug-in. Please refer to the VR plug-in about the specific operation of it.

### 4)Modifying ESED and Patient Information



This part is used to modify ESED phase. After clicking ok, the system will automatically calculate again and update the table and curve according to the modified ES and ED.



This part is used to modify the heart rate, height and weight of the patient. After clicking ok, the system will automatically calculate again and update the table according to the modified content. At first, the items of heart rate, height and weight were all zero.

### 5)Analysis Tools



Analysis method 1: According to the modified new location of the heart base and heart apex, segment again ventricles and calculate again, and meanwhile, update the image and table.



Analysis method 2: According to the modified contour information, segment again the ventricles and calculate again, and meantime, update the image and table.

### 6)Contour Edit Tools



Contour edit button, after clicking it, the layout will be switched to 3\*n, and display the contour at the same time. The contour line of the image becomes editable.



Ok button, after clicking it, save the edit result.



Cancel button, after clicking it, cancel the edit result.

#### 7)4D RealPlayer



Full screen means all the windows can be included recording; Window means only record

the selected windows.



It refers to the speed of playing, increase from left to right.



They mean play backward, stop and forward.

#### 8)Printing Modeling



Printing Modeling: Send selected segmentation to Printing Modeling plugin.

## Chapter 27 Liver Perfusion Analysis (Option)

The plug-in of liver perfusion analysis (LPA) is based on the CT image study of the same or multiple layers of livers after injection of contrast media. Through the analysis of liver perfusion image, the severity degree of liver lesions can be assessed to achieve the purpose of the auxiliary diagnosis of the disease.

### 27.1 Start

In the patient management list, after selecting one or multiple liver perfusion study, select “Liver Perfusion Analysis” in the plug-in list and enter into the plug-in.

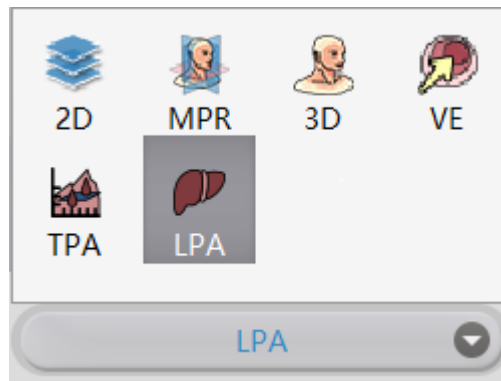


Figure 27-1 System Function Switch Panel

LPA mainly has 3 stages: image optimization, vascular definition, perfusion analysis.

### 27.2 Image Optimization

Image optimization is mainly a series of preprocessing operations on images to prepare data for the subsequent calculation and analysis, which mainly includes image correction, series editing, series playing and tissue extraction.

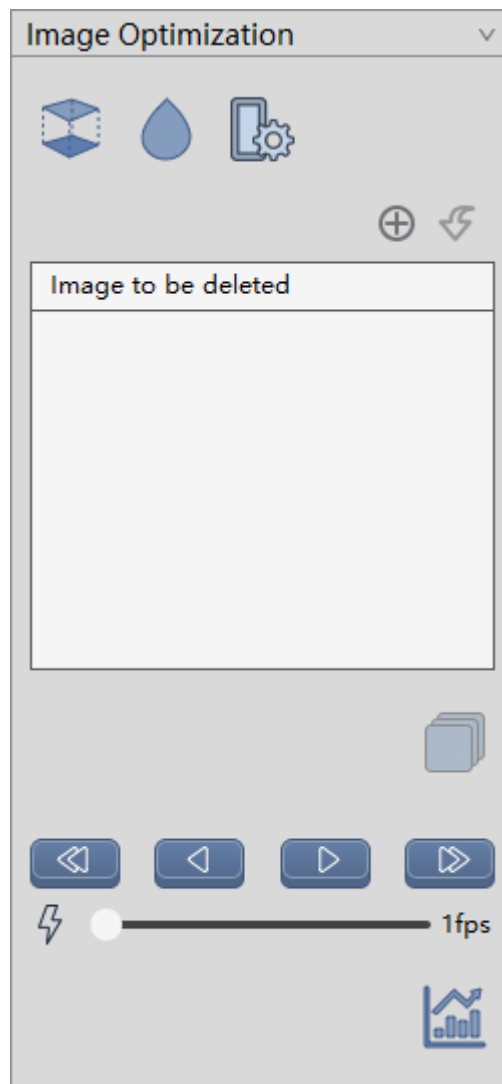


Figure 27-2 Image Optimization Panel

## 1. Image Correction

- Registration: correct the head movement during the scanning;
- Image Smoothing: operate the image smoothing;
- Setting Parameter: set the methods and times of image smoothing.

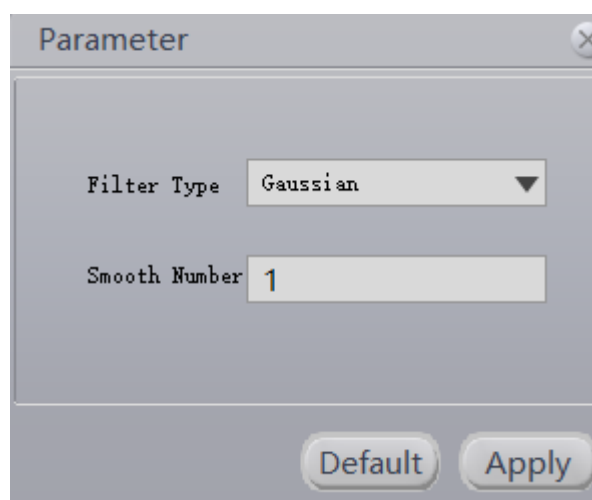


Figure 27-3 Parameter Setting

## 2.Series Editing

- Add the image to be deleted: add the image displayed in the current window to the list of images to be deleted;
- Undo Delete: undelete the selected image in the list to be deleted;
- Generate series: regenerate new image series according to the deleted image.

## 3.Series Playing

- One Step Back: Switch to the previous image display.
- Reverse Play: Play the image in reverse.
- Playing: Play the image in turn.
- One Step Forward: Switch to the following image display.
- Setting Play Speed: Set the playing speed.

## 4.Tissue Extraction

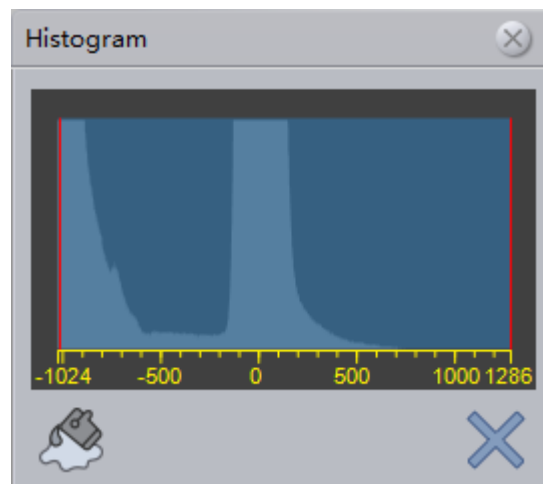


Figure 27-4 Grayscale Histogram

- Tissue Extraction: extract the tissue according to the selected histogram range.
- Close Histogram: Close the histogram.

## 27.3 Vascular Definition

After completing the image optimization, click vascular definition to enter vascular definition stage. It is necessary to manually select the liver arteries, portal veins and splenic arteries on the image and define the time

period of perfusion to complete the calculation of perfusion parameters.

The vascular definition panel, contains the following functions:

- Hepatic Artery Definition (red icon): manually drawing the hepatic artery area on the image and generate the hepatic artery time density curve. The operation supports two ways of area definition and single point definition.
- Portal Vein Definition (blue icon): make manual sketch of the portal vein area in the image to generate portal vein time density curve, which supports two methods of area definition and single point definition.
- Splenic Artery Definition (yellow icon): make manual sketch of the splenic artery area in the image to generate splenic artery time density curve, which only supports area definition.

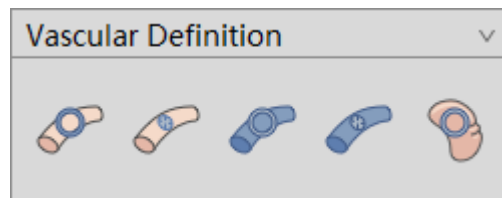
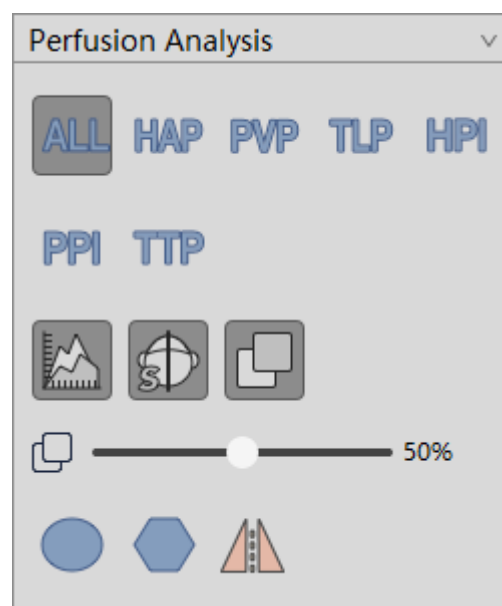


Figure 27-5 Vascular Definition Tool Panel

## 27.4 Perfusion Analysis

After click perfusion analysis, the system is automatically switched to the perfusion analysis phase. The perfusion analysis is mainly about the quantitative analysis for the calculated perfusion parameter image of ROI tissue area. And the related measurement indexes are calculated.

### 1.Perfusion Analysis Panel



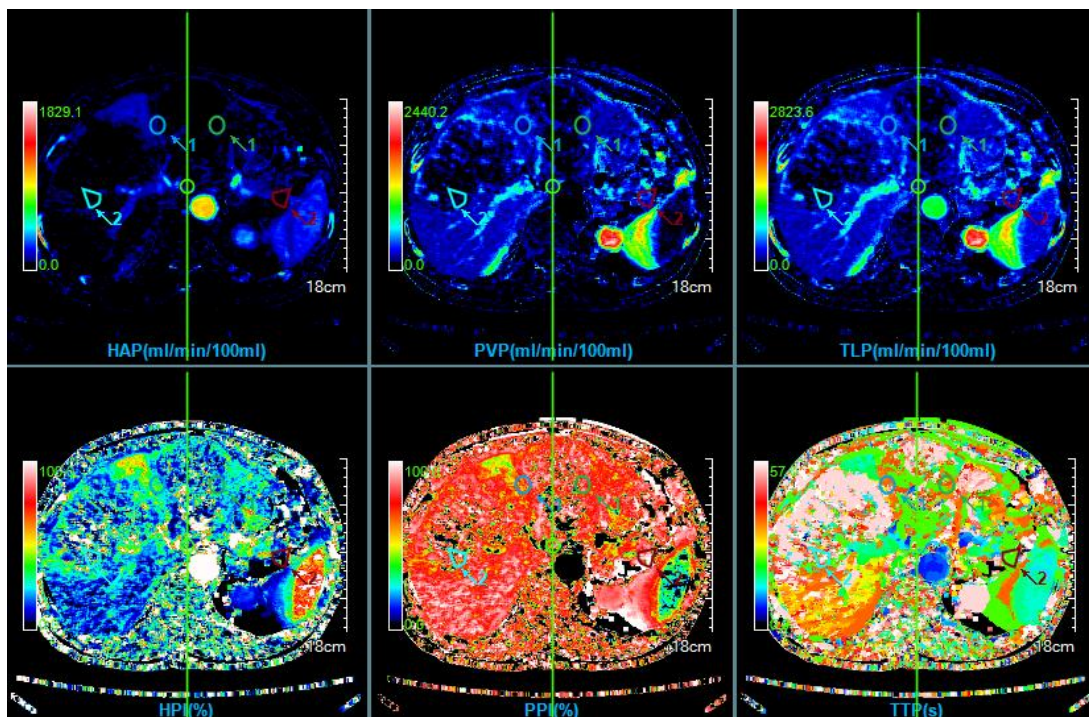
**Figure 27-6 Perfusion Analysis Tool Panel**

The following functions are mainly included in the perfusion analysis tool panel:

- Perfusion Parameter Image Layout: a single or all the perfusion parameter images are shown separately.
- Display TDC Curve Display: whether display the hepatic artery/ portal vein /splenic artery time density curve in ROI time density curve image will be displayed;
- Central Line Display: whether the central line is display;
- Fusion Display: whether the perfusion parameter image which is displayed and selected in the 2D window will be conducted fusion.
- Fusion Extent: set the fusion ratio.
- ROI Area Selection: provide two ROI selection ways of circular area and polygon area and automatically calculate the mirror area according to the center line. The selected area will be displayed in the original image and the perfusion parameter diagram.

## 2. Perfusion Parameter Image

The result of the perfusion parameter image is displayed at the top right of the measurement analysis interface, as shown in the figure below, respectively containing the HAP, PVP, TLP, HPI, PPI and TTP. Any perfusion parameter image can be displayed separately in the tool panel area on the right. And all the perfusion parameter images can be selected and displayed as well.

**Figure 27-7 Perfusion Parameter Image**

In the perfusion parameter image window, you can double click on the pseudo color bar to replace the

pseudo color of the current perfusion parameter image.

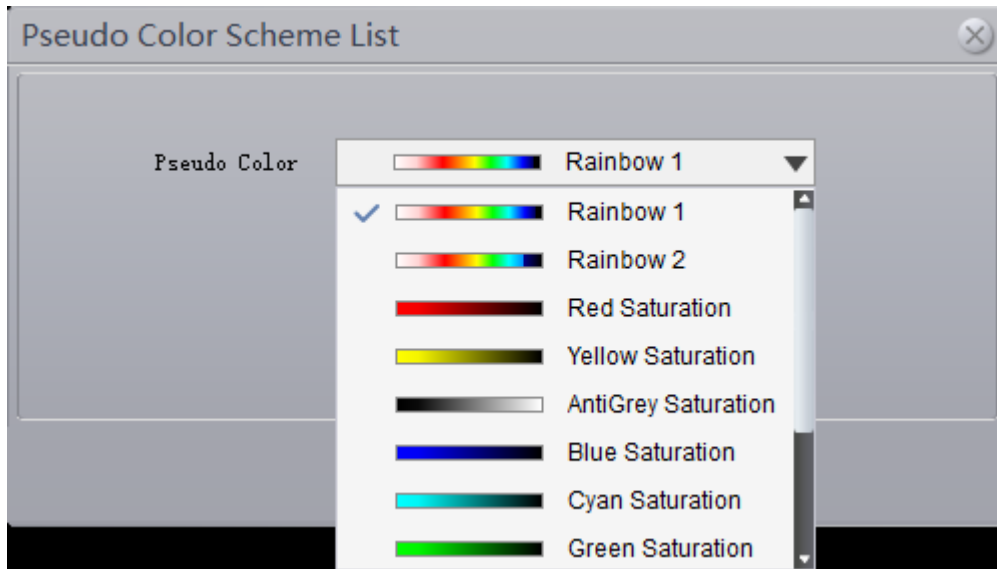


Figure 27-8 Pseudo Color Coding

### 3.ROI Time Density Curve Image

The ROI time density curve is located at the bottom left of the measurement analysis interface, as shown in the figure below, which can draw the time density curve of the hepatic artery, portal vein and splenic artery or manual sketch of ROI area. And the image density can be measured at different time points.

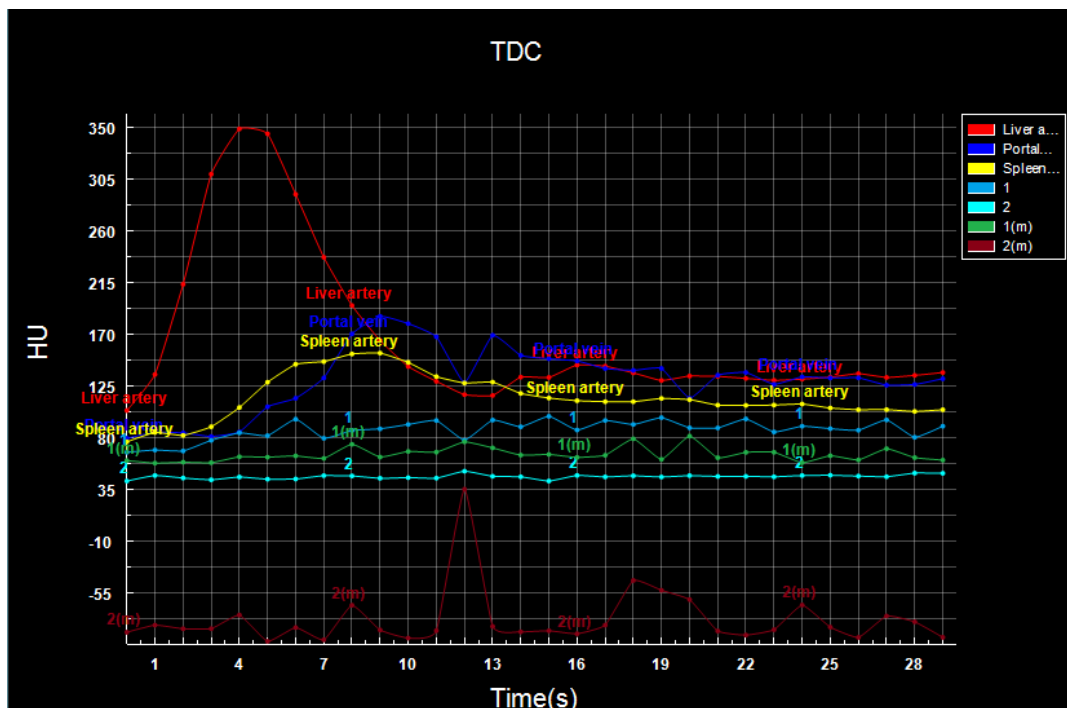


Figure 27-9 ROI Time Density Curve Image

### 4.ROI Analysis Statistics Table

ROI statistics analysis table is located at the bottom right of the measurement analysis interface, which is



used to display and organize the average value of all the ROI perfusion parameters, including HAP (ml/min/100g), PVP (ml/min/100g), TLP (ml/min/100g), HPI, PPI and TTP (s).

ROI Statistics Table						
ROI#	HAP (ml/min/100ml)	PVP (ml/min/100ml)	TLP (ml/min/100ml)	HPI (%)	PPI (%)	TTP (s)
1	104.29 ± 29.23	229.20 ± 65.40	333.68 ± 69.56	32.03 ± 8.55	67.94 ± 8.55	36.94 ± 9.97
1 (m)	44.82 ± 26.25	161.70 ± 92.42	206.67 ± 105.21	26.67 ± 22.12	73.31 ± 22.12	31.02 ± 9.00
2	38.89 ± 26.89	87.65 ± 64.91	126.68 ± 66.66	36.74 ± 28.02	63.23 ± 28.02	43.28 ± 13.83
2 (m)	42.77 ± 42.24	300.14 ± 158.72	343.02 ± 147.10	17.22 ± 24.09	82.76 ± 24.09	25.50 ± 8.36

Figure 27-10 ROI Statistics Analysis Window

## Chapter 28 Tumor Perfusion Analysis (Option)

The plug-in of tumor perfusion analysis (TPA) is based on the tumor CT image study of the same or multiple layers of tumors after injection of contrast media. Through the analysis of tumor perfusion images, the severity degree of tumor lesions of patients can be assessed to achieve the purpose of the auxiliary diagnosis of the disease.

### 28.1 Start

In the patient management list, after selecting one or multiple tumor perfusion study, select “Tumor Perfusion Analysis” in the plug-in list and then enter into the plug-in.

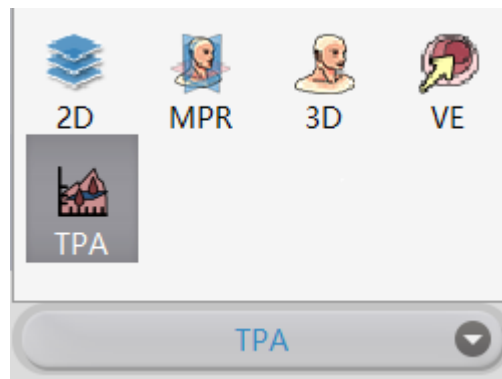


Figure 288-1 System Function Switch Panel

Tumor perfusion analysis is divided into three stages: image optimization, vascular definition and perfusion analysis.

### 28.2 Image Optimization

Image Optimization is mainly a series of preprocessing operations on images to prepare data for the subsequent calculation and analysis. It mainly includes three parts: image correction, series editing, series playing and tissue extraction.

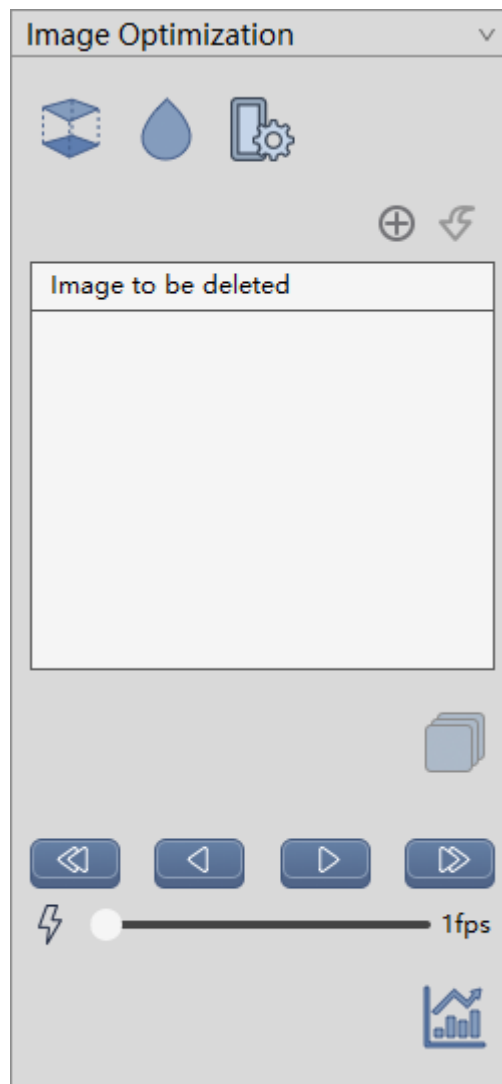


Figure 28-2 Image Optimization Panel

## 1. Image correction

- Registration: correcting the head movement during the scanning process.
- Image smoothing: conducting the smoothing operation on images;
- Setting parameters: setting image smoothing methods and smoothing times;

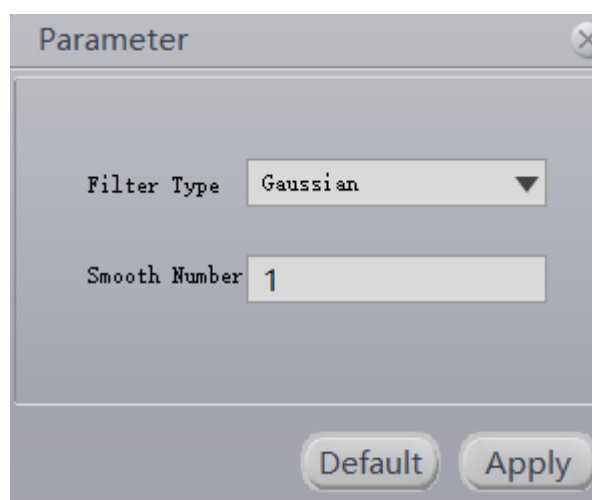


Figure 28-3 Parameter Setting

## 2.Series Editing

- Add the image to be deleted: add the image displayed in the current window to the list of images to be deleted;
- Undo Delete: undelete the selected image in the list to be deleted;
- Generate series: regenerate new image series according to the deleted image.

## 3.Series Playing

- One Step Back: Switch to the previous image display.
- Reverse Play: Play the image in reverse.
- Playing: Play the image in turn.
- One Step Forward: Switch to the following image display.
- Setting Play Speed: Set the playing speed.

## 4.Tissue extraction

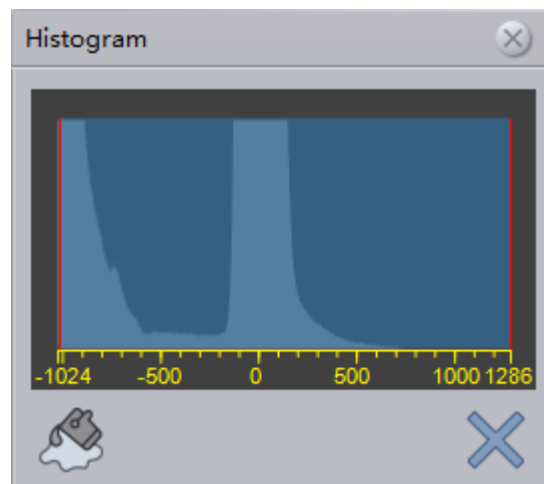


Figure 28-4 Grayscale Histogram

- Tissue extraction: remove the skull according to the selected histogram range;
- Close histogram: close the histogram;

## 28.3 Vascular Definition

After completing the data correction, click vascular definition to enter the vascular definition phase. It is necessary to manually select the artery on the image and define the time period of perfusion to complete the

calculation of perfusion parameters.

The vascular definition panel, shown in the figure below, contains the following functions:

- Artery definition (red icon): manually drawing the artery area on the image and generate the time density curve of the artery. The operation supports two ways: area definition and single point definition.

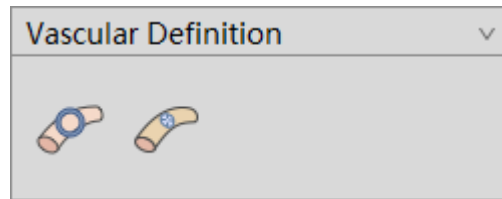


Figure 28-5 Vascular Definition Tool Panel

## 28.4 Perfusion Analysis

After click perfusion analysis, the system is automatically switched to the perfusion analysis phase. The perfusion analysis is mainly about the quantitative analysis and hypo perfusion area statistics for the calculated perfusion parameter image of ROI tissue area. And the related measurement indexes are calculated.

### 1. Perfusion Analysis Panel

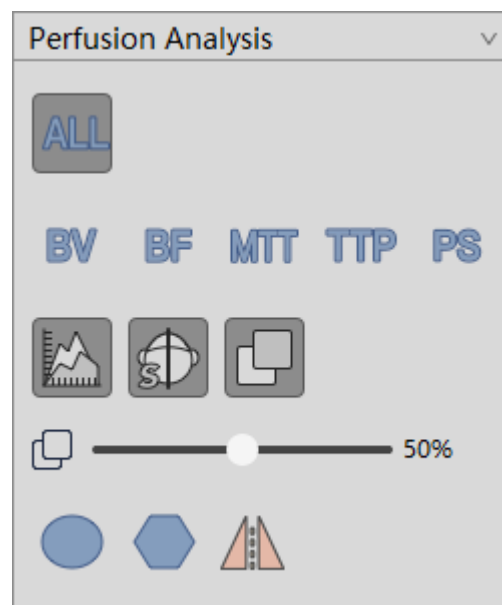


Figure 28-6 Perfusion Analysis Tool Panel

The following functions are mainly included in the perfusion analysis tool panel:

- Perfusion Parameter Image Layout: a single or all the perfusion parameter images are shown separately.
- TDC curve display: whether the time density curve of artery/vein in the ROI time density curve will be displayed.
- Center line display: whether the center line will be displayed;

- Fusion Display: whether the fusion image is displayed or not.
- Fusion degree: set the fusion ratio.
- ROI area selection: provide two ROI selection ways of circular area and polygon region, and automatically calculate the mirror area according to the center line. The selected area will be displayed in the original image and perfusion parameter image;

## 2. Perfusion Parameter Image

The results of the perfusion parameter image are displayed below the measurement analysis interface, as shown in the figure below, respectively including the blood volume (BV) image, blood flow (BF) image, mean transit time (MTT), peak to time (TTP) and surface permeability (PS). In the tool panel area on the right side, you can display any perfusion parameter image separately or you can also select to display all the perfusion parameter images.

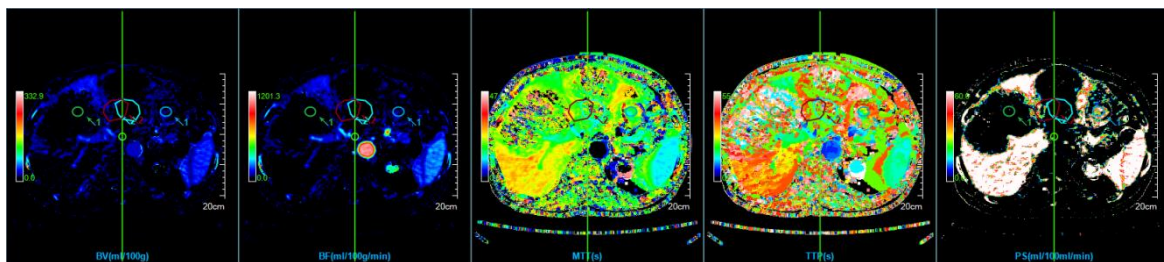


Figure 28-7 Perfusion Parameter Image

In the perfusion parameter image window, you can double click the pseudo-color bar to replace the pseudo color of the current perfusion parameter image.

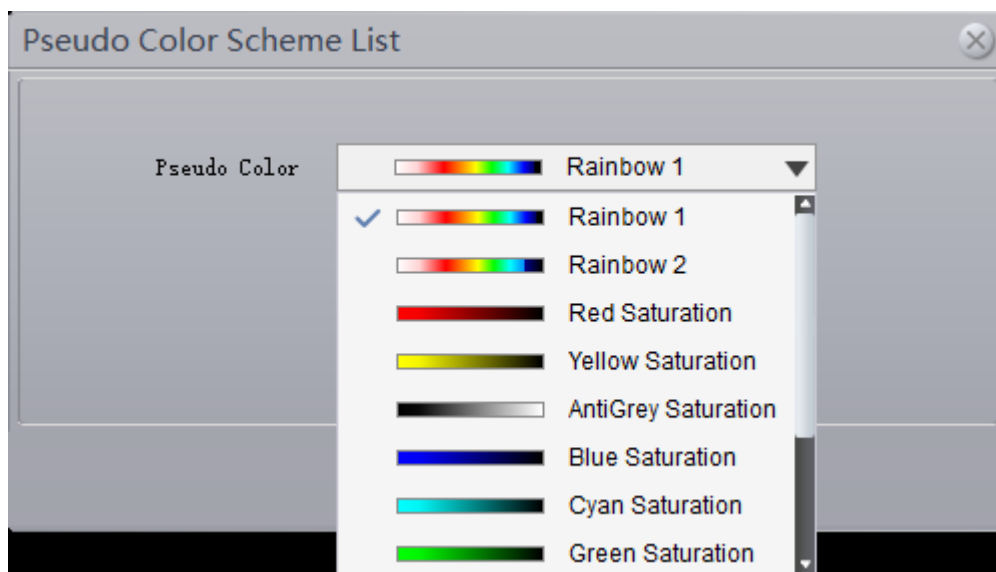


Figure 28-8 Pseudo color Coding

### 3.ROI Time Density Curve

The ROI time density curve is located at the upper right of the measurement analysis interface, as shown in the figure below. It can draw arteries and veins of blood vessels or you can manually sketch the time density curve of ROI region. And it can also measure the image density at different time points.

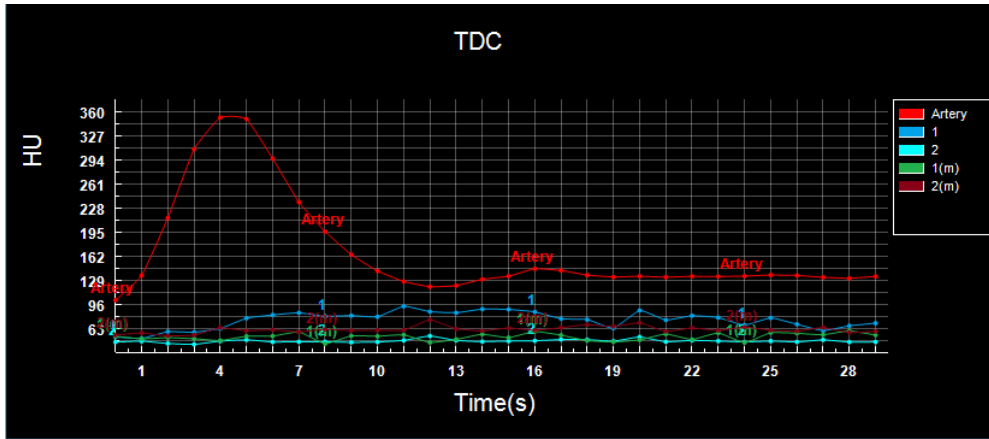


Figure 28-9 ROI Region Time Density Curve

### 4.ROI Analysis Statistical Table

The ROI statistical analysis table is located at the upper right of the perfusion parameter image, which is used to show the mean value of all the perfusion parameters of the tissue ROI, including blood volume (ml/100g), blood flow (ml/100g/min), mean transit time (s), peak time (s) and surface permeability (ml/100ml/min).

ROI Statistics Table					
ROI#	BV (ml/100g)	BF (ml/100g/min)	MTT (s)	TTP (s)	PS (ml/100ml/min)
1	13.67 ± 7.44	50.44 ± 32.84	17.51 ± 2.87	26.09 ± 6.62	31.02 ± 5.50
1 (m)	3.70 ± 4.69	12.61 ± 18.06	21.90 ± 14.03	40.97 ± 14.67	8.56 ± 6.15
2	5.27 ± 6.35	18.75 ± 22.88	19.10 ± 7.94	30.24 ± 11.60	7.26 ± 5.43
2 (m)	10.71 ± 9.32	36.15 ± 31.54	19.12 ± 5.92	30.76 ± 10.85	16.41 ± 10.20

Figure 28-10 ROI Statistical Analysis Window

## Chapter 29 Lung Function Analysis (Optional)

Lung function analysis, hereinafter referred to as LFA, is mainly to extract lung parenchyma, extract lung trachea, segment lung lobes, extract emphysema and calculate the volume of the lungs occupied by emphysema by using CT data. LFA is a powerful tool for clinicians to evaluate the structure and function of lung tissue. It can distinguish which the patient's main disease is, emphysema or small airway lesions and can quantitatively evaluate the degree of the lesion change in lung structure and tracheal tissue by imaging.

### 29.1 Start

The LFA plug-in, as a functional plug-in in the system, is deployed in advanced application module.

In the patient management list, select "LFA" in the plug-in list after selecting a lung study and enter the plug-in, as shown in figure 29-1.

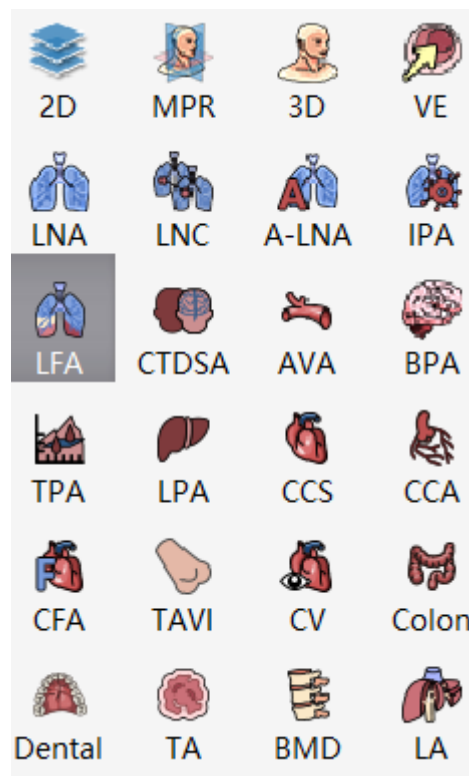


Figure 29-1 Launching LFA Plug-in

Click on the [LFA] button on the function switch panel in the advanced application module and the system can also be switched to the tooth analysis plug-in, as shown in figure 29-2.



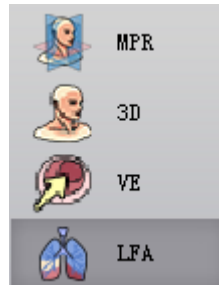


Figure 29-2 Switch to LFA Plug-in

## 29.2 LFA Operating Interface Overview

The LFA operation interface, as shown in figure 29-3, mainly includes two parts, view area and function operation panel area:

A: Functional operation panel, provide the tools for extracting lung parenchyma, trachea and emphysema, tools for tissue modification, tools for segmenting lung lobes and general tools.

B: View area, after successfully loading the data, the system will extract the lung parenchyma automatically; after the successful extraction, the view area will display the lung parenchyma, VR and MPR images of trachea and emphysema, image window for calculation results of emphysema.

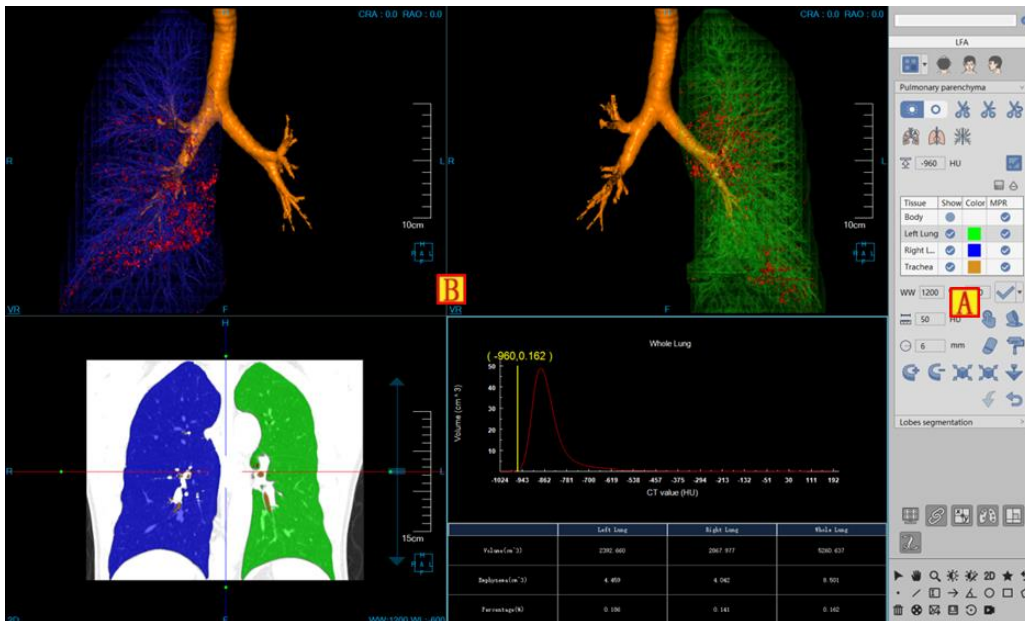


Figure 29-3 LFA Operation Interface

## 29.3 View

The LFA Analytic View area has two layouts: 1\*3 and 2\*2. Layout 1\*3 consists of the whole lung parenchyma VR image (A) and the three axial, coronal and sagittal MPR images (B,C,D) . Layout 2\*2 consists of

the left lung parenchyma VR image (E), right lung parenchyma VR image (F) and data window (G), as shown in figures 29-4 and 29-5:

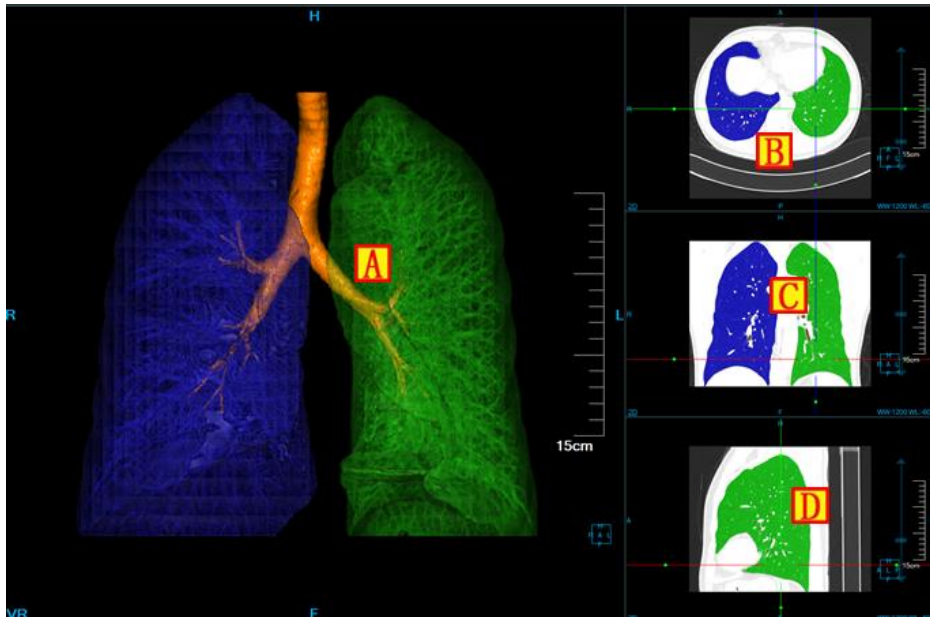


Figure 29-4 LFA View 1\*3 Layout

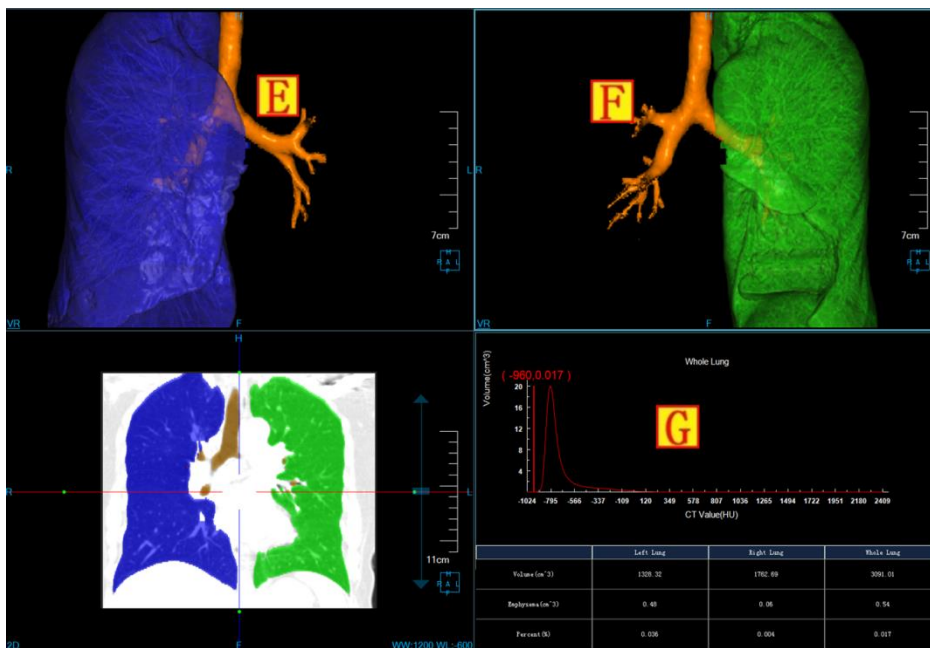


Figure 29-5 LFA View 2\*2 Layout

## 29.4 Control Panel

The operation panel of lung function analysis consists of two parts: the general tool and the lung analysis tool.

## 1.General Tool

### 1)Patient Information

Click [patient information], A [patient list] and B [series list] corresponding to the selected patient will pop up. After the patients being switched, the series list will also be switched accordingly, as shown in figure 29-6:

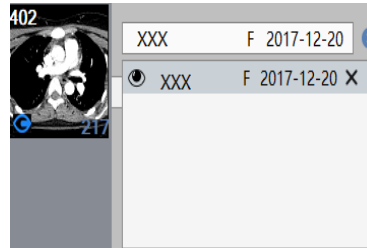


Figure 29-6 Patient Information List

### 2)General operation

#### ➤Default operation

Function description: click on the button to restore to the default mouse operation. The default operation function of the mouse in the MPR window is for adjusting layers.

Operation mode: click on the default operation button in the operation panel, and press the mouse button in any window and move it.

#### ➤Translation Operation

Function description: by translation, MPR and VR images can be moved to a position suitable for observation.

Operation mode: click on the translation button on the operation panel and press the mouse button and move it in any window. The image in the current window will move with the mouse.

#### ➤Zooming Operation

Function description: zoom function can enlarge or reduce the MPR image to a satisfying size.

Operation mode: click on the zooming button on the operation panel, press the mouse button and move it in any image window to achieve the dynamic zooming of the image in the current window.

#### ➤Adjusting WW/WL or Opacity

Function description: adjust WW/WL in MPR window, VR and the opacity in endoscope window to observe the interested images more clearly.

Operation mode: click on the button of adjusting WW/WL on the operation panel and press the mouse button

moving it up and down, or from left to right in the image window to adjust WW/WL or opacity.

### ➤ Quick Browsing **2D**

Function description: click on the "Quick View" button to browse the corresponding two-dimensional image.

### 3) Preset WW and WL

Click on this button, you can find that 15 kinds of WW and WL preset values are provided for adjusting WW and WL, as shown in figure 29-7. Click on the corresponding preset value in the list and the image of WW and WL will be changed correspondingly.

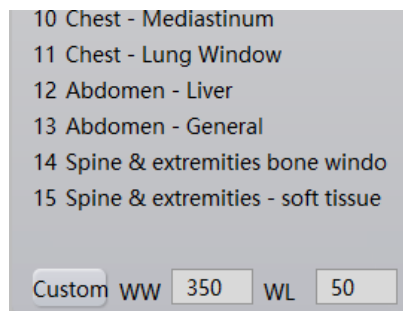


Figure 29-7 WW and WL Preset Setting

### 4) General Tool Bar

#### ➤ Reset Function

Function description: restore the image to the loaded original default state.

#### ➤ Send to the Film

Function description: send the image in the currently selected window to the film.

#### ➤ Send to the Report

Function description: send the image in the currently selected window to the report.

#### ➤ Save

Function description: save the image / screen to the designated location.

#### ➤ Recorder tool

Function description: provide screen recording function.

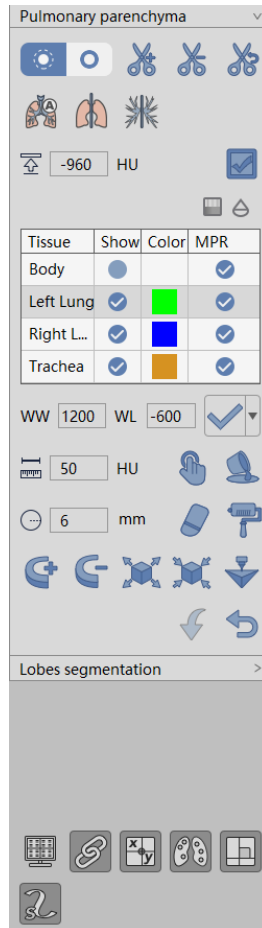
#### ➤ Rotate tool

Function description: provide VR rotation function.

## 2.LFA tool

The operation panel consists of two functions: pulmonary parenchyma extraction panel and lung lobe partition panel.

The lung parenchyma extraction panel is shown in figure 29-8:



**Figure 29-8 Lung Parenchyma Extraction Panel**

### 1)Layout



1\* 3 layout: default layout, which is composed of the whole lung parenchyma window and the three axial, coronal and sagittal MPR image windows.



Form layout: when the lung data are loaded into the LFA plug-in, the automatic extraction begins, including the extraction of the left and right lung parenchyma, pulmonary windpipe and emphysema. After the successfully automatic extraction, the system will jump to the layout, which includes the left lung segmentation result image, right lung segmentation result image, MPR coronal plane and tabular data window.

### 2)Display Azimuth




The three VR visual azimuth information settings provide three default body position orientations: Axial, Coronal and Sagittal. Click on the corresponding button, the system can switch the orientation of the VR window data.

### 3)Cut




The cutting function is provided in the VR view to cut the inner side, outer side and restore the inner side and outer side. And it can be reset to restore to the original state before cutting.


### 4)Automatic extraction

Click on the panel  and an automatic extraction can be performed again, including the extraction of the left and right lung parenchyma, lung trachea and emphysema.



### 5)Manually Extracting pulmonary parenchyma

Click on the panel , and the system will prompt that the previous lung parenchyma extraction result needs to be deleted. After clicking on the confirmation button, the range of the lung parenchyma in the MPR image will be delineated with the mouse. According to the region, extract the lung parenchyma and the table data will be updated accordingly.

### 6)Manually Extracting Trachea















Click on the panel , and the system will prompt that the previous trachea extraction result needs to be deleted. After clicking on the confirmation button, click the left button with the mouse in the trachea part on the MPR image to extract the trachea according to the position of the point. The table data is updated accordingly.

### 7)Calculating Emphysema


Set appropriate thresholds  -960 HU and the emphysema default value is -960. Click on the panel  and extract emphysema according to the threshold. The table data will be updated accordingly.

### 8)Tissue Management

The tissue list includes five tissues: body, left lung, right lung, trachea and emphysema. You can modify the tissue color of the MPR window by double-clicking on the colour button. The tissue can be displayed and hidden by checking the checkbox. Tissue modifications provide the following tools, and the body tissue and emphysema do not support the following tools. After the tissue is modified, the table data will be updated accordingly.

-  Tissue extraction: provide manual settings of WL. Click on the button to extract;  the tissue is extracted according to the upper and lower thresholds set in the histogram.
-  Manual extraction: in any interesting area of the MPR window, press the left mouse button, you can extract the tissue. You can set the step size parameter  to specify the growth rate of manual extraction.
-  Filling Hole: if the extracted tissue is not completely extracted and there are other tissues inside the volume, this function can be used to fill the internal tissue into this tissue.
-  3D staining: a 3D sphere is used to perform the function of tissue extraction on MPR image. The radius of the 3D sphere can be set through the radius parameter.
-  3D erasure: a 3D sphere is used to perform the function of erasing the extracted tissue. The radius of the 3D sphere can be set through the radius parameter.
-  Projection addition: it is suitable for the tissue extraction. Press the left mouse button to demarcate a closed area on any MPR image, and the closed area is projected layer-by-layer from the upper and lower ends to form a volume area, which is the extracted tissue.
-  Projection deletion: it is suitable for the tissue extraction. In contrast of projection addition, the function is used to delete a closed area from the extracted tissue formed by projecting the tissue layer-by-layer from the upper and lower ends.
-  Inflation: it is suitable for the tissue extraction. A morphological algorithm is applied to the extracted tissue to combine the other tissues of the tissue boundary into the function that the issue is extracted.
-  Corrosion: it is suitable for tissue extraction. The difference from expansion is the function to remove a portion of the extracted tissue boundary from the tissue.
-  Undo: return the tissue state to the last extracted result state.
-  Reset: empty the extracted tissue area.
-  :Selected organization is sent to the print modeling plug-in.

### 9)Opacity Adjustment

Click on the panel button , and the opacity model dialog box will pop up. Select the appropriate opacity model for the selected tissue in the tissue list to adjust opacity, as shown in figure 29-9:

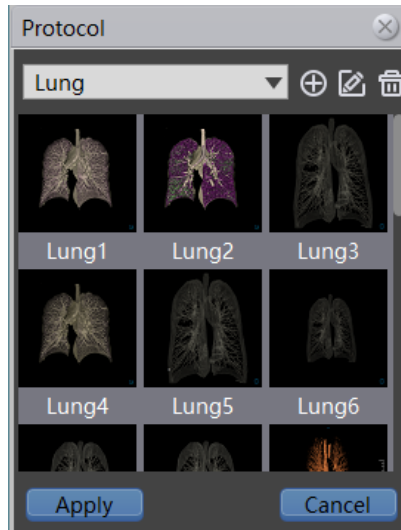



Figure 29-9 Opacity Model

### 10)Permeability Adjustment

Click on the panel button , and the permeability dialog box will pop up. The permeability of VR and MPR can be adjusted for the selected tissue in the tissue list, as shown in figure 29-10:

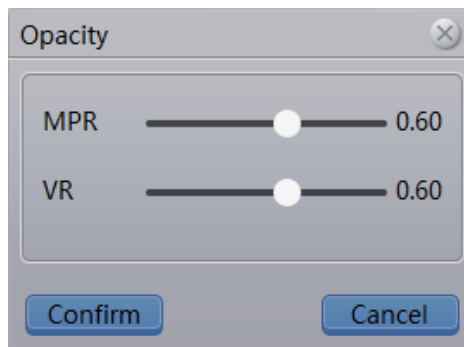






Figure 29-10 Permeability Adjustment Window


### 11)Display Control

-  Overlay Information Checkbox: when it is selected, the window will display the overlay information; when it is not selected, it will not display the overlay information.
-  Linkage checkbox: when it is selected, the synchronous linkage of the three MPR window zooming and WL adjusting will be performed. Otherwise, the above linkage will not be performed.
-  Crosshair checkbox: when it is selected, the overlay information on the Axial, Coronal and Sagittal



window will be displayed; Otherwise, the crosshair information will not be displayed.

➤  Emphysema check box: if selected, emphysema will be displayed, if not selected, emphysema will not be displayed.

➤  Orthogonal check box: Set whether the cross line is orthogonal. If selected, the cross line is orthogonal.

### 3.Lobes segmentation panel

The lung lobes segmentation panel is shown in figure 29-11:

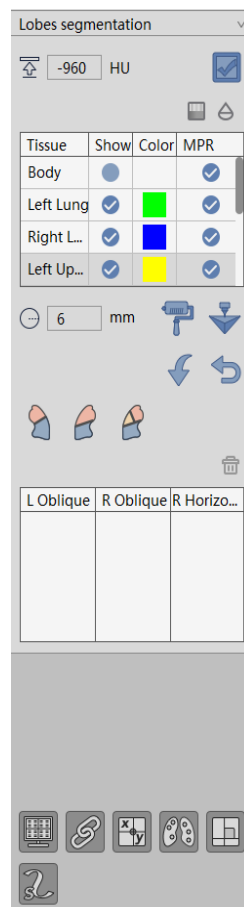



Figure 29-11 Lung Lobes Segmentation Panel

#### 1)Layout

 2\*2 layout: the default layout, which is composed of the whole lung parenchyma VR images and Axial, Coronal and Sagittal MPR images. The trace description of the lung lobe segmentation under this layout will be performed, as shown in figure 29-12:

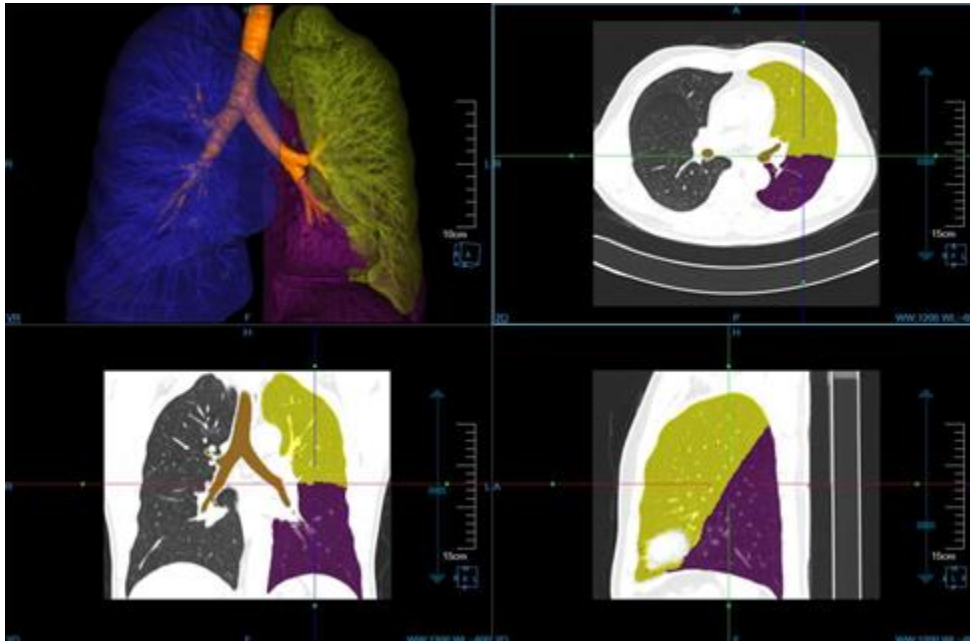


Figure 29-12 Lung Lobe Segmentation 2 \* 2 Layout



Form layout: includes left lung VR image, right lung VR image, MPR coronal and tabular data window, as shown in figure 29-13:

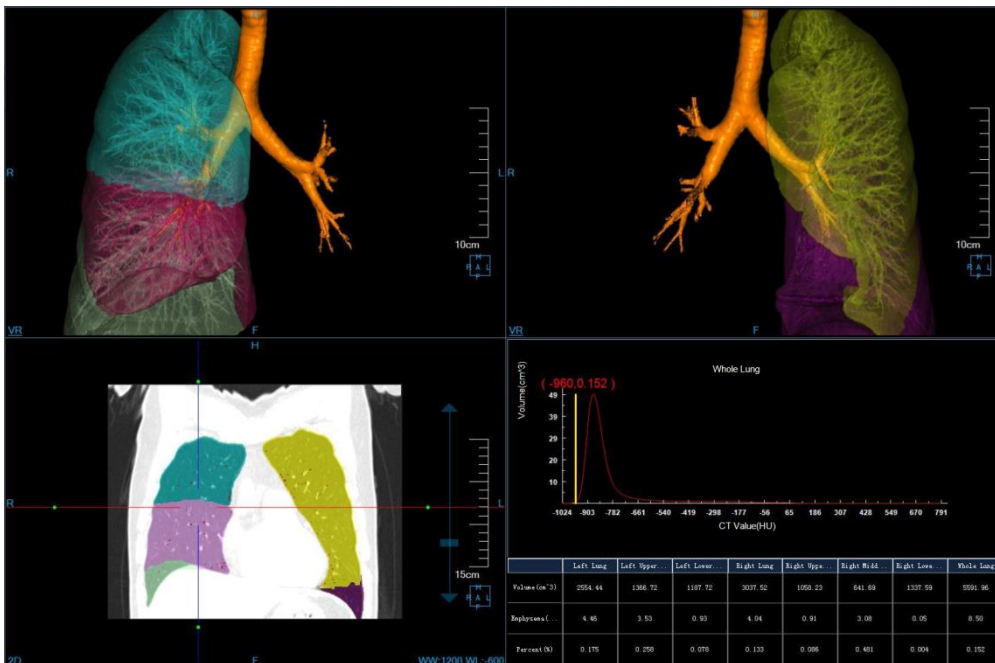


Figure 29-13 Form Layout of Lung Lobe Segmentation

2) Display Azimuth









: The functional operation is the same as lung parenchyma extraction panel.


3) Tissue List Management:

The tissue list includes ten tissues: body, left lung, upper left lung, lower left lung, right lung, upper right lung, middle right lung, lower right lung, windpipe and emphysema. You can modify the MPR window tissue

colour by double-clicking the color button. Displays can be hidden by checking the checkbox. Tissue modifications provide the following tools, and body tissues and emphysema do not support the following tools. After the tissue is modified, the table data will be updated accordingly.

-  Three-dimensional staining: the same operation with the staining function of lung parenchyma extraction panel.
-  : The selected organization is sent to the print modeling plug-in.
-  Undo: the same operation with the revocation function of lung parenchyma extraction panel.
-  Reset: the same operation with the revocation function of lung parenchyma extraction panel.
-  Resistive photometric regulation: the same operation with the resistive photometric regulation function of lung parenchyma extraction panel.
-  Transmissivity regulation: the same operation with the resistive photometric regulation function of lung parenchyma extraction panel.

#### 4) Pulmonary lobe Segmentation

-  Left lung left oblique: press the left mouse button and draw the track on the left lung left oblique line of different slices in the MPR window . The trajectory drawing will be terminated when the mouse is lifted. Tracks named "L Oblique n" appear synchronously in the left lung left oblique list. Draw at least three tracks, and click the accept button to split the upper and lower lobes of the left lung. The segmentation results are shown in figure 29-14. Click the cancel button to finish the trace drawing pro

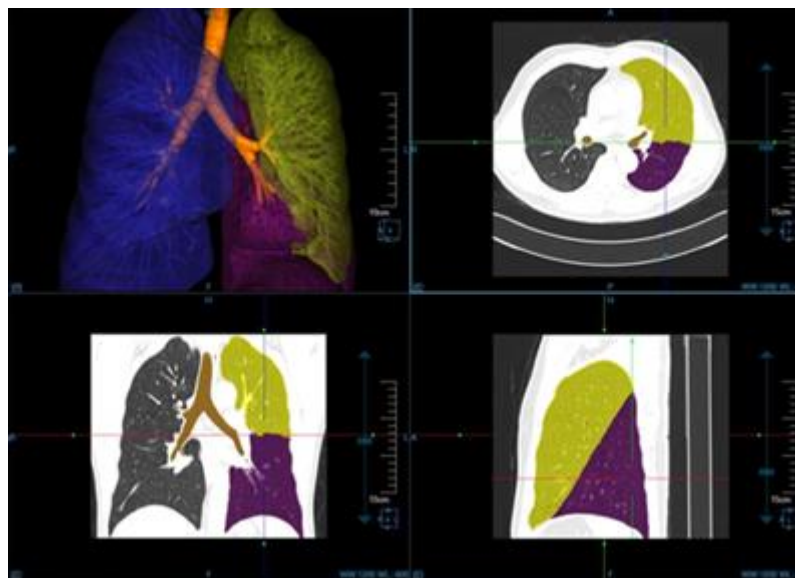

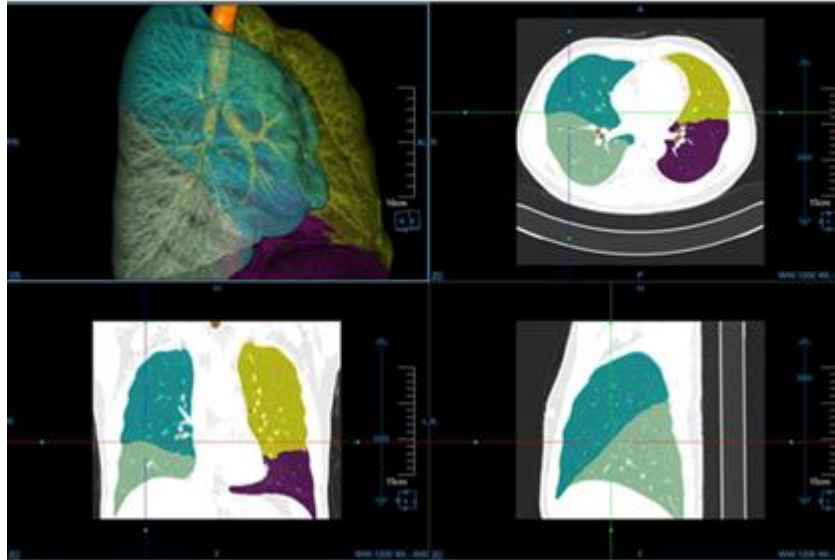



Figure 29-14 Left Lung Lobe Segmentation Effect Image

-  Right lung right oblique: press the left mouse button and draw the track on the right lung right oblique line of different slices in the MPR window. The trajectory drawing will be terminated when the mouse is lifted. Tracks named "R Oblique n" appear synchronously in the right lung right oblique list. Draw at least three tracks and click the accept button and divide the upper and lower lobes of the right lung. The segmentation result is shown in figure 29-15. Click the cancel button to finish the trace drawing process.



**Figure 29-15 Right Lung Lobe Segmentation Effect Image**

-  Right lung right horizontal: press the left mouse button and draw the trace on right lung right horizontal line of different slices in the MPR window. The trajectory drawing will be terminated when the mouse is lifted. Tracks named "R Horizontal n" appear synchronously in the right lung right horizontal list. Draw at least three tracks. Click the accept button to split the upper lobe of the right lung into the upper lobe of the right lung and the middle lobe of the right lung. The segmentation results are shown in figure 29-16. Click the cancel button to finish the trace drawing process

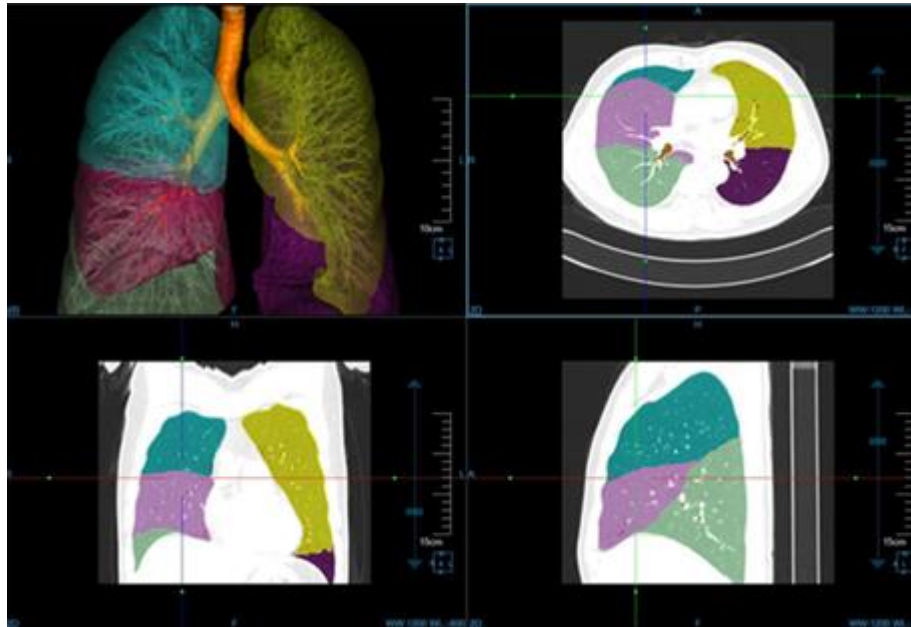





Figure 29-16 Right Lung Lobe Segmentation Effect Image


#### 5)Track List Management

- Track list: it includes left lung left oblique list, right lung right oblique list and right lung right horizontal list.
- Switch track: select a track in the list, and the corresponding MPR window will locate to the track. The currently selected track is red, and the unselected track is yellow.
- Delete track: select a track in the list, and then click  the button of deleting track. The selected track will be deleted. After the track is deleted, the previous lung lobe segmentation result will not be affected.

#### 6)Calculating Emphysema

Set appropriate thresholds   HU and default values of emphysema are -960. After clicking on the  panel, extract emphysema according to the threshold. The table data will be updated accordingly.

#### 7)Control Display

- Overlay information, the function of linkage and crosshair is consistent with the lung parenchyma extraction panel.
- Track  : when it is selected, the painted lung lobe segmentation track will be shown. When it is not selected, The track will not be shown.

8)Return to the Lung Parenchyma Extraction Panel

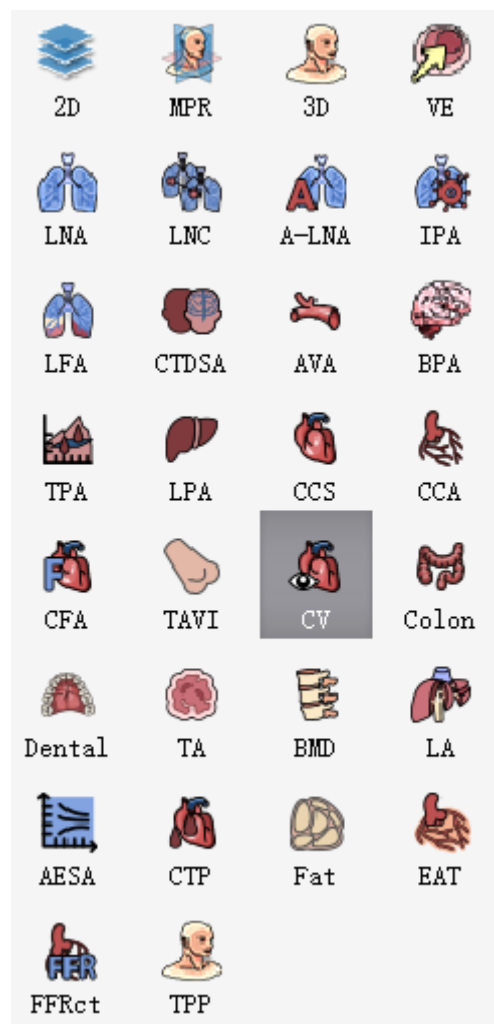
Return to the lung parenchyma extraction panel and the lung lobe segmentation result will be cleared.

## Chapter 30 Cardiac Viewer (Option)

Cardiac view plugins can automatically segment cardiac images in each phase, which makes it easier for users to observe the structure of the heart and cardiovascular diseases. At the same time, it also provides a variety of convenient interactive tools, supporting the basic window operations of image rotation and zooming, supporting WL adjustment and opacity adjustment, etc., to assist doctors in more detailed analysis and diagnosis.

### 30.1 Start

Cardiac view plugin is deployed in the advanced application module as a functional plug-in of the system. In the following figure, select [CV] through the image view on the patient information page and the cardiac view plugin can be switched to.



**Figure 30-1 Cardiac View Quick Start Panel**

On the function switch panel of advanced application module, click [CV] button and the cardiac view plugin

can be switched to, as shown below.

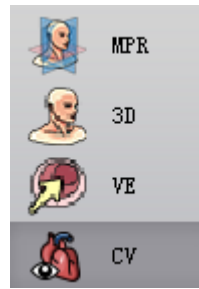


Figure 30-2 Switch Panel between the Plug-ins

### 30.2 The Description of Operation Interface

The cardiac view operation interface mainly consists of two parts: view area and function operation panel area:

- A: View Area, display the MPR image of image data: it includes short-axis images, horizontal long-axis images, vertical long-axis images, chamber images and body VR images;
- B: Function Operation Panel, provide the methods and tools for operating windows, 4D play tools, curve generation, phase comparison and sending report images and so on.

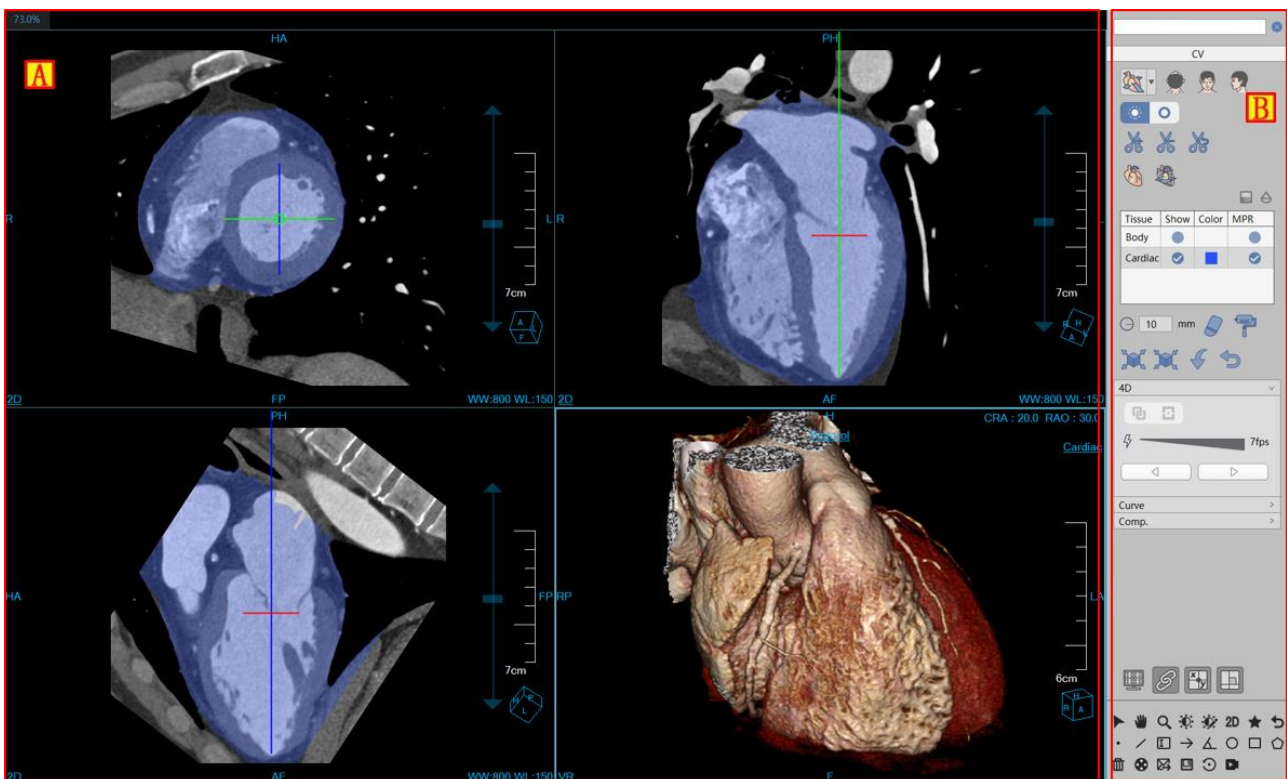


Figure 30-3 Cardiac View Operation Interface

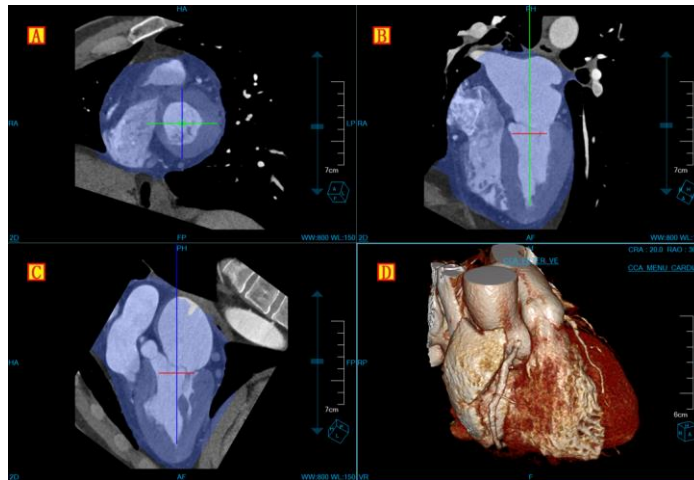
### 30.3 Image Display View

#### 1.Holistic View

Image display view realizes the content output of the image display window through the combined layout of



multiple image windows and multiple tabular image views. As shown in the following figure, each window is: short-axis image window (A), horizontal long-axis image window (B), vertical long-axis image window (C) and VR image window (D).



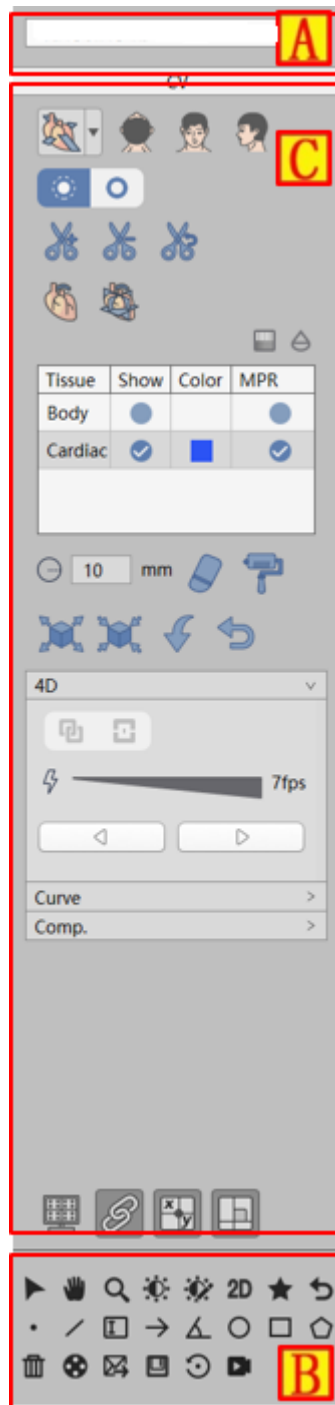
**Figure 30-4 heart view window**

## 30.4 Function Operation Panel

### 1. Holistic Function Operation Panel

The operation panel of the cardiac view plug-in is divided into three areas: data switching, cardiac view function and common function.

- A: Data Switching, switch the image series, delete study by thumbnail image;
- B: Common Function, provide the common operations such as default operation, translation, zooming, adjusting WW/WL, restoring default function button, etc.
- C: Cardiac View Function, provide a series of function operations such as layout switch, ventricular restoration, cardiac resegmentation, 4D play, curve editing and multi-phase comparison for cardiac view to processing and analysis.



**Figure 30-5 Cardiac View Function Panel**

## 2. Cardiac View Function Panel

### Restore Heart Chamber Default Position



The button is used to restore the positions of cardiac base and apex before the modification of the currently selected phase.

### Layout Switch

Three layouts are provided:

Standard 2+2 layout: display 3 MPR images, 1 VR image.

Axial 2+2 layout: display 3 ventricular axial images and 1 VR image.

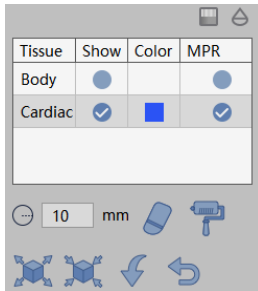
Chamber 2+2 layout: display short axis image, 2 chamber image, 3 chamber image and 4 chamber image.

### Cutting Tool



This tool is the same as VR plug-in. Please refer to VR plug-in for specific operation.

### Tissue List and Repair Tool



Display the current tissue and modify it by erasing, dyeing, corroding, expanding, etc.

### Extraction Tool



Automatically segment heart, and position the base and apex of the heart.

### 4D Play Tool



Full screen means that all the windows are included when recording; A window refers to the one selected only when recording.



show play speed, increasing speed gradually from left to right.

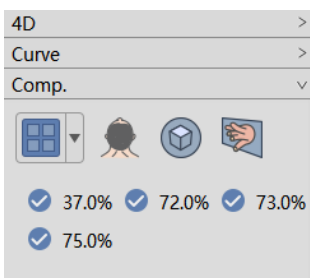


mean play back, stop and play forward, respectively.

### Curve Tool

Refer to the curve tool in MPR plug-in.

### Multi-phase Contrast Tool



Four layouts are provided for multi-phase contrast: 1\*2 phase contrast, 2\*2 phase contrast, 2\*3 phase contrast, 3\*3 phase contrast;

Tick the phase series under the comparison layout and the image will be loaded into the layout automatically.

Users can choose short axis, axial plane, and VR image for comparison.

## Chapter 31 Advanced Lung Nodule Analysis (Option)

Based on the image data loaded by the patient management, taking the image series as unit, A-LNA plug-in can effectively evaluate lung nodules and generate nodule report through the operations of extracting nodule, fully automatically analyzing lungs, extracting nodules, calculating the volume of lung nodules and describing the nodule form, etc.

For the specific nodules that are selected, the data of the reconstructed nodules in the direction of HFS are formed, and the information of the 3d volume and effective diameter of nodules is automatically calculated, which can provide an effective basis for future follow-up study, volume change rate and doubling time required in the contrast of nodules.

### 31.1 Start

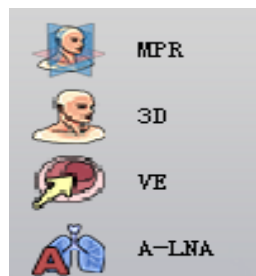
The advanced lung nodule analysis (A-LNA) plug-in is deployed in the advanced application module as a functional plug-in of the system.

As shown in figure 31-1, select [A-LNA] through the image browsing in the patient information page to switch to the advanced pulmonary nodules analysis (a-lna) plug-in.



**Figure 31-1 pulmonary nodules quick start panel**

In the function switch panel of the advanced application module, click the [a-lna] button to switch to the advanced pulmonary nodules analysis (a-lna) plug-in, as shown in figure 31-2.



**Figure 31-2. Switch panel between plug-ins**

## 31.2 The Description of Operation Interface

As shown in figure 31-3 and 31-4, the lung nodule analysis operation interface mainly has two parts: view area and function operation panel area:

➤A: View Area, display MPR section of the image data, including the images of axial plane, coronal plane and sagittal plane; locally zoomed in image of the nodule, lung MIP image and the reconstructed images of nodule HFS.

➤B: Function Operation Panel, provide ways and tools of the operation image display window and the functions of extracting nodules, editing match nodule and sending report images, etc.

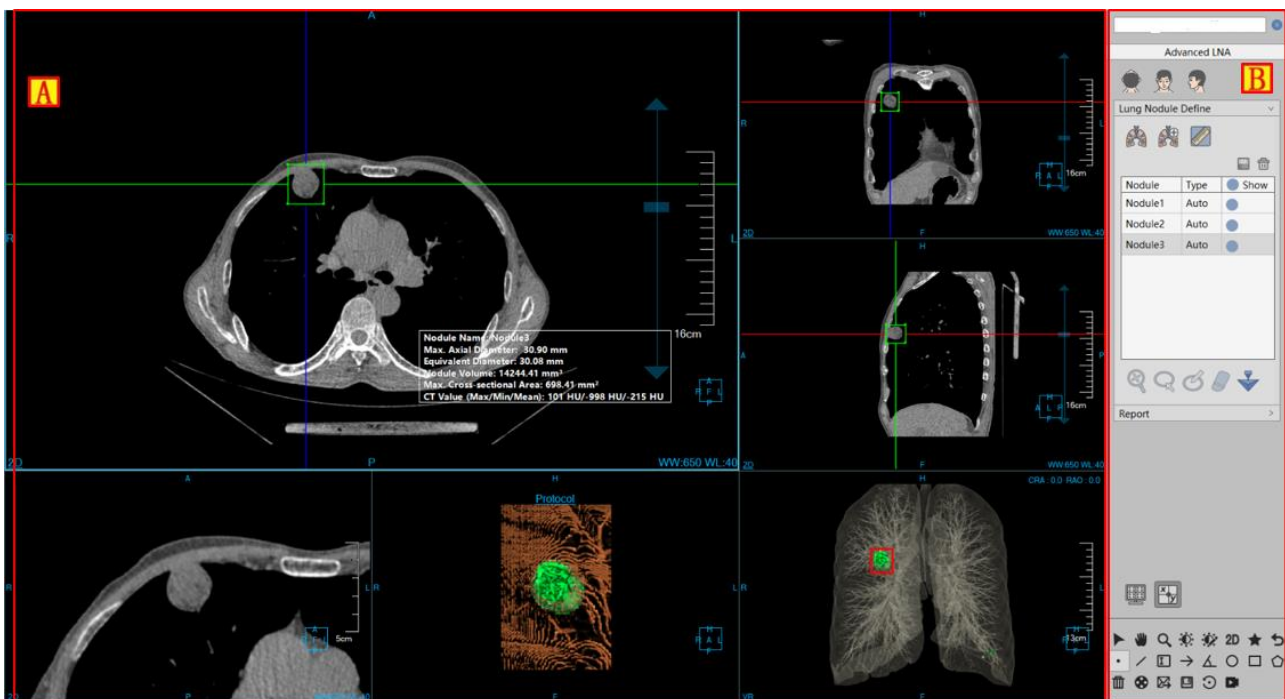


Figure 31-3 A-LNA Operation Interface -- Extraction

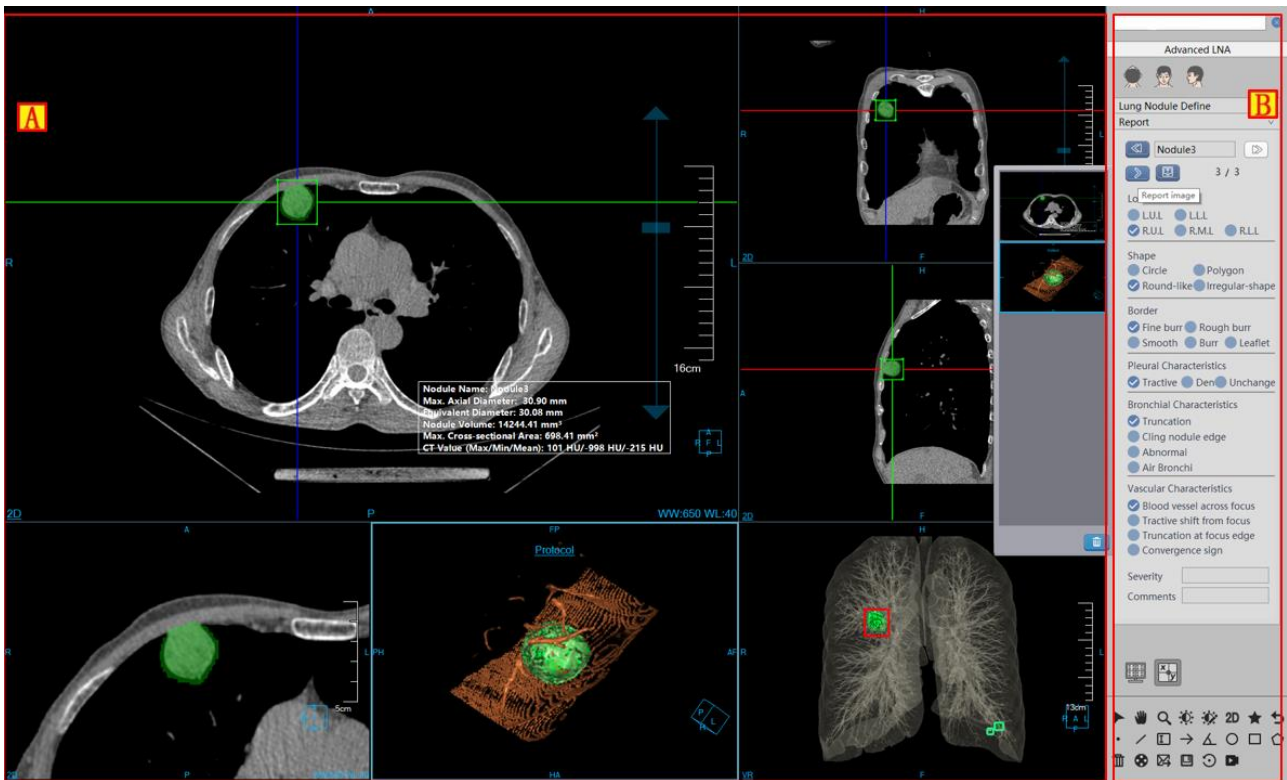


Figure 31-4 A-LNA Operation Interface -- Edit

### 31.3 View

#### 1.Lung Nodule Analysis Holistic View

The image display window can implement the content output of the image display window through multiple basic window combination layouts. As shown in figure 31-5, the image is displayed in a 4\*2 window layout. The four basic windows of them are: axial plane window (A), coronal window (B), sagittal window (C) and nodule local magnification window (D). Two VR windows are nodule reconstruction image window (E) and lung MIP window (F); Floating window for nodule analysis results (G).

After double clicking on any window, the window is displayed in full screen in the view area. Double click the full-screen image again, and the view area will restore the previous 4\*2 window layout to display the image.

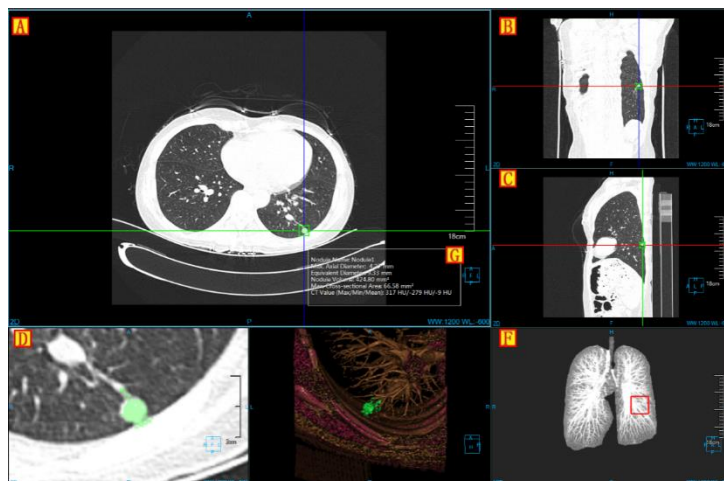
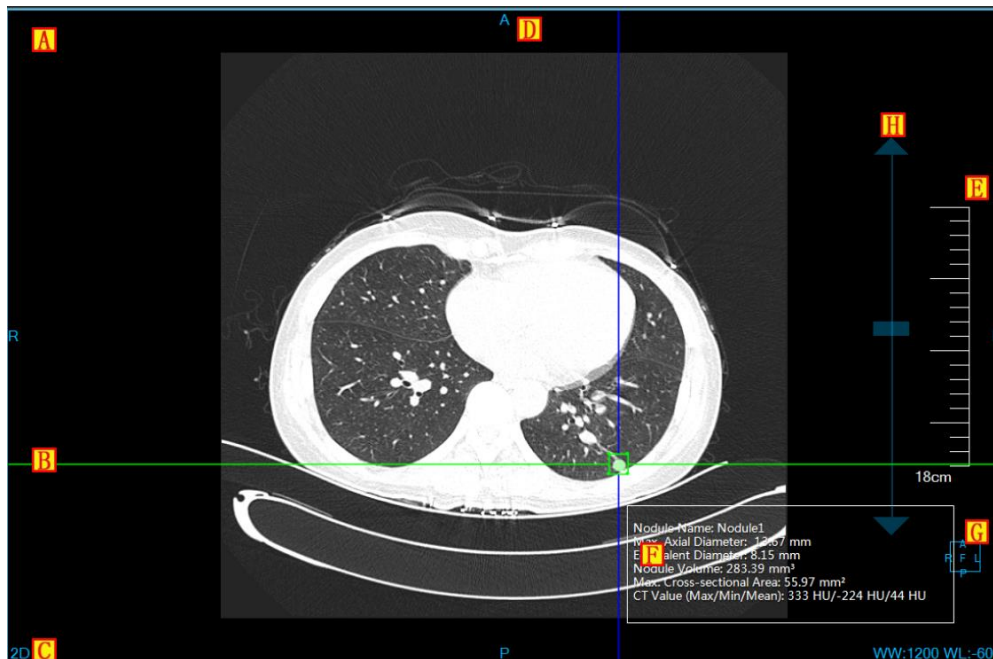


Figure 31-5 Lung Nodule Analysis View Window

## 2. Image Display View

The displayed contents that the image displays in the basic window include crosshair, overlap information, location information, display mode, ruler, location box and nodule analysis results as shown in figure 31-6.



**Figure 31-6 Image Display Basic Window**

➤A: Overlap Information, display the head information content of DICOM image and the real-time information of window width and window level. The customized contents of the head information can be displayed in the setting interface;

➤B: Crosshair, you can adjust the corresponding axial plane、 coronal plane and sagittal plane images by moving the red, green and blue crosshair; When the nodules are enlarged and modified, the size of the nodule bounding box can be adjusted by dragging the four sides of the middle box to extract nodules.

C: Display Mode, display the display mode of the current image display window, including the contents such as 2D, MIP, AIP and MinIP, etc. Right click on the button on the display mode text in the window and the system will pop up the switch menu of display mode. Choose the corresponding menu item and the display mode of the image window will be switched;

➤D: Location Information, Synchronized with the displayed image content, the location information of the current display image can be identified. It is displayed in the form of text in the middle of four lines of image display basic window;

➤E: Ruler, output the image scale based on the half height of the image display window;

➤F: Nodule Extraction Result, after the nodule extraction is completed, this information will be displayed.

➤G: Location Box, the display box of the location information is adjusted with images

synchronously.

➤H: Dragging Slider of Regulating Layers, drag the slider to the corresponding image

layer;

## 31.4 Function Operation Panel

The operation panel of nodular analysis function is divided into three areas: data switching, lung nodule analysis and common function.

➤A: Data Switching, switch the image series and delete the study through thumbnails.

➤B: Common Function, provide the function buttons of common function operations, such as default operation, translation, zooming, adjusting WW/WL and restoring default, etc.;

➤C: Nodule Analysis Function, provide a series of function operations for processing and analyzing nodules such as extracting, modifying, editing and deleting nodules, etc.



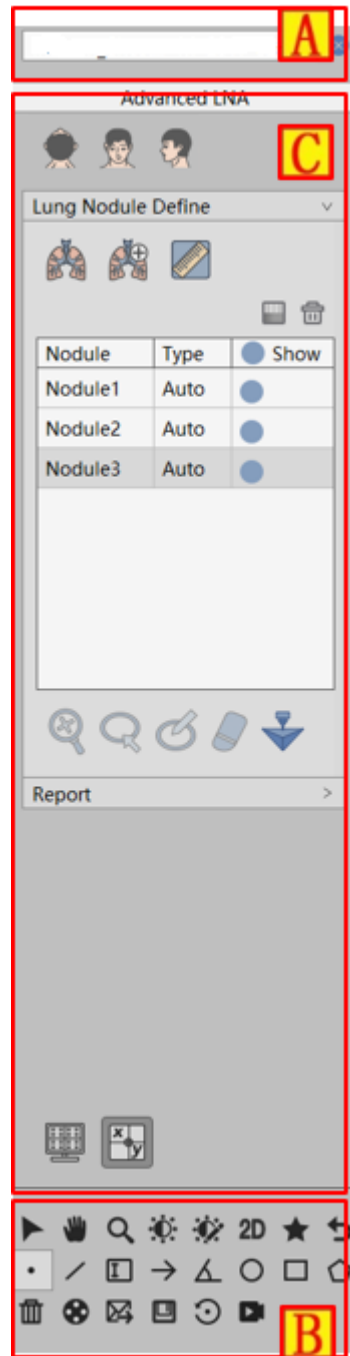


Figure 31-7 LNA Function Panel

## 1.Lung Nodule Extraction Function Panel

### 1)Image Orientation



LNA Function provides 3 default body position orientation: Axial, Coronal and Sagittal. Click on the corresponding button, the window data orientation can be switched.

## 2) Extract Lung

Enter into the nodule plug-in, prompt separate lungs, and meanwhile generate lung MIP image;

On the extraction panel, click on [Manual Extraction Lung] button and extract lung to generate lung MIP image by drawing closed areas.

## 3) Extract Nodules

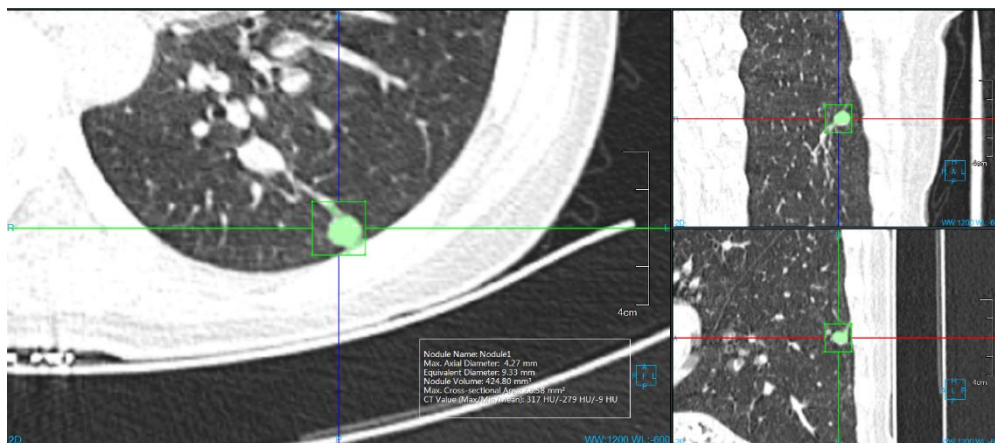


Extracting nodules can be divided into two parts: extracting nodules for the first time and modifying nodules for the second time, supporting to send to **【Printing Modeling】**

➤ **The First Extraction:** click on the nodule to extract it in the basic window.

➤ **Modifying Nodules for the Second Time:** it can be divided into four modification methods: enlargement modification, contour line modification, magnetic modification and erasion modification. The operations of contour line modification, magnetic modification and erasion modification can be restored and undone.

**【Enlargement and Modification】** Zoom in the three nodule images of axial plane, coronal plane and sagittal plane, and adjust the size of nodules to extract nodules for the second time by dragging the bounding box on the crosshair.

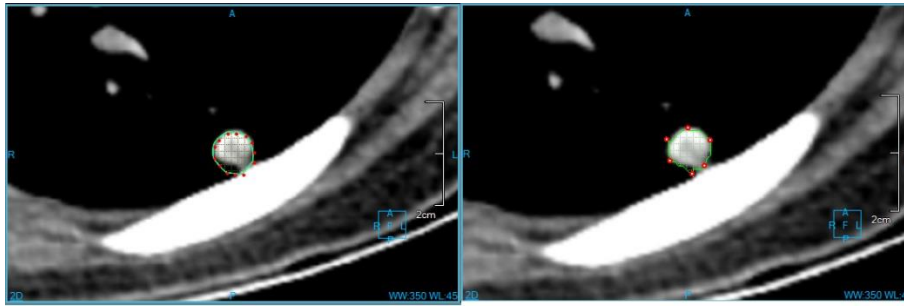


**Figure 31-8. Lung Nodule Image Enlarged and Extracted**

**【Contour Line Modification】** draw nodule boundary for nodule secondary modification and extraction on the nodule window zoomed in.

**【Magnetic Modification】** According to nodule contour boundary, change magnetism for nodule secondary modification and extraction on the nodule window zoomed in.

**【Erasion Modification】** Erase the unnecessary tissues extracted for nodule secondary modification and extraction on the nodule window zoomed in.



**Figure 31-9 Lung Nodule Contour Line & Magnetism Extraction Image**

#### 4)Nodule List

This part is to display nodule names, types, set visual states and perform the operations of editing and deleting.

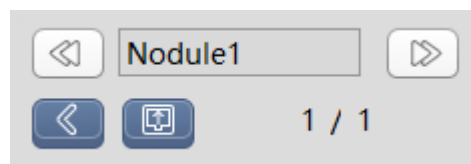
Nodule	Type	<input checked="" type="checkbox"/> Show
Nodule1	Auto	<input checked="" type="checkbox"/>
Nodule2	Auto	<input checked="" type="checkbox"/>
Nodule3	Auto	<input checked="" type="checkbox"/>

**Figure 31-10 Lung nodule list**

## 2.Lung Nodule Edit Function Panel

### 1)Edit Control Area

Lung Nodule Edit Control Area, can switch lung nodules from one to the next and edit the current nodule name. View, delete and add images to the report to generate reports and then return to the extraction page.



**Figure 31-11 Lung Nodule Edit Control Area**

- Previous: switch to the previous nodule;
- Next: switch to the next nodule;
- Nodule Name: display the current nodule name and you can modify it;

- Back: Return to the lung nodule extraction interface;
- Generate Reports: save all the nodule information and generate reports;
- Report Images: View, delete and add the image to the report.

## 2) Nodule Edit Area

Describe a series of nodule attributes such as forms, positions and border, etc. and then generate to the report item.

Location		
<input checked="" type="checkbox"/> L.U.L	<input type="checkbox"/> L.L.L	
<input type="checkbox"/> R.U.L	<input type="checkbox"/> R.M.L	<input type="checkbox"/> R.L.L
Shape		
<input checked="" type="checkbox"/> Circle	<input type="checkbox"/> Polygon	
<input type="checkbox"/> Round-like	<input type="checkbox"/> Irregular-shape	
Border		
<input checked="" type="checkbox"/> Fine burr	<input type="checkbox"/> Rough burr	
<input type="checkbox"/> Smooth	<input type="checkbox"/> Burr	<input type="checkbox"/> Leaflet
Pleural Characteristics		
<input checked="" type="checkbox"/> Tractive	<input type="checkbox"/> Den	<input type="checkbox"/> Unchange
Bronchial Characteristics		
<input checked="" type="checkbox"/> Truncation	<input type="checkbox"/> Cling nodule edge	
<input type="checkbox"/> Abnormal	<input type="checkbox"/> Air Bronchi	
Vascular Characteristics		
<input checked="" type="checkbox"/> Blood vessel across focus	<input type="checkbox"/> Tractive shift from focus	
<input type="checkbox"/> Truncation at focus edge	<input type="checkbox"/> Convergence sign	
Severity	<input type="text"/>	
Comments	<input type="text"/>	

**Figure 31-12 Lung Nodule Edit List**

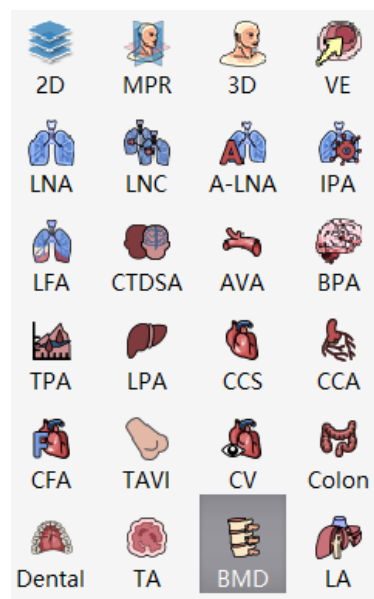
## Chapter 32 Bone Mineral Density (Option)

Bone mineral density analysis, hereinafter referred to as BMD, its main purpose is to use CT data to measure patients' bone density, i.e. the quality of bone tissue per unit volume (The unit is mg/cc).It helps doctors assess whether patients have normal bone mass and whether they have osteoporosis. The BMD application uses the patient's muscle and fat tissue as internal reference material rather than external body membranes. This method can reduce the reproducibility error when bone mineral density changes with time tracked by follow-up examination. Finally, the bone mineral density values, T values and Z values, of a patient specific centrum were obtained, and the results were shown in the report in the form of a graph.

The peak value of bone mineral density in a person's lifetime usually occurs between the ages of 25 and 35, with the peak value changing at different ages depending on the gender. Compared with the bone mineral density of patients under examination, the bone density average value over this period produces a standard difference above or below the peak value, called T value. Z value is the standard difference of the patient bone mineral density compared with that of the normal population. T value is the most significant value for the diagnosis of osteoporosis, while Z value is not significant for the diagnosis of osteoporosis, but it can reflect the severity of osteoporosis.

### 32.1 Start

As a functional plug-in of the system, BMD plug-in is deployed in advanced application modules. In the patient management list, after selecting a bone mineral density test, select "BMD" in the list of plug-ins, and enter the plug-in, as shown in figure 32-1:



**Figure 32-1 Start BMD Plug-in**

In the function switch panel of the advanced application module, click [BMD] button to switch to the bone density analysis plug-in, as shown in figure 32-2:

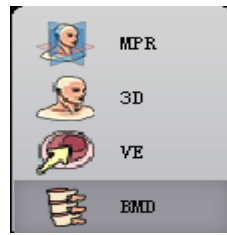


Figure 32-2 Start BMD Plug-in

## 32.2 BMD Operation Description

BMD mainly consists of two-and three-dimensional models for bone mineral density analysis. Bone mineral density (BMD) analysis can be performed with two-dimensional modules for the data that cannot be reconstructed by discontinuous scan. Click the "2D" and "3D" buttons on the panel and you can switch between two-and three-dimensional modes. After the "2D" button is selected, ROI definition and bone density analysis can be performed on the 2D image. After the "3D" button is selected, ROI definition and bone density analysis can be made on the reconstructed MPR image.

### 32.3 Bone Density Analysis in Two-dimensional Model

Bone mineral density analysis in 2d mode is divided into two workflows: definition operation phase and result analysis phase. Definition operation phase is to correctly define ROI tissue for the selected vertebral body. Result analysis phase is to calculate bone mineral density, T value and Z value.

#### 1. Definition Operation Phase

The views and panels of definition operation phase in 2d mode are shown in figure 32-3:

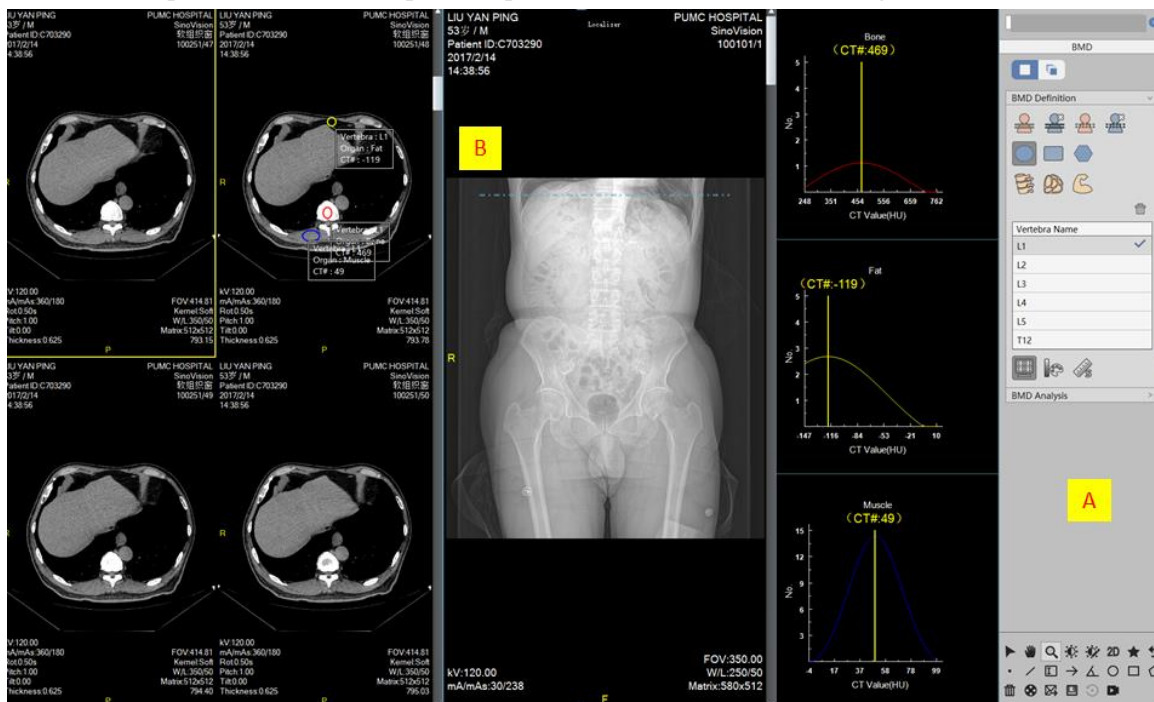


Figure 32-3 Definition Operation Phase

A: Function Operation Panel, provide the setting of positioning film, associate the function of positioning

film and define the function of ROI tissue. To ensure the accuracy of bone density result, the various ROI tissues in the same vertebral body should be defined on the same two-dimensional image.

B: View area, layout dimension 1\*3. The left window displays the 2d image series and the middle window displays the positioning film. The three histogram windows on the right side respectively correspond to the gauss-like curve graph of bone tissue, fat tissue and muscle tissue of ROI.

### 1) Definition Operation View

A: a Two-dimensional Image Window, define bone tissue, fat tissue and muscle tissue of ROI on the 2d of the window for the specific vertebral body.

B: Positioning Film Window, the system will automatically load the positioning film image into the window. This window is only responsible for the positioning function, not ROI definition.

C: Histogram Window, after ROI is defined, the system will create the corresponding histogram to ensure that the histogram displays a proper bell curve graph. Only the histogram is shown as a bell curve graph, it is indicated that the defined location of ROI is appropriate. If a non-bell curve graph is displayed, the histogram needs to be optimized by moving and resizing ROI. You can also remove an undesirable ROI by using the "Del" key or delete button.

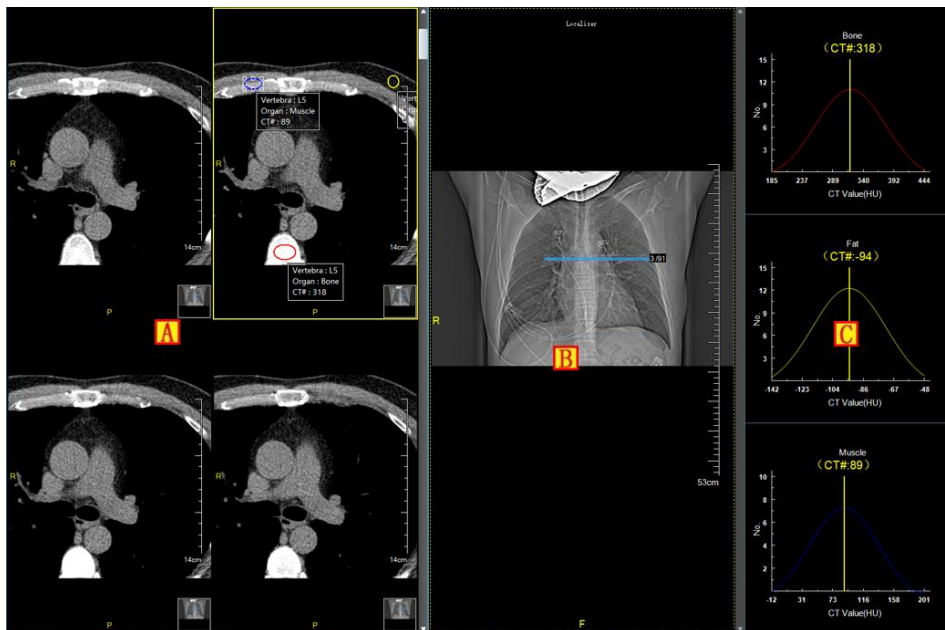


Figure 32-4 Definition Operation View

## 2) Definition Operation Panel

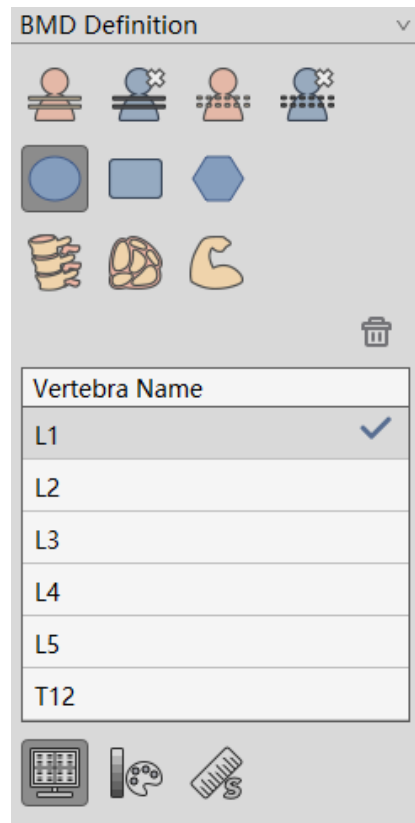


Figure 32-5 Definition Operation Panel

**Set the Positioning Film Association**

Set and cancel the positioning film, and associate and cancel the associated positioning film with the same function of 2D plug-in.

**ROI Style**

Three kinds of ROI options with different shapes are provided. The user can choose according to the actual situation of the image.

**Definition**

Provide the definition button to bone tissue, fat tissue and muscle tissue. After clicking any tissue button, you can define the ROI with the specific shape by dragging the mouse on the selected tissue corresponding to the vertebral body. The histogram will appear in the histogram window when the definition ends. In order to obtain the correct bone mineral density value, the following conditions should be satisfied when ROI is defining:

- Bone ROI CT# should be greater than 15.
- Muscle ROI CT# should be between 40 and 120.
- Fat ROI CT# should be between -150 and 0.



**Vertebral Body List**

Vertebra Name
L1 ✓
L2
L3
L4
L5
T12

The user can select and switch the vertebral body through the list. You can also double-click the list to rename the vertebral body. The checkmark on the right of the items in the list indicates that the corresponding bone, fat and muscle tissues of the vertebral body have been defined. If there is no checkmark, it means that the corresponding three tissues of the vertebral body are not fully defined.

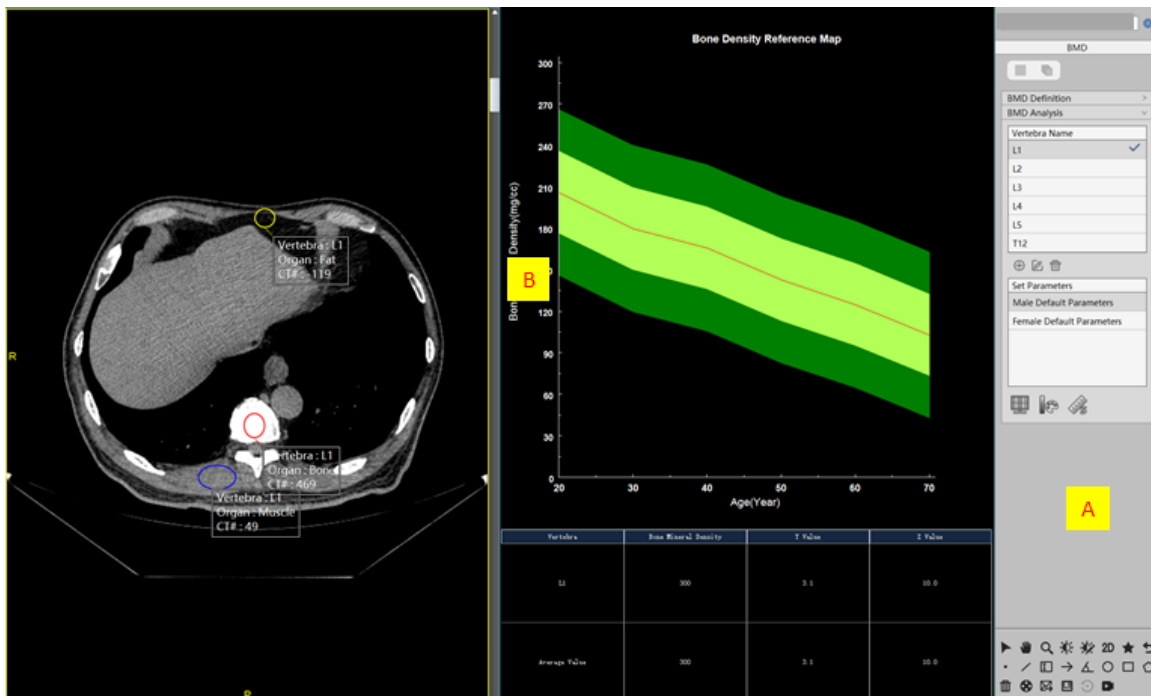
**Delete ROI**



Remove all the defined ROIs for the selected vertebral body.

**2.Result Analysis Phase**

The views and panels of the result analysis phase in 2d mode are shown as follows:



**Figure 32-6 Result Analysis**

A: Function Operation Panel, provide the function of vertebral tissue switching and bone density parameter setting.

B: View Area, Layout Dimension 1\*2.The left window displays 2d image series. The figure window on the right shows the bone density result.

1)Result Analysis View

A: 2d Image Window, is the same as the defined operation phase.

B: Figure Window: shows the calculated results of the patient’s bone mineral density.

**Histogram**

The histogram shows the patient’s current bone density information. The middle red line represents the reference line of normal bone mineral density value at all ages. The red solid dots represent the patient’s bone mineral density of each vertebral body. The yellow-green range represents the normal bone mineral density difference of -1 to +1 standard deviation with the same age. If the red dot falls within this range, the vertebral body Z value is between -1 and +1. The following dark green range represents the normal bone mineral density difference of -2 to -1 standard deviation with the same age. If the dot falls within this range, the vertebral body Z value is -2 and -1. The dark green above indicates the normal bone mineral density difference of +1 to +2 standard deviation with the same age. If the dot falls within this range, the vertebral body Z value is between 1 and 2.

**Table**

The patient’s bone mineral density value, T value and Z value of each vertebral body and their average values are displayed. The system will assess the risk of osteoporosis according to average values.

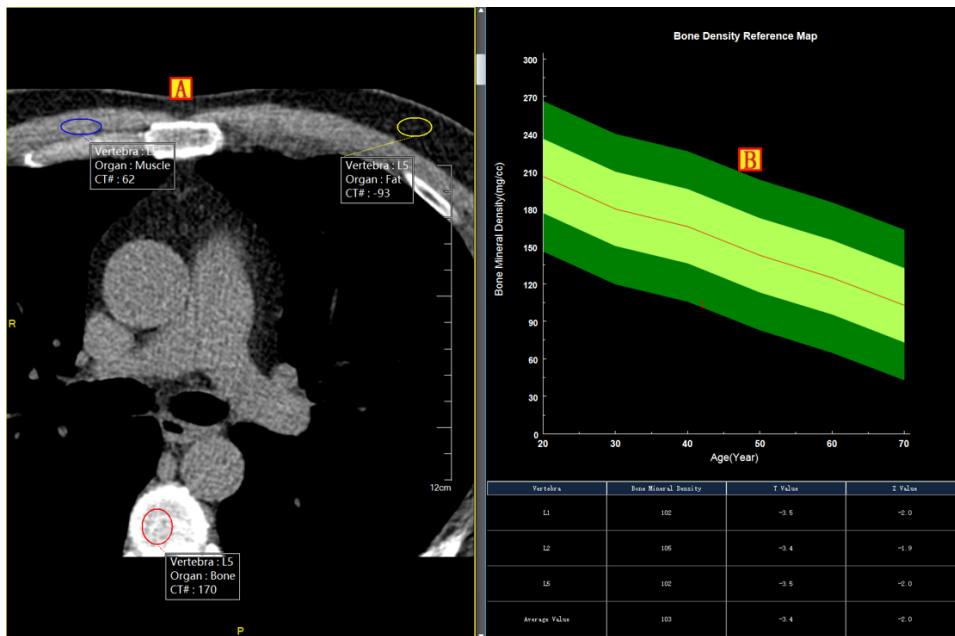


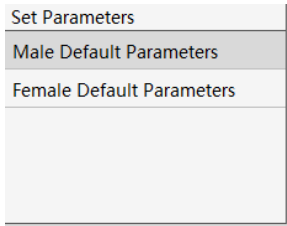
Figure 32-7 Result Analysis View

2)Result Analysis Panel

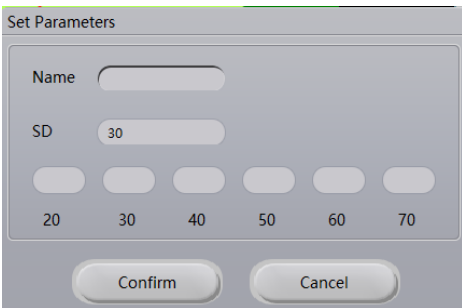
**Vertebral Body List:** Function is the same with the definition phase.

Vertebra Name	
L1	✓
L2	
L3	
L4	
L5	
T12	

**Set Parameters**



By switching the parameter list, different bone mineral density parameter models can be selected to calculate the bone mineral density value, T value and Z value. Because of the different factors such as race, gender, and region etc., the bone mineral density values may differ in the same age group, so the parameter functions of building, editing, and deleting are provided. The default parameters cannot be removed.

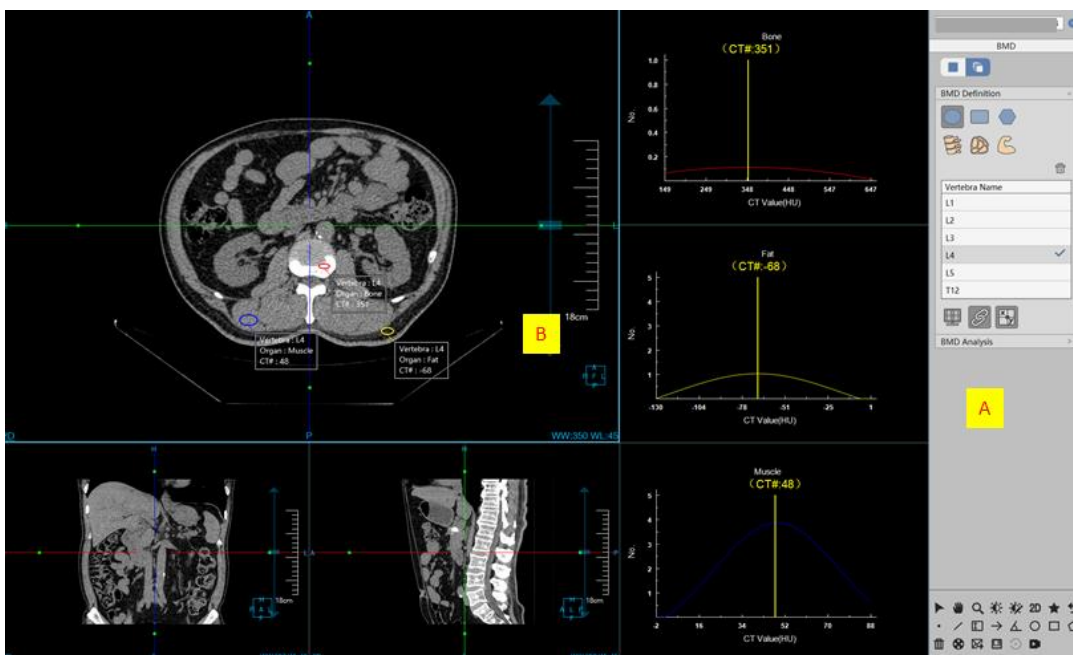


**32.4 Bone Density Analysis in Three-dimensional Model**

Bone mineral density analysis in the three dimensional mode is also divided into two workflows: definition operation phase and result analysis phase. Definition operation phase is the correct definition of tissue ROI for the selected vertebral body. Result analysis phase is for calculating bone mineral density, T value and Z value.

**1. Definition Operation Phase**

The views and panels defining the operation phase in 3d mode are shown in figure 32-10:



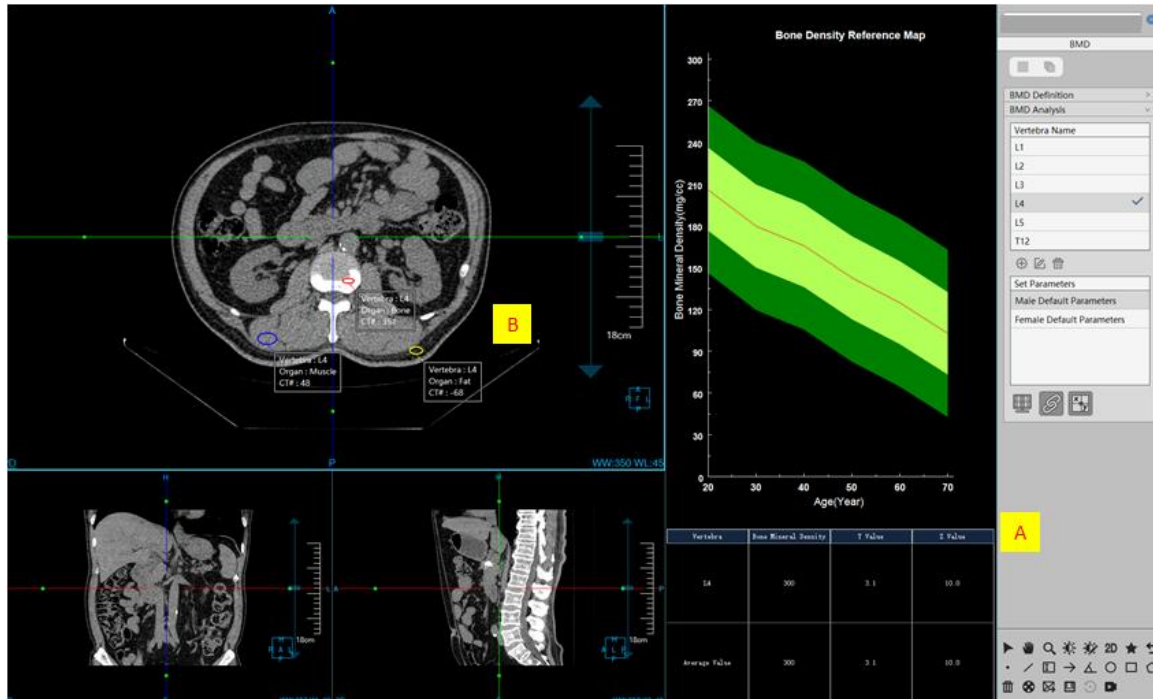
**Figure 32-10 Definition Operation Phase**

A: Functional Operation Panel, Define ROI Tissue Function. The definition mode is the same as the bone mineral density analysis in the two-dimensional model. To ensure the correctness of bone density result, various kinds of ROI tissues with the same vertebral body should be defined on the same axial plane image.

B: View Area, the left window displays the axial plane MPR image respectively, and the three histogram windows on the right correspond to the gauss-like curve graphs of ROI tissue of bone tissue, fat tissue and muscle tissue.

## 2.Result Analysis Phase

The views and panels of the result analysis stage in the three-dimensional mode are shown in figure 32-11:



**Figure 32-11 Result Analysis Phase**

A: Functional Operation Panel, provide the functions of vertebral body tissue switching and bone mineral density parameter setting. The operation mode is the same as the bone mineral density result analysis panel in the two-dimensional mode. General tools include the operations of patient information, general operation, preset window width and window level and general toolbar which is the same as MPR plug-ins.

B: View Area, the left window shows the axial plane MPR image, and the right figure window shows the bone density result.

## Chapter 33 Printing Modeling (Option)

It is mainly used in orthopedics, neurosurgery and cardiovascular department. Through the combination of CT machine, image workstation, third-party CAD engineering software and 3D printer, the operation processes such as the three-dimensional modeling, STL grid modeling and STL file output of the target tissues can be quickly completed, providing effective support and aid decision making for doctors' teaching and training, preoperative planning, doctor-patient communication, etc.

### 33.1 Description

As a functional plug-in of the system, Printing Modeling is deployed in the basic application module, similar to the [Film Typesetting] plug-in. The plug-in receives the results of tissue segmentation from other plug-ins, converts the tissue into a grid model, and then displays and optimizes the grid models through such as the model classification, model visualization, model rendering model, model post-processing and model output provided by the function panel. The functions are described in these detailed introductions below.

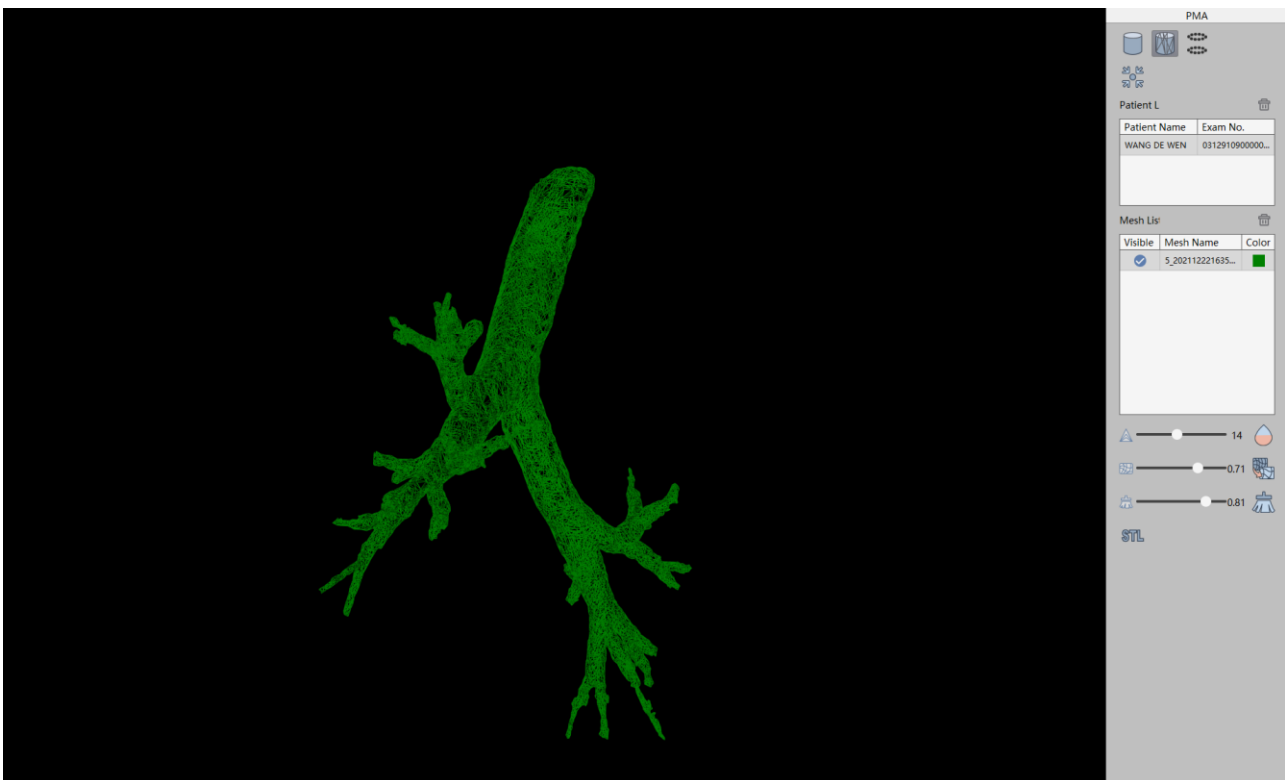


Figure 33-1 Printing Modeling

## 33.2 Function

### 1.Window Operation

#### 3)Rotation

Hold down the left mouse button in the window area dragging. The window image rotates with the mouse.

#### 4)Translation

Hold down the middle mouse button in the window area dragging. The window image moves with the mouse position.

#### 5)Zooming

Hold down the right mouse button in the window area dragging. The window image zooms with the mouse. Or zooming can be made by scrolling the mouse wheel.

### 2.Rendering Mode

#### 6)Surface



The model is represented by the surface rendering method.

#### 7)Grid



The model is represented by the wireframe rendering method.

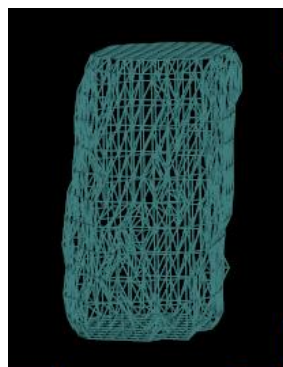
#### 8)Point



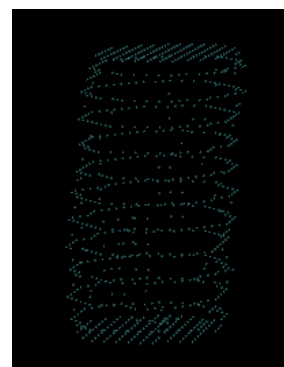
The model is presented by the point rendering method.



(a) Surface



(b) Grid



(c) Point

**Figure 33-2 Rendering Mode**

### 3.Reset Center



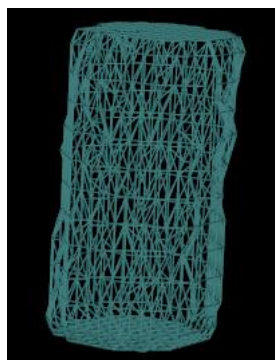
Restore the window image to the window center for display.

### 4.Model Processing

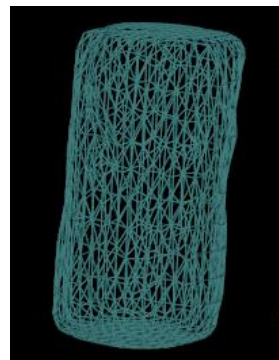
#### 9)Smooth



This function can make the grid model more relaxed and the distribution of polygon vertices more even, which results in a smoother grid model. The smoothing number can be controlled by the "iteration number" parameter.



(a) Before



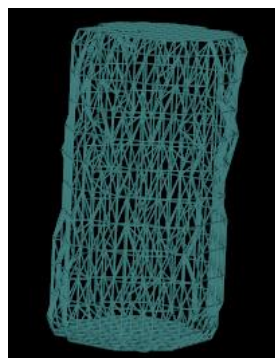
(b) After

**Figure 33-3 Smooth Effect (20 Iterations)**

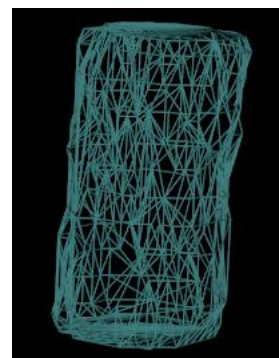
#### 10)Simplification



The main purpose of this function is to reduce the number of triangular patch in the grid model by algorithm, so as to reduce the size of the grid model and facilitate processing and displaying without affecting the grid geometry. Control the percentage of simplification by setting the simplification rate parameter. For example, if you set the simplification rate to 0.5, the triangular patch will be reduced by 50%.



(a) Before



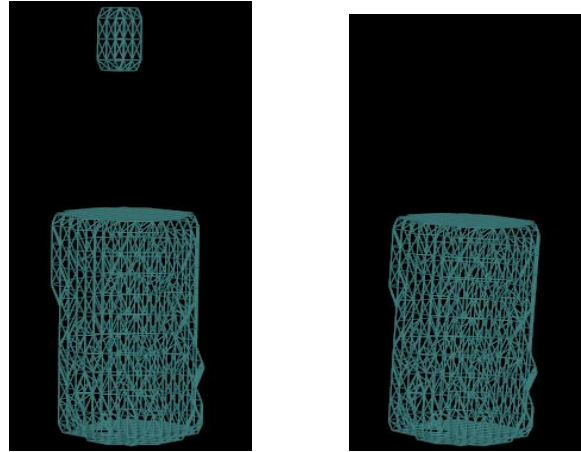
(b) After

**Figure 33-4 Simplification Effect**

## 11)Remove



According to the removal rate parameter specified by the user, this function deletes the uninterested regions and only keeps the interested model regions. The removal rate parameter ranges from 0 to 1.



(a) Before

(b) After

**Figure 33-5 Removal Effect (Removal Rate 0.1)**

## 12)Export



The grid model is exported in the STL file format to prepare the data file for the subsequent execution of slicing and 3D printing.



## Chapter 34 TAVI(Optional)

TAVI (Preoperative analysis of transcatheter aortic valve implantation) plug-in automatically calculates the information of the area, diameter, plane distance from opening to cingulum and C- arm angle of a plane by automatically positioning aortic valve ring plane, aortic sinus ring plane, sinus coronary connecting plane, ascending aorta plane and left and right coronary opening position. At the same time, it provides interactive hand-operated tool and assists doctors to conduct preoperative quantitative analysis on the aortic ring.

### 34.1 Start

TAVI plug-in is deployed in the advanced application module as a functional plug-in of the system.

Select [TAVI] in the patient information page below to switch to TAVI plug-in.

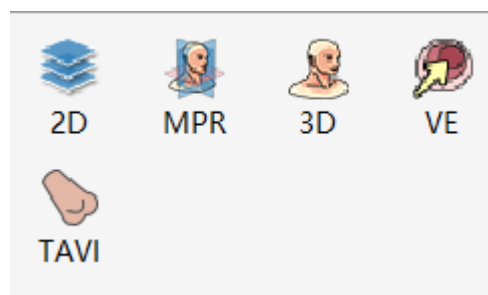


Figure 34-1 TAVI Quick-start Panel

Click [TAVI] button on the function switching panel of the advanced application module to switch to TAVI plug-in, as shown in the figure below.

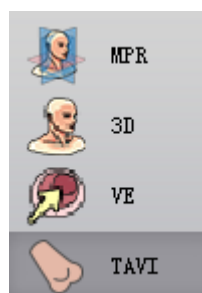


Figure 34-1 Switch Panel between Plug-ins

### 34.2 Overview of Operation Interface

TAVI operation interface mainly contains two parts, view area and function operation panel area:

➤A: View area: In this area, MPR images displaying image data include the axial plane, coronal image and

sagittal plane section and 3D visual images;

- B: Function Panel: The function operation panel provides the functions such as the methods and tools of displaying windows for operating images, define the valve ring plane, sinus ring plane, sinus tube connection plane, ascending aorta plane and C - arm angle calculation and sending report images, and so on.

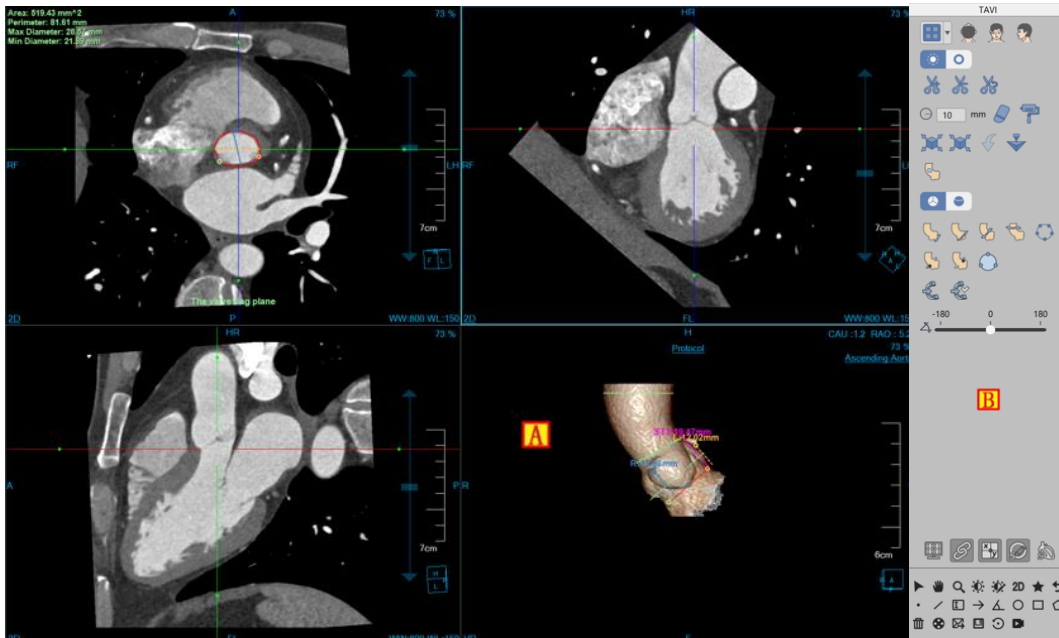


Figure 34-2 TAVI Operation Interface

### 34.3 Image Display View

The image display view realizes the content output of image display window through the combined layout of multiple image windows and multiple table image views. As shown in the figure below, each window of them is: axial plane (A), coronal plane (B), sagittal plane (C), and VR image window (D).

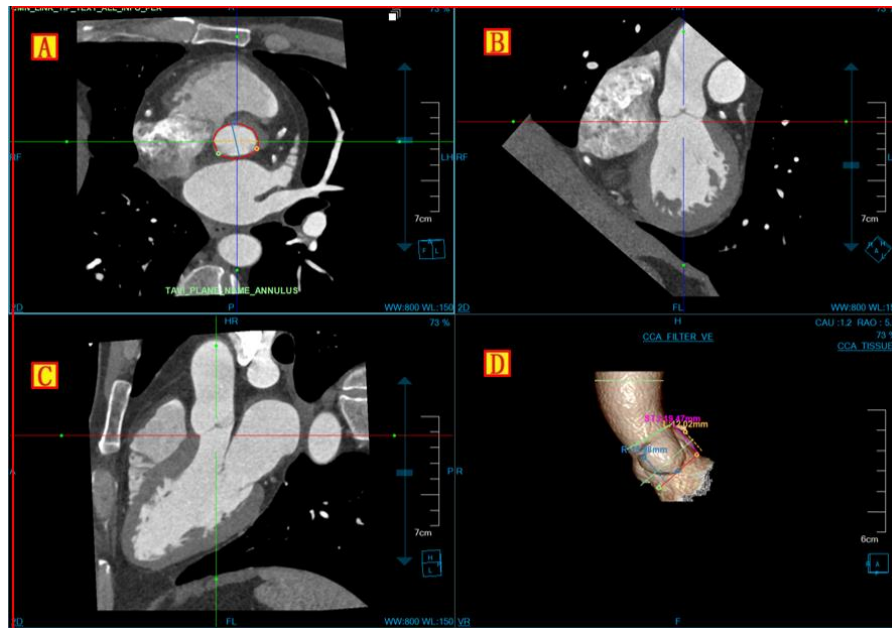


Figure 34-3 TAVI View Window

## 34.4 Functional operation panel

### 1. Overall Feature Panel Introduction

The operation panel of the cardiac viewer plugin is divided into three areas: data switching, TAVI operation function, and common function.

- A: Data switching, with the functions such as switching image series and deleting study through thumbnail and so on.
- B: Common function, with the common function operations such as providing default operation, translation, zooming, adjusting window width/window level, restoring the default function button and so on.
- C: TAVI operation function, with a series of functional operations for TAVI function processing and analysis such as providing layout switching, 3D tissue repair, shearing, valve ring plane, sinus ring plane, sinus tube connection plane, ascending aorta plane and C-ARM angle calculation.

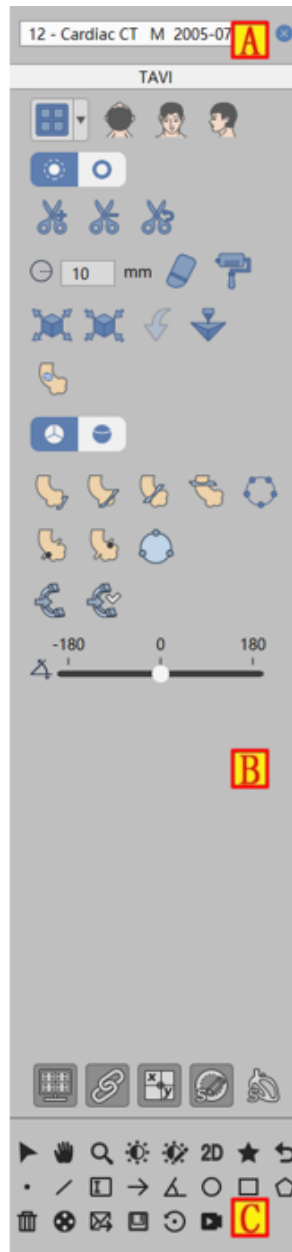



Figure 34-4 TAVI Function Panel

## 2.TAVI Function Panel

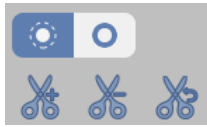
### Layout Switch

Two layouts are available:

2\*2 layout : 2\*2 mode displays 3 MPR images and 1 VR image.

1\*3 layout : 1\*3 mode displays 3 MPR images and 1 VR image.

## Cutting Tool



This tool is the same as VR plug-in. Please refer to VR plug-in for its specific operation.

## Tissue Repair Tool



Display the current tissue, and modify it by erasing, staining, etching and dilating, Support sending to **【Printing Modeling】**.

## Extraction Tools



Define the valve ring plane: extract the valve ring plane by drawing the contour, and in the meantime, calculate the valve ring area, perimeter, long diameter and short diameter and vertex information.



Define the sinus ring plane: by drawing the contour, extract the sinus ring plane, and at the same time, calculate the sinus ring area, perimeter and diameter information according to the selection of bicuspid aortic valve or trilocular aortic valve.



Define the sinus tube connection plane: by drawing the contour, extract the sinus tube connection plane, and at the same time, calculate the area, perimeter, diameter and STJ information.



Define the ascending aorta plane: by drawing the contour, extract the ascending aorta plane, and at the same time, calculate the area, perimeter and diameter.



Define the position of the left opening: find the position of the left coronary artery on the MPR image and calculate the distance from the position of the opening to the valve annular plane.



Define the right opening position: locate the right coronary opening on the MPR image and calculate the distance from the opening position to the valve ring plane.

## Editing Tools



Edit ring vertex: modify the vertex position, and recalculate ring vertex information.



Contour editing: modify the contour information of each plane, recalculate the relevant information of

each plane, such as area, perimeter and diameter.

### C-arm Calculation

After calculating the C-ARM angle, save it by directly adjusting to the set C-ARM angle.

### C-arm Rotation

Rotate to see the C-ARM angle along the axis from -180 to 180.

## Chapter 35 Liver Analysis (Option)

Liver analysis, hereafter referred to as LA, is mainly the application program plug-in of assisting doctors in the diagnosis and evaluation of diseases related to liver by using CT data and a series of medical image analysis algorithms. The application plug-in provides intelligent one-stop diagnostic services. It helps doctors to quickly understand the patient's lesion situation by automatically segmenting liver and portal vein, vena cava tissue and automatically extracting vascular center line, semi-automatic liver segmentation and manual liver segmentation. At the same time, it provides a variety of convenient interactive tools to assist doctors in more detailed analysis and diagnosis.

### 35.1 Start

Liver Analysis (LA) plug-in is deployed in the advanced application module as a functional plug-in of the system.

Select [LA] on the patient information page in Figure 35-1 to switch to the Liver Analysis (LA) plug-in.

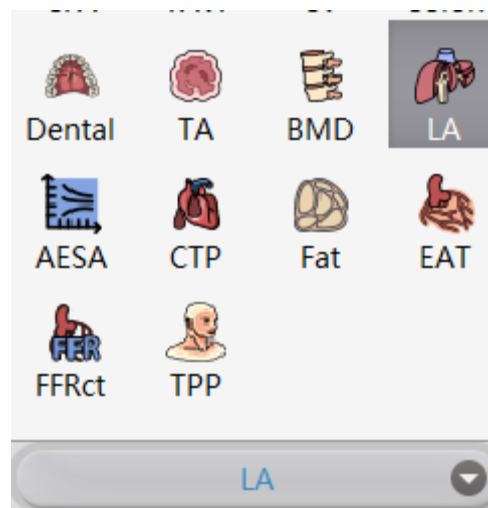


Figure 35-1 First Start

If LA is not started for the first time, but migrated to another application plug-in and migrated back, click the [LA] icon as shown in Figure 35-2 to return to the LA application plug-in.

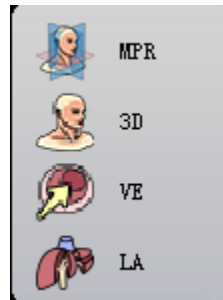


Figure 35-2 Return to LA

## 35.2 Data Loading

Select data from the patient list managed by patients and click [LA] to load the data. The series selection dialog box pops up automatically. The operation mode refers to [Series Selection], and the software performs automatic analysis according to the user's selecting the loaded by default and selected [Portal Vein Phase] data.

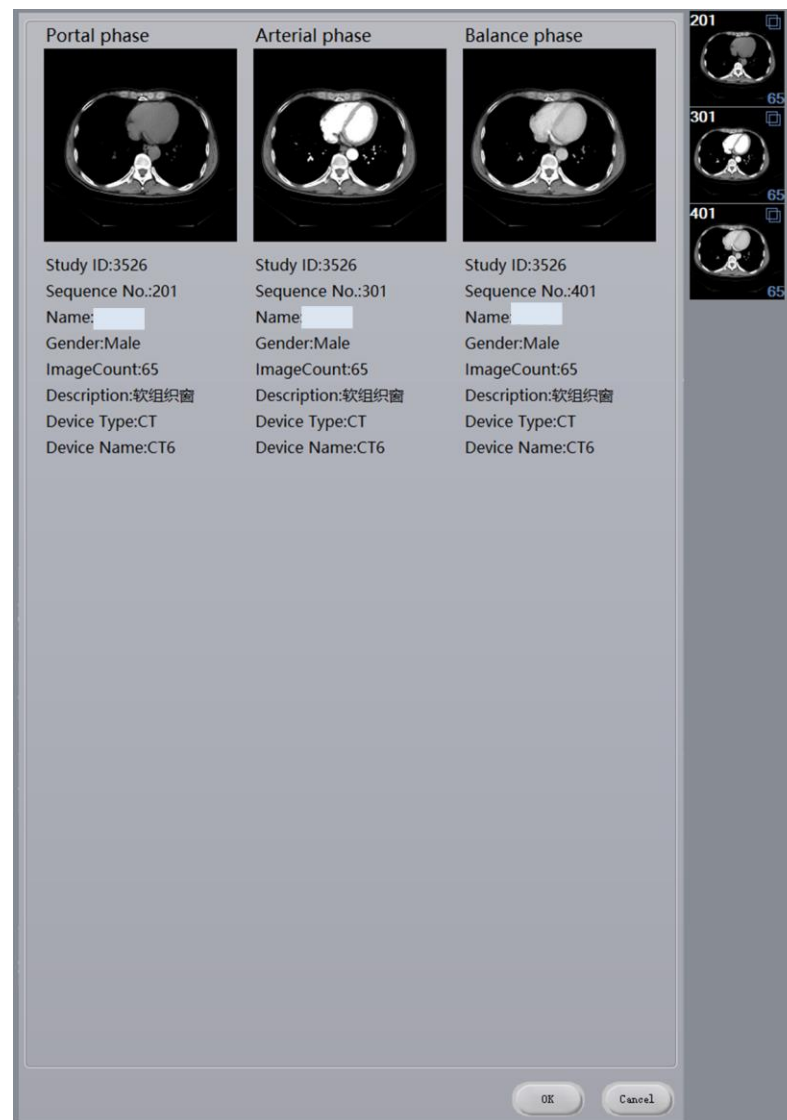


Figure 35-3 LA Series Selection Dialog Box



## 35.3 Automatic Analysis

### 1.Interface

After data loading was completed, the system performs a one-stop automatic liver analysis, including automatically segmenting liver, portal vein and hepatic vein, and calculating the relevant measurement indicators.

The final analysis result is presented to the user, as shown in the figure below.

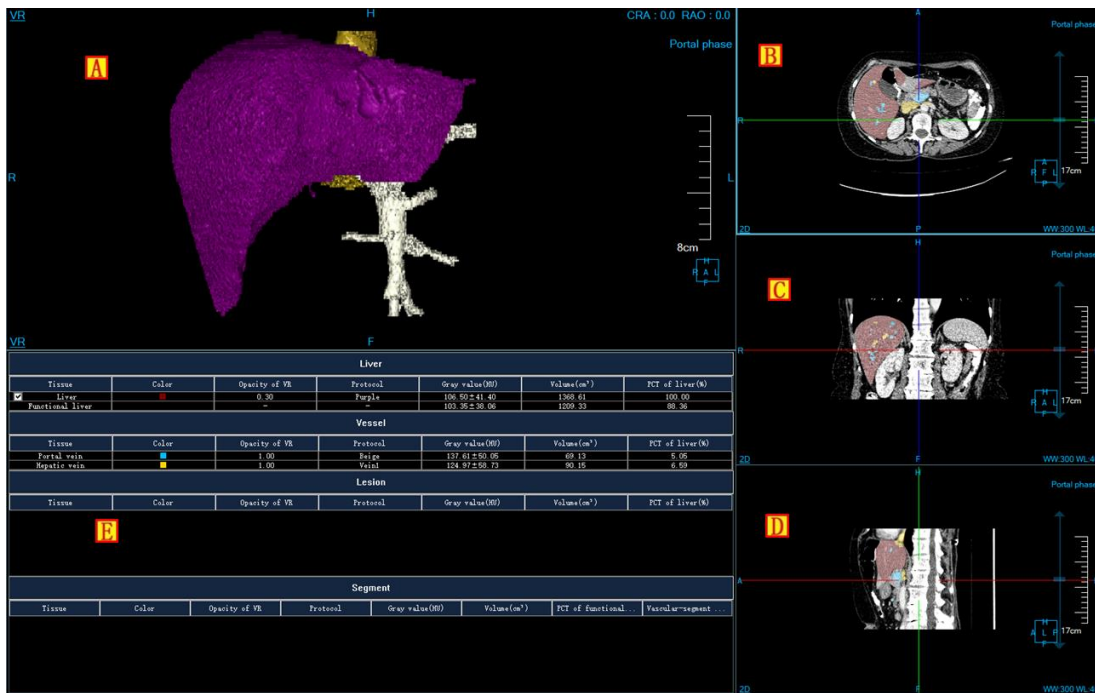


Figure 35-4 LA Automatic Analysis Result

- A: VR Image Window.
- B: Axial Plane Image Window.
- C: Coronal Plane Image Window.
- D: Sagittal Plane Image Window.
- E: Liver Parameter List Window.

## 35.4 Liver Segmentation and Lesion Definition Tool

### 1.Interface

As shown in Figure 35-4, segmentation tools for liver, portal vein and vena cava as well as lesion extraction tools are provided.

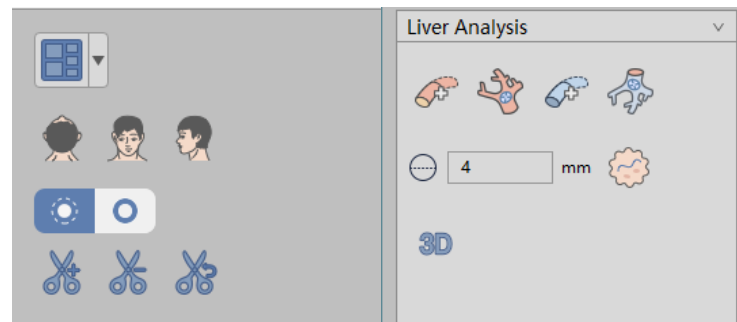









Figure 35-5 Liver Segmentation and Lesion Definition Tool Panel


## 2.Function

- : Five kinds of image area layouts, including 1+3+1, 3+1+1, 2 \* 2, 1+3, and 3\*3 layouts.
- : Switch the orientation information of VR images, including axial plane, coronal plane and sagittal plane.
- : The VR image is cut.
- : Portal vein vascular extraction button.  
After clicking this button, seed points are set in the MPR window. According to the seed point information, portal vein vessels are extracted and connected to the current portal vein tree. Seed points need to be defined inside the portal vein vessels to be extracted. Otherwise, segmentation may fail, and a prompt box will pop up after failure [Tissue extraction failed!].
- : Portal vein vessel tree extraction button.  
After clicking this button, seed points are set in the MPR window to automatically segment and extract the portal vein according to the seed point information. If there are portal vein extraction results, a prompt box [The current portal vein segmentation results will be cleared, whether to re-extract portal vein or not?] will pop up, and select [yes] to remove all portal vein segmentation results; Click [No] to close the dialog box and keep the previous state of the system.
- : Hepatic vein extraction button.  
After clicking the button, seed points are set in the MPR window. According to the seed point information, hepatic vein vessels are extracted and connected to the current hepatic vein tree.

Seed points should be defined inside the hepatic vein to be extracted. Otherwise, segmentation may fail, and a prompt box [Tissue extraction failed!] will pop up after failure.

- : Hepatic vein vascular tree extraction button.

Click this button. If there are hepatic vein extraction results, a prompt box [The current hepatic vein segmentation results will be cleared, whether to re-extract hepatic vein or not?] will pop up, and select [Yes] to clear all hepatic vein segmentation results; Click [No] to close the dialog box and keep the previous state of the system.


- : Combination tool for extraction of hepatic lesions.

In the edit box, set the width of the line to extract the lesion. The unit is mm, and the range is between 1 and 20. The default is 4mm.

After clicking the lesion extraction button, draw a line on the MRP image (The line must be inside the lesion), and extract it directly after lifting the mouse. After successful extraction, hover buttons [OK] and [Cancel] appear in the MPR window.

Before clicking [OK], you can use the [Tissue Modification] tool to modify the lesion area. Tissue repair can be performed using tools such as erasure, dyeing, corrosion, and expansion.

Click [OK], the system will automatically calculate the lesion parameters and update the parameter list; Click [Cancel], and the system will be restored to the state before lesion extraction.

- : Tissue modification tool unfolded button, after left-clicking on the mouse unfold tissue modification tool window, as shown in the figure below.

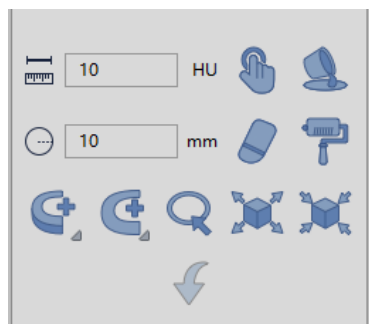













Figure 35-6 LA Tissue Modification Tool

- : Manual extraction. In the interested area on any MPR window, hold down the left mouse button to extract the tissue. You can set the step size parameter to specify the rate of tissue growth for manual extraction.

- : Fill in the hole. If the extracted tissue is not completely extracted and there are other tissues inside the volume, this function can be used to fill the internal tissue into the tissue.
- : Three-dimensional erasure. The function of using a three-dimensional sphere to erase the extracted tissue. The radius of the 3 D sphere can be set using the [Radius] parameter.
- : 3D dyeing. The function of tissue extraction on MPR image using a 3 D sphere. The radius of the 3 D sphere can be set using the [radius] parameter.
- : Projection addition, it is suitable for tissue extraction. On any MPR image, hold down the left button to demarcate a closed area. The closed area is projected to the upper and lower ends layer by layer to form a volume area, which is the extracted tissue.
- : Projection deletion, it is suitable for issue extraction. In contrast to projection addition, this feature is used to delete the tissue from the extracted tissue by projecting a closed area layer by layer to the upper and lower ends.
- : Contour segmentation, it is suitable for tissue extraction. The extracted tissue is extracted again by contour drawing.
- : Expansion, it is suitable for tissue extraction. It has the function of combining the other tissues along the boundary of the extracted issue into the ones to be extracted by using morphological algorithm.
- : Corrosion, it is suitable for tissue extraction. The difference from expansion is that it has the funtion of of removing a part of the extracted tissue boundary from the tissue.
- : Revocation, returning tissue state back to the last extraction result state.
- : It is the button to enter liver segment interface.

## 35.5 Liver Segment Tool

### 1.Interface





As shown in below, tools for liver segment are provided, including automatic segment, manual segment, and

tissue modification tools.




Figure 35-7 Liver Segment Tool Panel


## 2.Function

-  : Liver segment automatic/manual option switch button.
-  : Reset the liver segment button. After clicking this button, clear all segments extracted under the current option.
-  : Unfolded button of tissue modification tool, after a left-click on the mouse, unfold the tissue modification tool window. The modification tool in the tool window is the same as the one of the [liver segmentation].
-  : The button of entering the virtual surgery plan interface.

### 1)Automatic Segmentation

-  : The button of executng manual liver segment. When the segment list in the liver parameter list window corresponds to no less than 2 vessels in the VR window, click the button to carry out automatic segment of the liver.

### 2)Manual Segment

-  : The button of manual liver segmentation. After clicking this button, draw two straight lines (different planes) near the liver area in the MPR window (axial/coronal/sagittal). After the two straight lines are drawn, the selected liver part is divided into two segments. If there are other segments at present, multiple segments can be defined according to the boundary between the drawn straight line and other segments. The liver can be divided into 8 segments at most by manual segment.

## 35.6 Virtual Surgical Plan Tools

### 1.Interface

An interactive virtual liver resection plan provides automatic measurement and prediction of parameters related to the surgery plan.

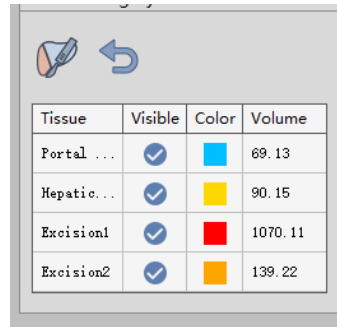




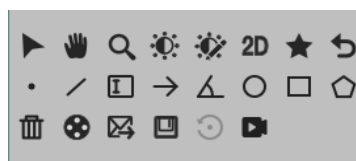
Figure 35-8 Virtual Surgical Plan Tool Panel

### 2.Function

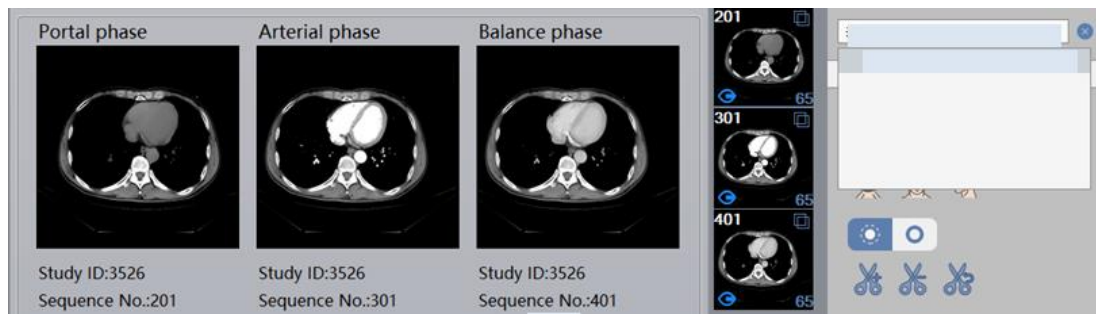
- : The button of virtual surgical, after clicking this button, draw two straight lines (different planes) near the liver area in the MPR window (axial/coronal/sagittal). After the two straight lines are drawn, the selected liver part is divided into two parts: reserved liver and resected liver. In the cut list, permeability and color can be set.
- : Reset the virtual surgical results button. After clicking this button, all cutting material and analysis results cut under the current virtual surgical plan are cleared.
- Tissue list: display tissue name, display state, color and volume; Set whether the tissue is displayed or not by the selected state of the control, and double-click the tissue color column to set the tissue color.

## 35.7 Main General Tools


### 1.Basic Operation



The upper patient name line provides functions such as displaying loaded data information, deleting study, and image thumbnail, etc.



### 27)View of Series Information

Click the arrow to unfold and close the display of loaded data information. The series information in the study is in the form of a thumbnail taking study as a unit to display list in the image. The upper left corner of the thumbnail displays the series number, and the lower right corner shows the number of images in the loaded column.  in the the lower left corner identifies the image series currently being displayed.

### 28)Delete Study

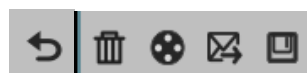
Click [Clear] and [Clear All] buttons to complete the unloading function of the loaded study.

*\* Note: Deleting study is an overall action. Deleting the study will simultaneously close the information of report, film, two-dimensional display related to the study.*



As shown in the figure above, the lower function buttons provide in order the functions of default operation, translation, zooming, adjusting window width/window level, quick viewer and bookmarks from left to right.

### 29)Send, Preset and Reset



Preset window width and window level setting button of the system is provided. Click [Preset Window Width and Window Level] button to expand the list of preset window width and window level of the system. You can double-click to switch the window width and window level of the currently displayed image, or enter the window width and window level for setting by yourself.

The bottom five buttons are reset, send film, send report, save, and tools from left to right.

- Reset: reset plug-ins to its initial state.
- Send film: send the activated and selected image to the film.
- Send the report: the report remark editing dialog box pops up and you can manually edit the remark information. Click Generating report to generate the PDF report.

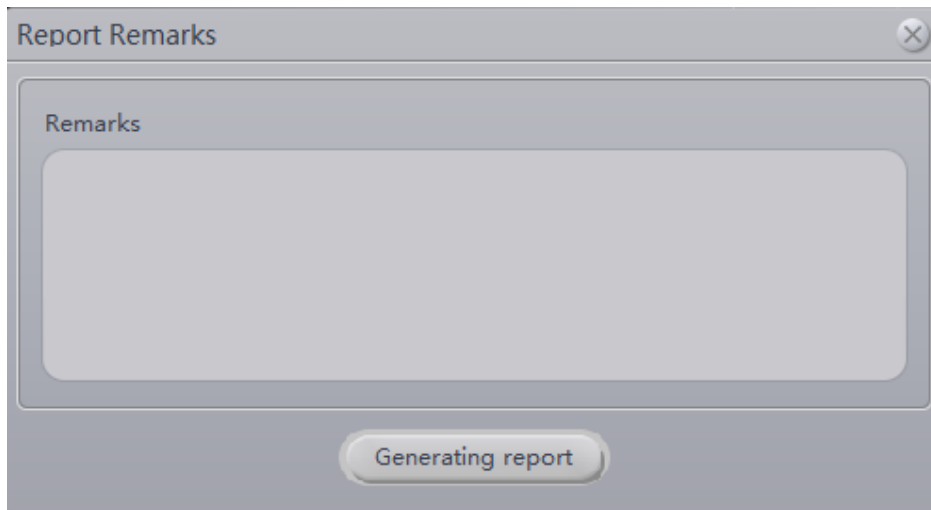


Figure 35-9 LA Report Remark Editing Dialog Box





- Save: save images, screen to the database and save screen to the local.
- Tools: general tools such as measurement annotation, etc. pops up.

### 30) Information Display/Hiding Tools

As shown in the figure below, it mainly includes:



Figure 35-10 LA General Tools

-  Display/Hide the overlap information.
-  Display/Hide the crosshair in the MPR window.
-  Whether MPR image zooming and window width information are linked or not.
-  Display/Hide MPR and VR window bounding boxes.

## 2. Parameter List Window Tool

- Tissue Name Modification: double-click the tissue item in the list to open the tissue name modification window and modify the tissue name corresponding to the current list item.
- Color Modification: double-click the color item in the list to open the color modification window. You can modify the Mark color of the MPR window corresponding to the current list item.
- Permeability Modification: double-click the permeability item in the list to open the VR permeability modification window and modify the VR permeability corresponding to the current item in the list.
- Opacity Modification: double-click the opacity item in the list to open the opacity modification window



and modify the VR opacity corresponding to the current list row.

- Tissue Deletion: lesion list and manual segment list support right-click menu to delete current tissue function.

Blood Vessel - Segment Association Status Cancellation: When a segment is associated with a blood vessel, the status item of the segment is marked as being selected. You can click on the status item of the segment to cancel the status of the blood vessel and segment.

## Chapter 36 Fat Analysis (Option)

Fat analysis, hereafter referred to as Fat. It is used to measure the area, volume and waistline of subcutaneous fat and visceral fat of patients, etc. and help doctors evaluate the degree of obesity..

### 36.1 Start

As a functional plug-in of the system, Fat plug-in is deployed in the advanced application module. In the list of patient management, select a fat study, and then select "FAT" in the list of plug-ins to enter the plug-in, as shown in Figure 36-1:

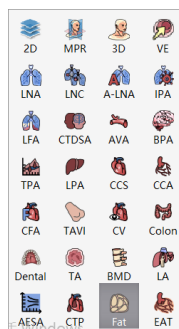


Figure 36-1 Start FAT Plug-in

Click [FAT] button in the function switch panel of the advanced application module to switch to the Fat analysis plug-in, as shown in Figure 36-2:

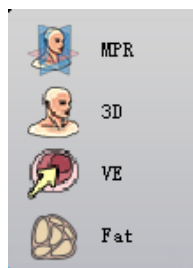


Figure 36-2 Start FAT Plug-in

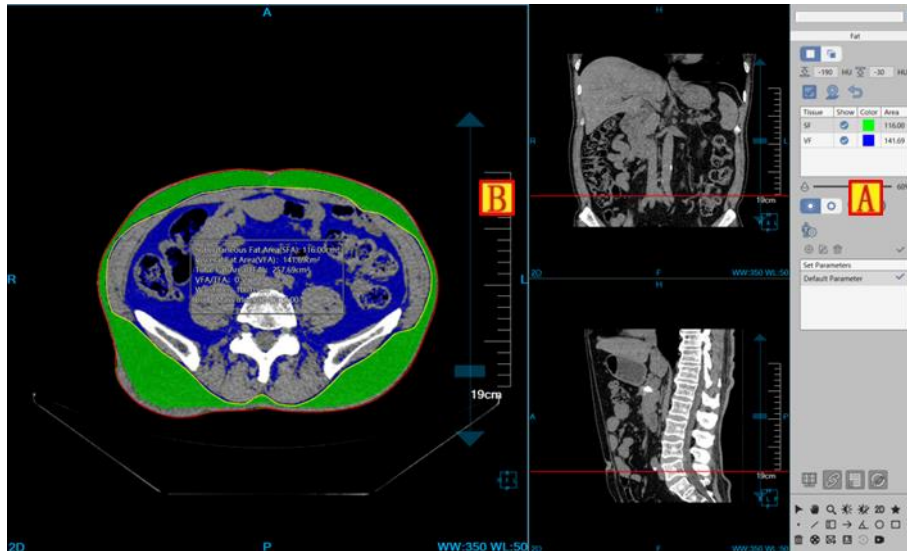
### 36.2 FAT Operation Overview

FAT mainly consists of single-layer and multi-layer modes for fat analysis. Click the "single-layer mode" and "multi-layer mode" buttons on the panel to switch modes. In single-layer mode, fat information is extracted and analyzed for a specific layer. The multi-layer mode is to extract and analyze the fat information from the selected

starting and ending layers.

### 36.3 Fat Analysis in Single-layer Mode

Single-layer mode is the default mode. After loading the data, the system will automatically select the most characteristic key layer and extract the fat and contour of this layer. As shown in Figure 36-3:



**Figure 36-3 Single-layer Mode**

**A:** Function operation panel, it provides the functions such as threshold setting, extraction and removal of fat, relocation, opacity setting, contour editing and parameter setting and so on.

**B:** View area, layout dimension 1\*3. The left window displays the axial plane orientation images, while the two image windows on the right correspond to the coronal and sagittal images respectively.

#### 1.View Area

**A:** In the axial plane image window, fat information is displayed in the center of the window, among which fat information includes subcutaneous fat area (SFA), visceral fat area (VFA), total area (TFA), VFA/TFA ratio, waistline and body mass index (BMI). In this window, you can perform contour editing, manual drawing and semi-automatic drawing contour.

**B:** The horizontal red positioning line on the coronal plane image represents the axial plane position, and the red positioning line supports on-line dragging. This window does not support operations related to contour.

**C:** The horizontal red positioning line on the sagittal plane image represents the axial plane position, and the red positioning line supports on-line dragging. This window does not support operations related to

contour.

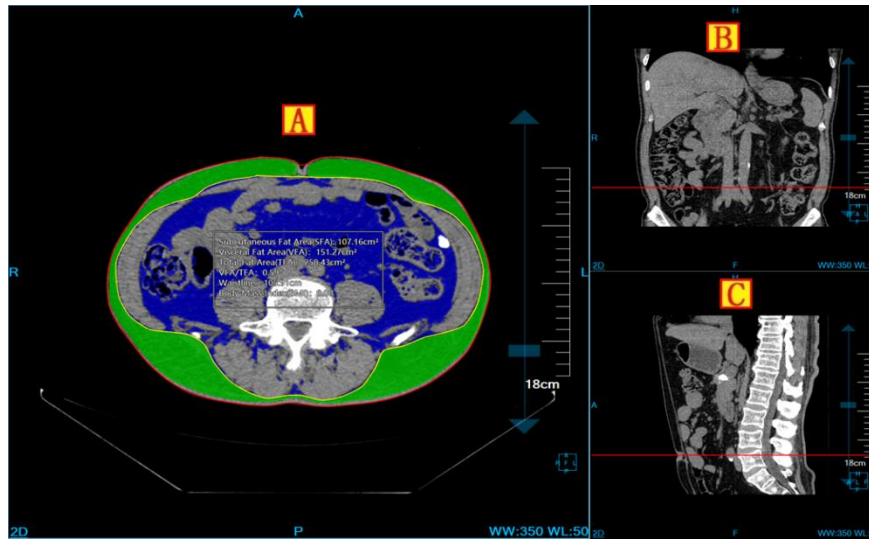


Figure 36-4 View

## 2.Operation Panel

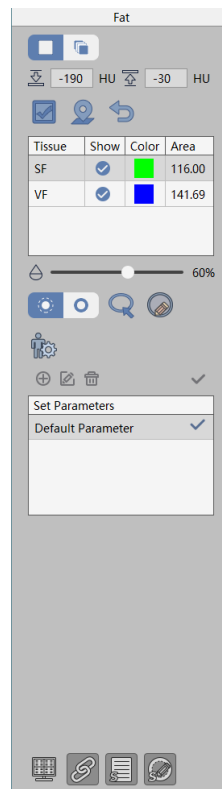
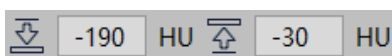


Figure 36-5 Operation Panel

### 1)Threshold Setting



Set the threshold lower limit and upper limit, after which the system will automatically extract fat and contour according to the new threshold range.

## 2)Re-extracting



After clicking this button, the system will extract the fat and contour of the selected layer in the current axial plane according to the current threshold value.

## 3)Relocation



When this function is performed, the axial plane is automatically positioned to the key layer where the fat and contour have been extracted.

## 4)Clear



Clear fat and contours that have been extracted in current mode.

## 5)Tissue List

Tissue	Show	Color	Area
SF	<input checked="" type="checkbox"/>	<span style="color: green;">■</span>	116.00
VF	<input checked="" type="checkbox"/>	<span style="color: blue;">■</span>	141.69

Tissue list is used to control the display of subcutaneous and visceral fat, color setting and display of area information.

## 6)Opacity Setting



The MPR transmittance of the extracted adipose tissue can be adjusted.

## 7)Contour Operation



Used to switch between inside and outside contours.



Semi-automatic contour drawing.



Manual contour drawing.

Contour Editing: Click the left mouse button on the existing contour, the contour will be activated. Control

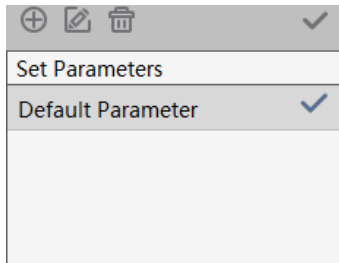
points can then be moved, added and deleted (in the form of a right-click menu).

### 8) Height and Weight Setting



Used to set the patient's height and weight information, used to calculate the body mass index BMI.

### 9) Report Parameter Setting



This function is used to set the parameters used in the report, including adding parameters, editing parameters, deleting parameters and setting as default parameters. The parameters included standard VFA (visceral fat area) values, standard BMI ranges, and standard waistline for male and female. The default parameter in the list are subsequently identified with the . The obesity classification in the report is given according to the information of the default parameters, and the default parameters cannot be deleted.

### 10) Display Control



➤ Four corner information check boxes: if checked, the window will display the four-corner information, if not checked, the four-corner information will not be displayed.



➤ Linkage check box: if checked, the three MPR Windows will shrink and WL adjust synchronously; if not checked, no linkage will be carried out.



➤ Check box for fat information: Select the cross-section window will display fat information, unchecked, no fat information will be displayed.



➤ Contour check box: check to show inner and outer contours, uncheck to hide inner and outer contours.

### 11) Send to Report

The key layer image and fat information extracted from the axial window are sent to the package PDF report in the form of one-click send report.

## 36.4 Fat Analysis in Multi-layer Model

After switching to the multi-layer mode, the system will automatically select the most characteristic interval and extract the fat and contour of the interval. As shown in Figure 36-6:

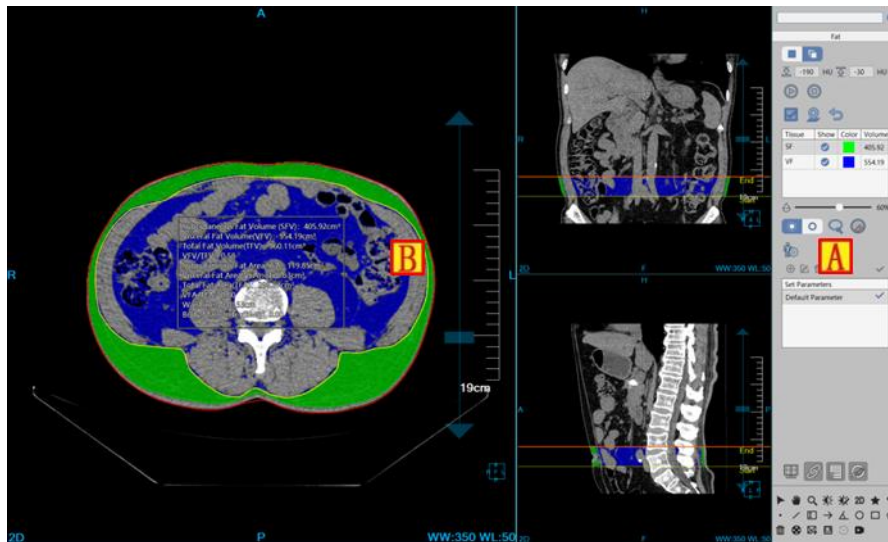


Figure 36-6 Multi-layer Model

A: Function operation panel, provides threshold setting function, start and end interval setting, extraction and removal of fat function, opacity setting, contour editing function and parameter setting function.

B: View area, layout dimension 1\*3. The left window displays the axial plane orientation images, while the two image windows on the right correspond to the coronal and sagittal images respectively.

### 1. View Area

A: In the axial plane image window, fat information displayed in the center of the window fat information including the selected interval subcutaneous fat volume (SFV), the selected interval visceral fat volume (VFV), total fat volume (TFV), VFV/TFV sum, the current layer of subcutaneous fat area (SFA), the current layer of visceral fat area (VFA), the total floor area (TFA) and VFA/TFA proportion, the current layer waist circumference and body mass index (BMI), users can see through the adjustment layer selected interval layers of fat. In this window, you can perform contour editing, manual drawing and semi-automatic drawing.

B: In the coronal plane image, in addition to the horizontal red positioning line representing the cross-section position, Start/End was increased compared with the single-layer mode Interval positioning line. The fat and contour were extracted systematically from this area.

C: In the sagittal image, the Start/End was increased compared with the single-layer mode, except for

the red horizontal positioning line representing the cross-section position

Interval positioning line. The fat and contour were extracted systematically from this area.

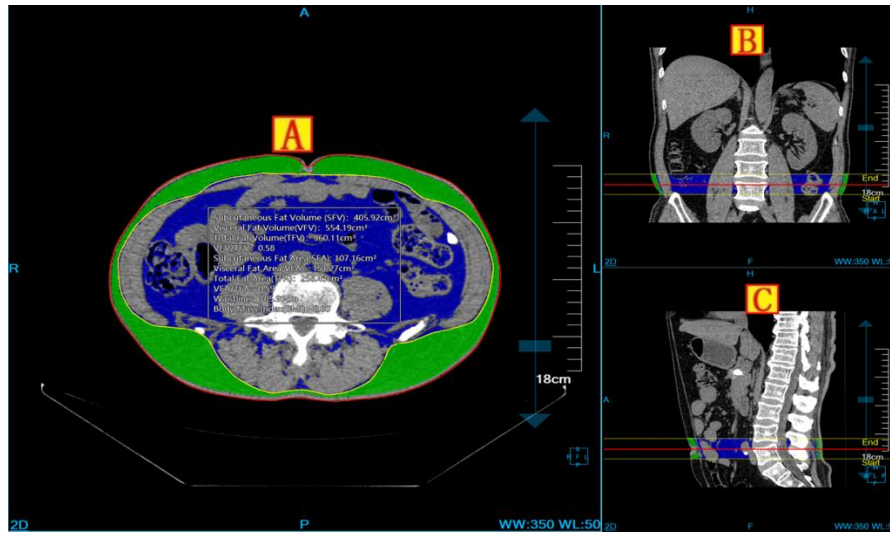


Figure 36-7 View

## 2.Operation Panel

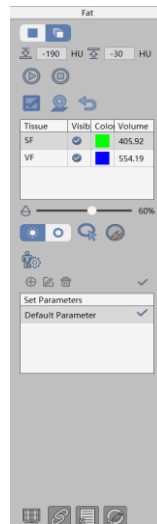
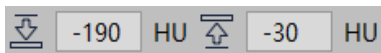


Figure 36-8 Operation Panel

### 1)Threshold Setting



Set the lower limit and upper limit of the threshold, after which the system will automatically extract the fat and contour according to the new threshold range and the currently selected starting and ending range.

### 2)Re-extracting



After clicking this button, the system will extract fat and contour according to the current threshold value and the currently selected starting and ending range.



### 3)Relocation



When this function is performed, the cross section is automatically located to the key layer where the fat and contour have been extracted.

### 4)Clear



Clear fat and contours that have been extracted in current mode.

### 5)Tissue List

Tissue	Show	Color	Volume
SF	<input checked="" type="checkbox"/>	<span style="color: green;">■</span>	405.92
VF	<input checked="" type="checkbox"/>	<span style="color: blue;">■</span>	554.19

Tissue list is used to show the display control, color setting and volume information of subcutaneous fat and visceral fat.

### 6)Permeability Setting

It is the same with single-layer mode, the set permeability value is suitable for single-layer and multi-layer modes.

### 7)Contour Operation

It is the same with single-layer mode.

### 8)Height and Weight Setting

It is the same with single-layer mode, the setting results apply to both single-layer and multi-layer modes.

### 9)Report Parameter Setting

It is the same with single-layer mode, the setting results apply to both single-layer and multi-layer modes.

### 10)Display Control

It is the same with single-layer mode, the setting results apply to both single-layer and multi-layer modes.

### 11)Send to Report

It is the same with single-layer mode.

# Chapter 37 Intelligent Pneumonia Analysis (Option)

Intelligent Pneumonia Analysis (hereinafter referred to as IPA) system, based on the image data loaded by patient management, and taking the image series as the unit, can effectively evaluate pneumonia and generate a pneumonia report through the operations of the fully automatic segmentation of lung, automatic extraction of lesions, calculation of lesion volume, description of lesion location and so on. For selected specific lesions, reconstructed lesion data in the direction of HFS is formed, and the information of three-dimensional volume and effective diameter of lesions, etc. are automatically calculated to provide effective basis for the volume change rate and doubling time required for follow-up examination and comparison in the future.

## 37.1 Start

IPA plug-in is deployed in the advanced application module as a functional plug-in of the system.

Switch to the IPA plug-in by selecting [IPA] in Fig 37-1.

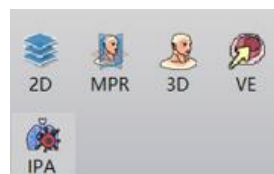


Figure 37-1 IPA Quick Start Panel

Click [IPA] button in the function switch panel of the advanced application module to switch to the IPA plug-in.

As shown in Fig 37-2



Figure 37-2 Switch Panels between Plug-ins

## 37.2 Overview of Operation Interface

The operation interface, as shown in Fig. 37-3 and Fig. 37-4, mainly consists of two parts, view area and function operation panel area:

- A: View area, display MPR section of the image data: including the images of axial plane, coronal plane

and sagittal plane; Locally enlarged images of the lesion, pulmonary MIP images and HFS reconstructed images of the lesion.

➤B: Function operation panel, provide the method and tools of operating the image display window, and the functions of extracting the lesion, editing the lesion, sending the report image and so on.

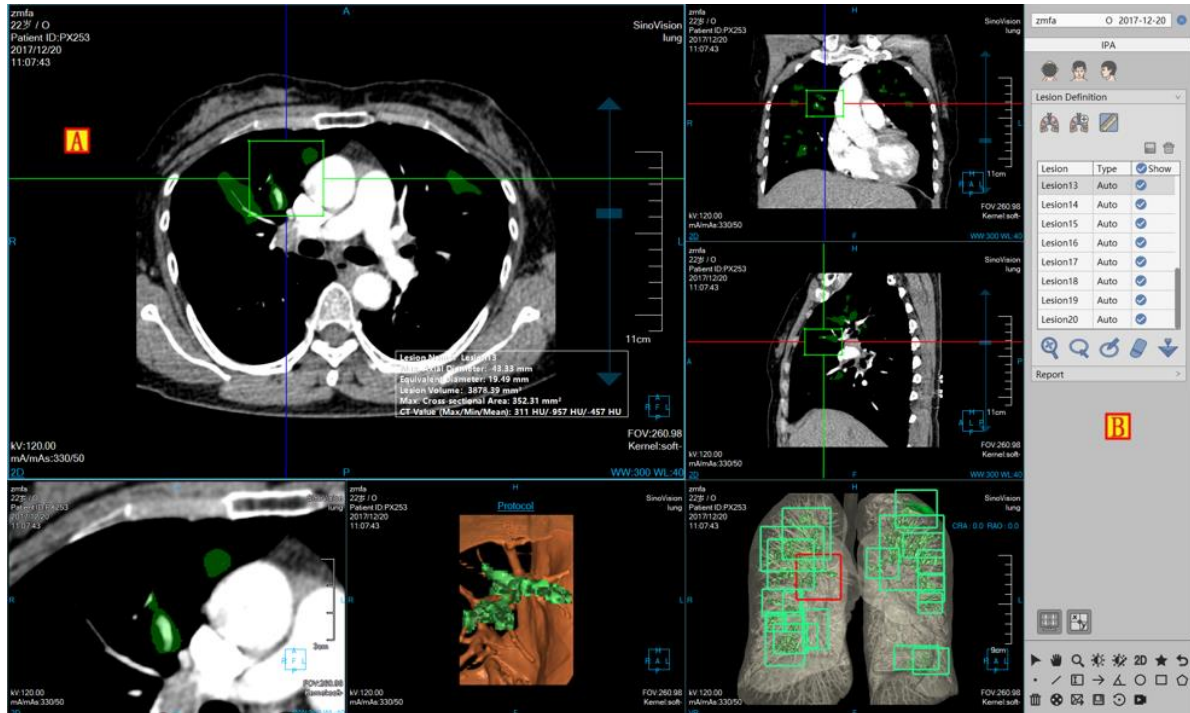


Figure 37-3 Operation Interface-extraction

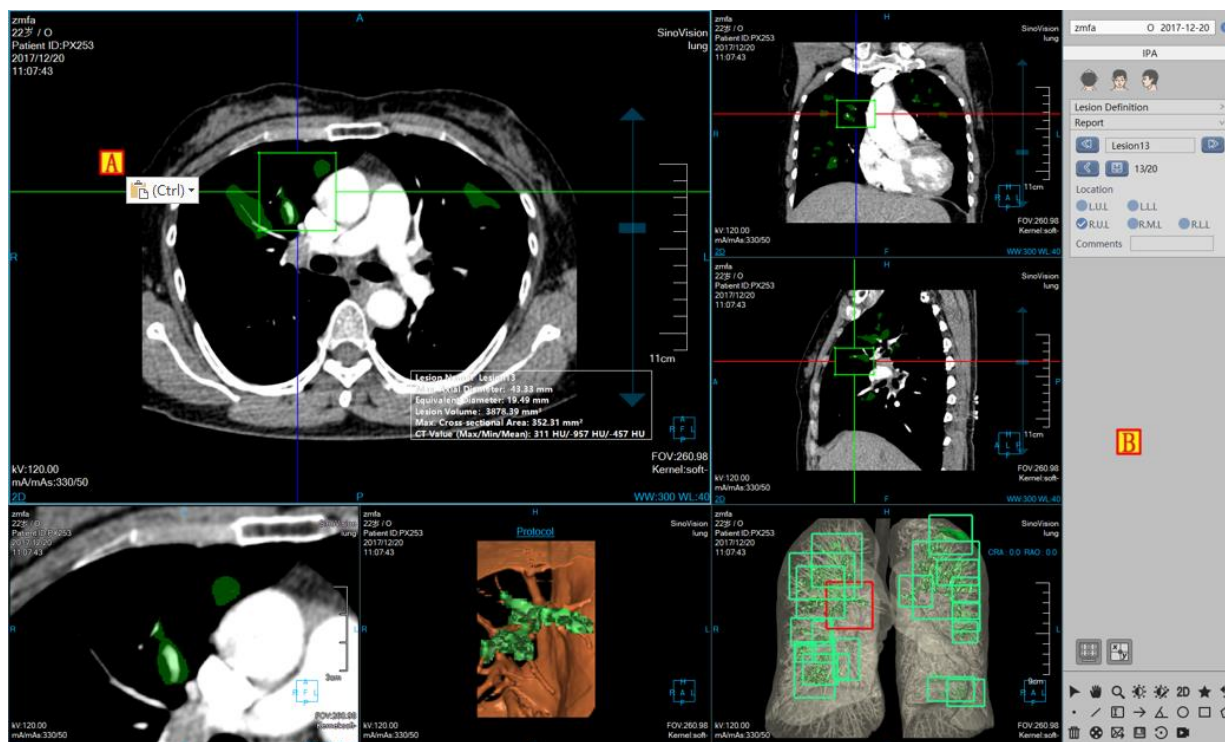


Figure 37-4 Operation Interface-Editing

## 37.3 View

### 1. Overall View

The image display window realizes the content output of the image display window through the combined layout of multiple basic Windows like Fig. 37-5 displays images with a window layout of 4\*2, among which the four basic windows were respectively: axial plane window (A), coronal plane window (B), sagittal plane window (C) and the local magnification window of nodule (D) and the two VR windows are respectively: lesion reconstruction image window (E) and lung MIP window (F); Floating window of lesion analysis results (G).

After double-clicking any window, the window will be displayed in full screen in the view area; Double-click the full-screen image again, and before the view area restores, 4\*2 window layout displays the image.

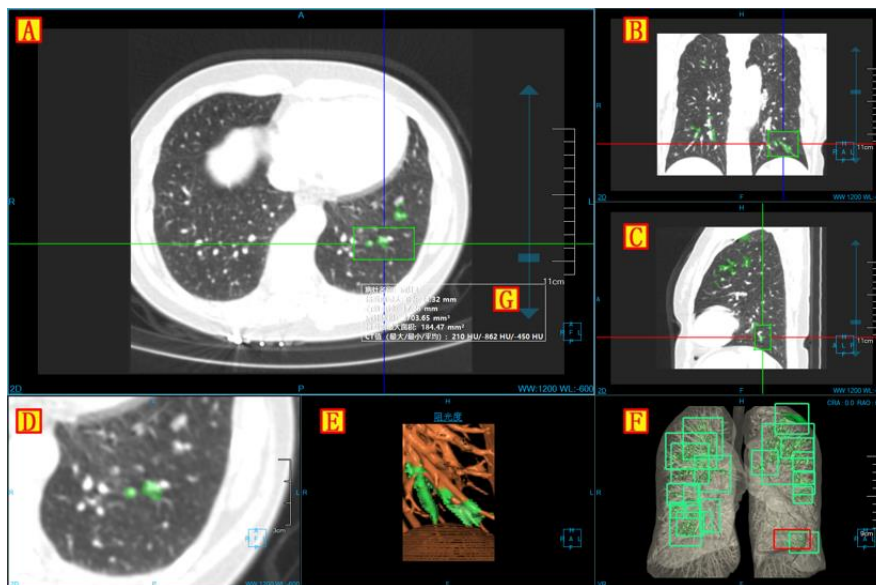


Figure 37-5 View Window

### 2. Image Display View

The contents displayed in the basic image display window include crosshair, overlap information, orientation information, display mode, scale and bounding box. The analysis results of lesions are shown in Fig. 37-6.



**Figure 37-6 Image Display Basic Window**

- A: Overlap information, display DICOM image header information content and real-time window width and window level information. This information can be customized to display the content in the setting interface;
- B: Crosshair, by moving the crosshair with three kinds of color of red, green and blue, the corresponding axial plane, coronal plane and sagittal plane images can be adjusted. When magnifying and modifying lesions, the size of the bounding box of the lesion can be adjusted by dragging the four sides of the middle square to extract the lesion.
- C: Display mode: display the display mode of the current image display window, including the contents of 2D, MIP, AIP, MINIP and so on. Right-click on the display mode text in the window and the display mode switch menu will pop up. Select the corresponding menu item to switch the display mode of the image window.
- D: Orientation information, synchronized with the displayed image content, the orientation information of the currently displayed image will be identified.  
The orientation information is displayed in the middle position of the four sides of the basic image display window in the text form;
- E: Ruler, the scale of the output image is based on the half height of the image display window;
- F: The extraction result of the lesion, after extracting the lesion, display the information;
- G: Orientation box, the display box of orientation information synchronously adjusted with the image;
- H: Slider for adjusting layer, drag the slider to the corresponding image layer;

## 37.4 Function Operation Panel

The operation panel is divided into three areas: data switch, pneumonia analysis, and common functions.

- A: Data switch, the functions of switching image series and deleting the study, etc. through thumbnail image;
- B: Common function, provide the common function operations of default operation, translation, zooming, adjusting window width/window level, restoring function button and so on;
- C: Pneumonia analysis, provide a series of function operations of lesion extraction, lesion modification, lesion editing, deleting, and so on used for the lesion processing and analysis.

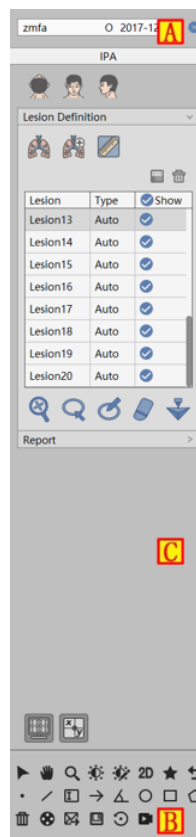


Figure 37-7 Function Operation Panel

### 1. Function Panel

#### 1) Image Orientation



Three kinds of default body position orientations are provided: Axial, Coronal and Sagittal. Click the corresponding button, you can switch the orientation of the window data.

## 2)Extract Lungs

Enter the plug-in, prompt the segmentation of lungs, and generate lung MIP image at the same time;

On the extraction panel, click the button [Manually Extracting Lungs] to extract the lungs by drawing the closed area and generate the MIP image of the lungs.

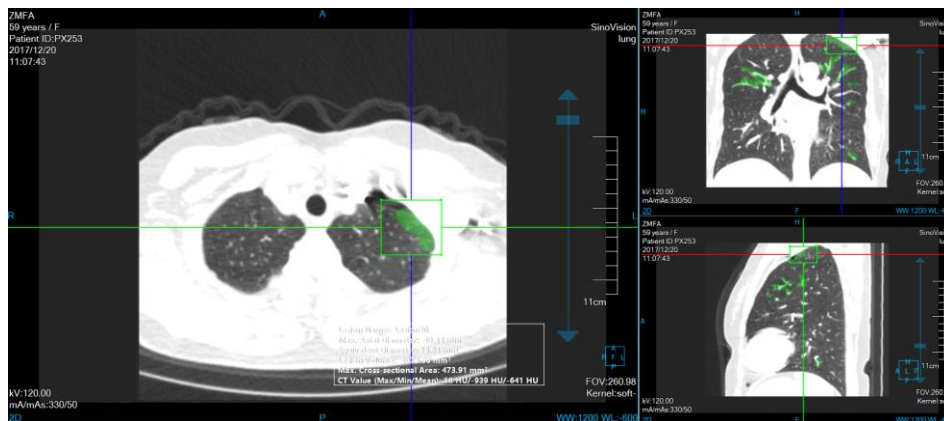
## 3)Extract Lesions



Extraction of lesions can be divided into two parts: extract lesions first, modify lesions second, and support for sending to [Printing Modeling]

- First extraction: click on the lesion for extraction on the basic window.
- Second modification of lesions: it can be divided into 4 modification methods: magnifying modification, contour modification, magnetic modification and erasion modification. For contour modification, magnetic modification and erasure modification, you can carry out the operations of restoring and undoing.

[Magnify Modification] Magnify the images of lesions on the axial plane, coronal plane and sagittal plane, and the size of the lesion was adjusted by dragging the bounding box on the crosshair for the second extraction of the lesions;



**Figure 37-8 Magnify the Image of Extracting Lesion**

[Modification of contour line] draw the boundary of the lesion on the magnified window of the lesion, and modify and extract the lesion for the second time;

[Magnetic modification] on the magnified window of the lesions, according to the contour boundary of the lesion, magnetic absorption was performed and modify and extract the lesion for the second time;

[Erasion modification] on the magnified window of the lesion, the extracted excess tissue was erased and modify and extract the lesion for the second time;

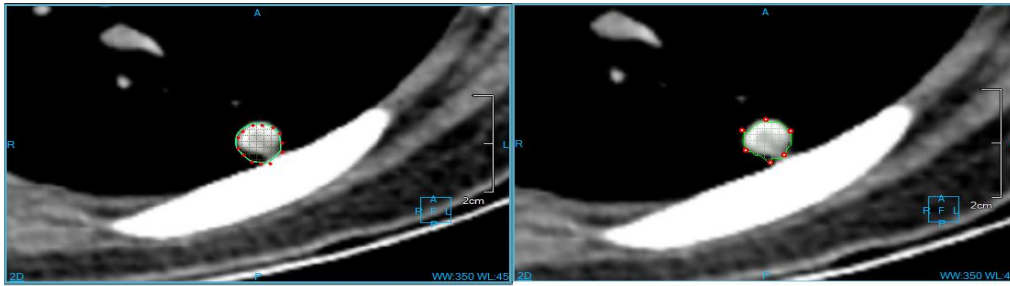


Figure 37-9 Lesions Contour & Magnetic Extraction Lesions Image

#### 4) Lesions List

It is used to display lesion name, type, set visual state, and perform the operations of editing and deletion

Lesion	Type	✓ Show
Lesion13	Auto	✓
Lesion14	Auto	✓
Lesion15	Auto	✓
Lesion16	Auto	✓
Lesion17	Auto	✓
Lesion18	Auto	✓
Lesion19	Auto	✓
Lesion20	Auto	✓

Figure 37-10 Lesion List

## 2. Edit Function Panel

### 1) Edit Control Area

Lesion editing control area, it can switch the previous and next lesions, edit the current lesion name, view, delete and append the images sent to the report, generate the report, and return to the extraction page.

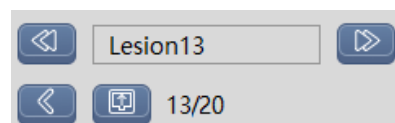


Figure 37-11 Edit Control Area

- Previous, switch to the previous lesion;
- Next: switch to the next lesion;
- Lesion name: display the current lesion name, and you can modify the current lesion name;
- Generate report: all lesion information is saved and reports are generated;
- Report image: view, delete, and append images sent to the report.

### 2) Lesion Editing Area

A series of attributes such as the form, position and edge of the lesion are described and generated into the report



item.

Location

L.U.L     L.L.L

R.U.L     R.M.L     R.L.L

Comments

**Figure 37-12 Editing List**

# Chapter 38 CT Fraction Flow Reserve Analysis (Option)

CT fraction flow reserve analysis, hereinafter referred to as FFRct. This option is mainly the analysis system for clinical prediction of patients with coronary stenosis blood flow pressure decline trend developed by using CT image, computational fluid dynamics and computer simulation technology.

The analysis results include not only the positioning of coronary artery stenosis, the quantitative analysis of plaque lesions, but also the physiological and functional evaluation of the coronary arteries to assist doctors in more detailed analysis and diagnosis.

## 38.1 Start

The plugin, as a functional plug-in of the system, is deployed in the advanced application module.

In the PM function switch panel shown in the figure below, click the [FFRct] button to enter the application module.

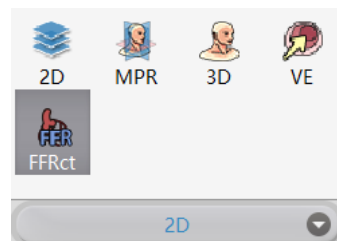


Figure 38-1 FFRct Start Plug-in

After startup, if you switch to another advanced plug-in, click the [FFRct] icon in the figure below to return to the plugin.

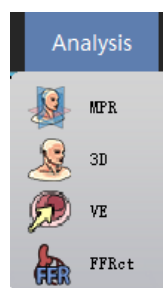


Figure 38-2 Switch Back to Plugins

## 38.2 Data Loading

The data processed by the plugin must be coronary CTA data. For other types of data, it can not be guaranteed to obtain the accurate and reliable coronary analysis results and FFR calculation results.

## 38.3 Operation Interface Overview

As the figures 38-3,38-4 and 38-5 shown, the operation interface mainly contains two parts, the view area and the function operation panel area.

- A: View area, mainly displays VR view of coronary segmentation, CPR view of current coronary branch, MPR view, calculation parameter table, FFR parameter model diagram, vascular straightening view and vascular cross section view.
- B: Function operation panel, includes segmentation tool panel, analysis operation panel and FFR calculation panel respectively.

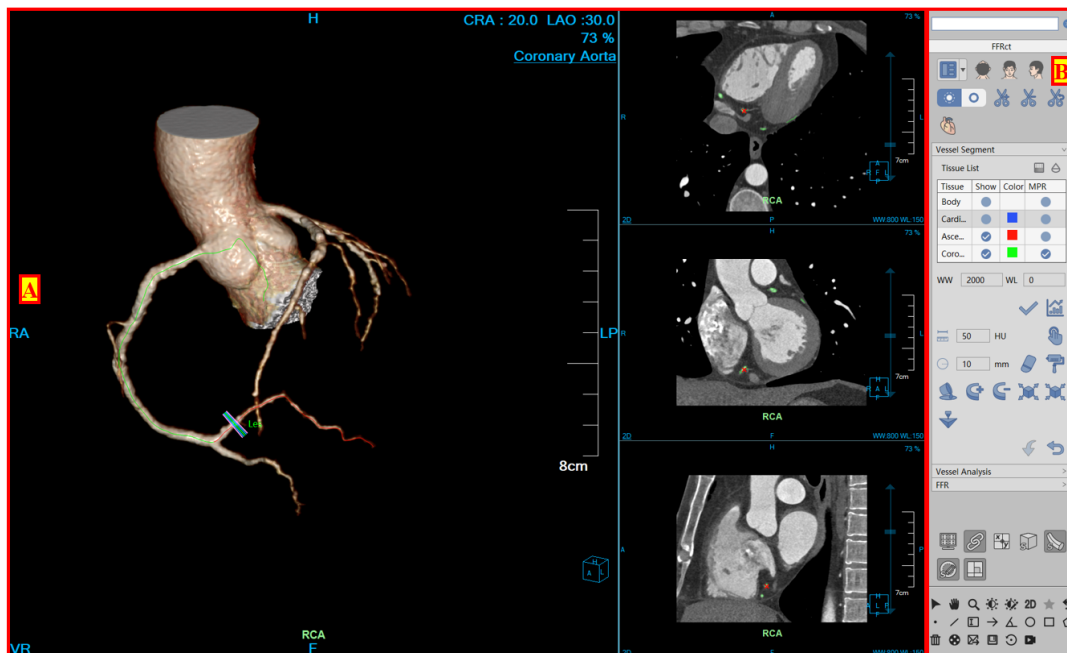


Figure 38-3 Operation Cross Section- segmentation

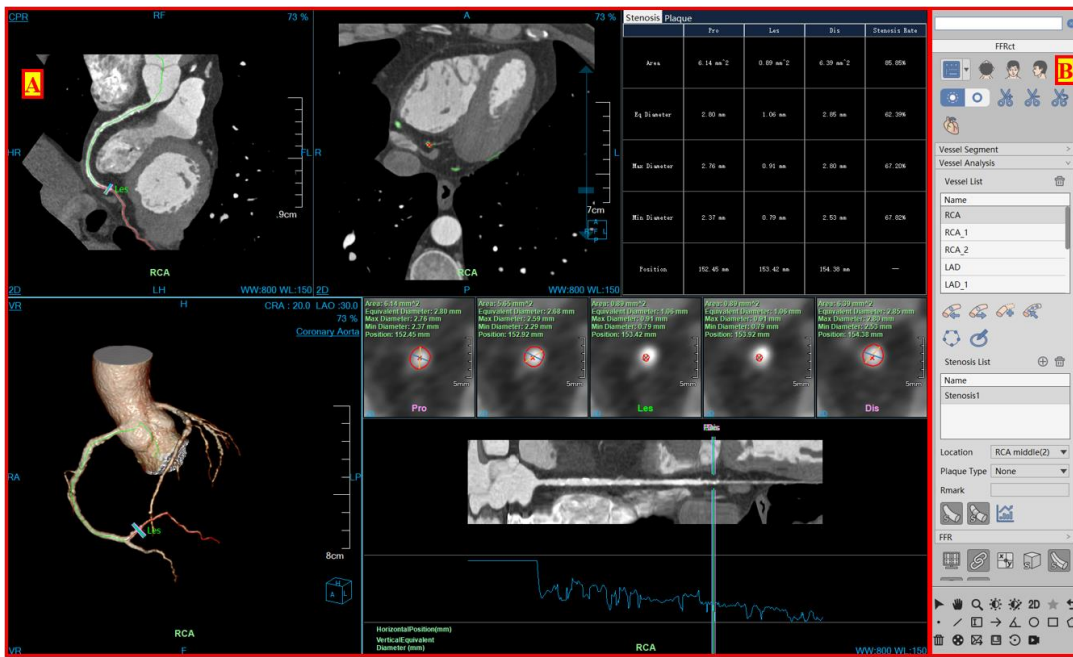


Figure 38-4 Operation Cross Section-analysis

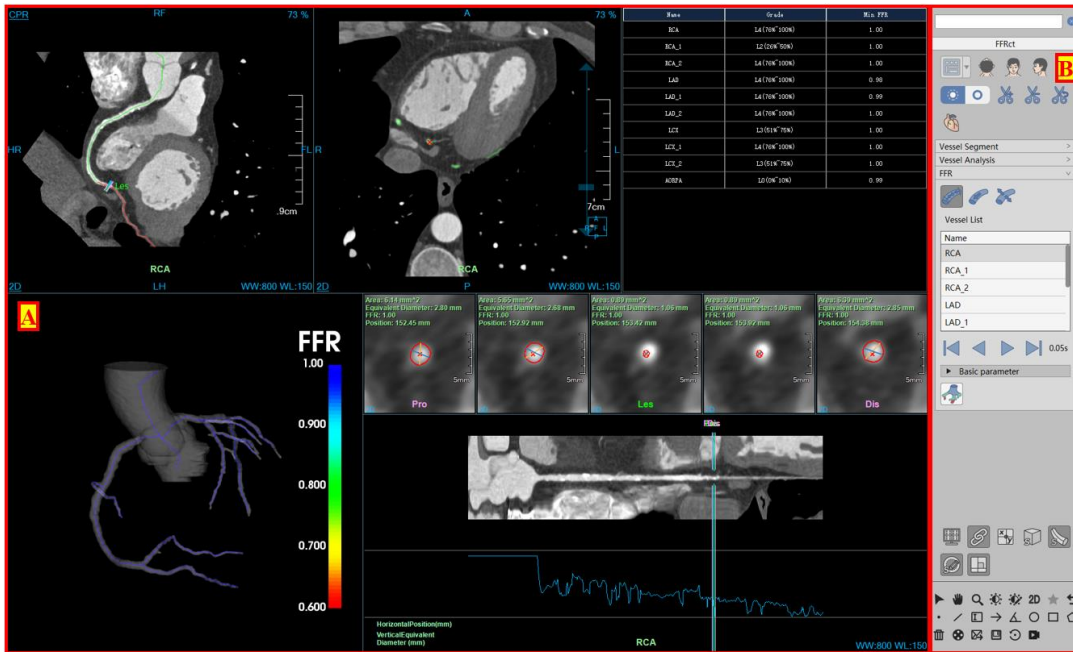


Figure 38-5 Operation Cross Section- FFR

### 38.4 Automatic Analysis

Please refer to the description in Section 21.3 of Chapter 21.

After automatic analysis, coronary topological tree can be automatically constructed according to the relationship of coronary branches.

### 38.5 Segmentation Tool

Please refer to the description in Section 21.4 of Chapter 21.

## 38.6 Analysis Tool

### 1.Interface

As shown in Figure 38-6, the tools for coronary topological structure editing, contour extracting, stenosis analyzing, and plaque analyzing are provided.

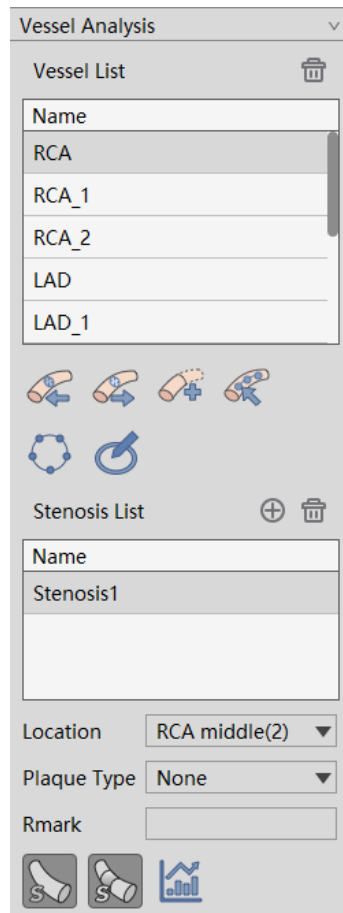









Figure 38-6 Analysis Panel

### 2.Function

#### 1) Description

- Single Point Extraction Left Coronary : the new left coronary artery center path is extracted and automatically added to the topological tree of coronary arteries.
- Single Point Extraction Center Line : the new right coronary artery center path is extracted and automatically added to the topological tree of coronary arteries.
- Single Point Lengthening Center Path : extend the existing coronary center path and update the coronary topology tree synchronously
- Edit Center Path : edit coronary center path and update coronary topology tree synchronously (The parent

branch does not support the function [ delete the control point])

- Delete a Central Path  : delete the central path and update the coronary topological tree synchronously (The ascending aorta and its branches cannot be deleted. The left or right coronary branches should retain at least one)
- Vascular List: coronary branch switch, double-click the name of the blood vessel to edit it. Right-click the name of the blood vessel and the setting menu of it is displayed to rename the blood vessel, including RCA, LAD, LCX and main branch
- Contour Editing  : edit the contour of the coronary vessel cross section
- Contour Drawing  draw the contour of the coronary vessel cross section
- Stenosis List: add/edit/delete the stenosis information for each coronary artery branch
- Position: edit the coronary branch where the current plaque is located
- Plaque Type: edit plaque type
- Remarks: add the remarks information about vascular diseases
- Display blood vessel name: display/ hide blood vessel name
- Display plaque: display/ hide plaque pseudo color
- Plaque Histogram: count plaque histogram

## 38.7 FFR

### 1. Interface

As shown in the Figure 38-7, coronary artery analysis are provided, including centerline extraction, contour line extraction, stenosis analysis and plaque analysis tools

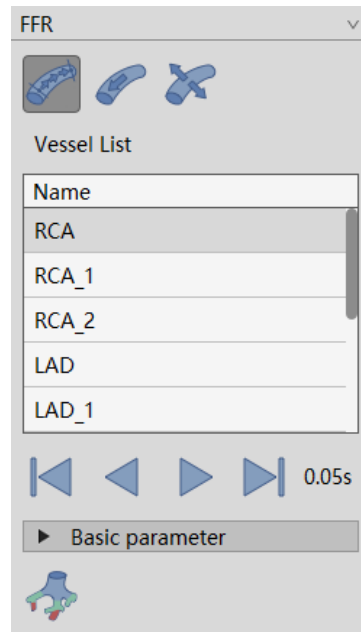







Figure 38-7 FFR Panel

## 2.Function

### 1)Description

- Type switching : supported data types include pressure, average pressure, average flow rate, FFR
- Previous : browse the data model of the previous frame
- Reverse playback : play the data model of the specified type in reverse order
- Play : play the data model of the specified type in forward order
- Next : browse the data model of the next frame
- Time Point: the simulated heartbeat time point corresponding to the current measurement, in seconds
- Basic Parameters: include **diastolic**/systolic blood pressure and inlet flow of the ascending aorta
- Calculate FFR: calculate the FFR value of coronary artery according to the result data of segmentation and analysis

### 2)Model View

Through this model view, the user can browse the FFR value distribution at any position of the coronary artery tree, and can also analyze the change trend and influence of the pressure/velocity of the coronary blood flow through the pseudo-color model. As shown in Figure 38-8, the minimum FFR values for each coronary branch in the corresponding vascular list are displayed in the list, as shown in Figure 38-9.

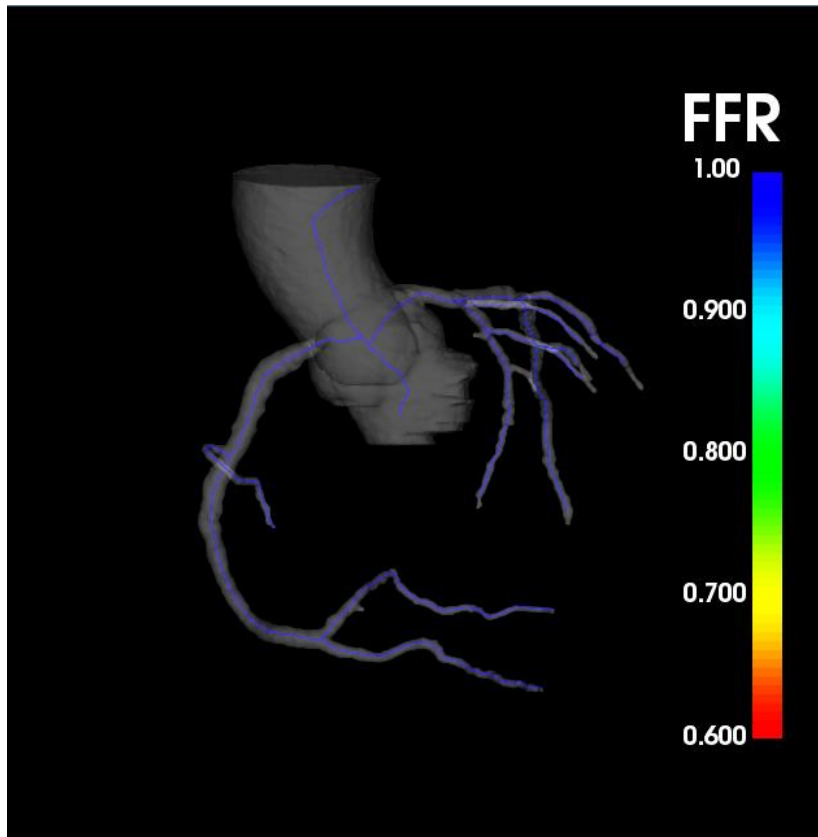


Figure 38-8 FFR View

Name	Grade	Min FFR
RCA	L4 (76%~100%)	1.00
RCA_1	L2 (26%~50%)	1.00
RCA_2	L4 (76%~100%)	1.00
LAD	L4 (76%~100%)	0.98
LAD_1	L4 (76%~100%)	0.99
LAD_2	L4 (76%~100%)	1.00
LCX	L3 (51%~75%)	1.00
LCX_1	L4 (76%~100%)	1.00
LCX_2	L3 (51%~75%)	1.00
AORPA	L0 (0%~10%)	0.99

Figure 38-9 FFR Information of Coronary Branches

### 38.8 Report tool

Please refer to the description in Section 21.6 of Chapter 21.

### 38.9 Main General Tool

Please refer to the description in Section 21.7 of Chapter 21.



## Chapter 39 Epicardial Adipose Tissue(Optional)

Epicardial adipose tissue analysis, hereinafter referred to as EAT. Although CTA can identify coronary artery stenosis, most patients with acute coronary syndrome are caused by unstable non-obstructive atherosclerotic plaque, which cannot be identified by conventional CTA. Studies have proved that chronic inflammation is the pathophysiological mechanism of the occurrence and progression of vascular atherosclerosis. Therefore, the main function of EAT is to provide a non-invasive way to measure the peri-coronary fat attenuation index (FAI), thereby identifying atherosclerosis early, detecting vulnerable plaques in time, and intervening early.

### 39.1 Start

The plug-in, as a functional plug-in of the system, is deployed in the advanced application module.

In the PM function switch panel below, click the [EAT] button to enter the application module.

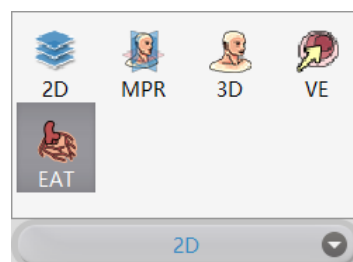


Figure 39-1 EAT Start Plug-in

After startup, if you switch to other advanced plug-ins, click the [EAT] icon in the figure below to return to the plug-in.

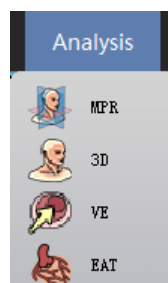


Figure 39-2 Switch Back to Plug-ins

### 39.2 Data Loading

The data processed by this plug-in must be coronary artery CTA data. For other types of data, accurate and reliable coronary artery analysis results and peri-coronary fat segmentation and analysis cannot be guaranteed.

### 39.3 Operation Interface Overview

The operation interface, as shown in Figure 39-3,39-4 and 39-5, mainly includes two parts, view area and function operation panel area:

- A: View Area, mainly displays VR view of coronary artery segmentation, CPR view of current coronary artery branch, MPR view, calculation parameter table, Fat parameter model diagram, vascular straightening view and vascular section view.
- B: Function Operation Panel, includes segmentation tool panel, analysis operation panel and Fat calculation panel respectively.

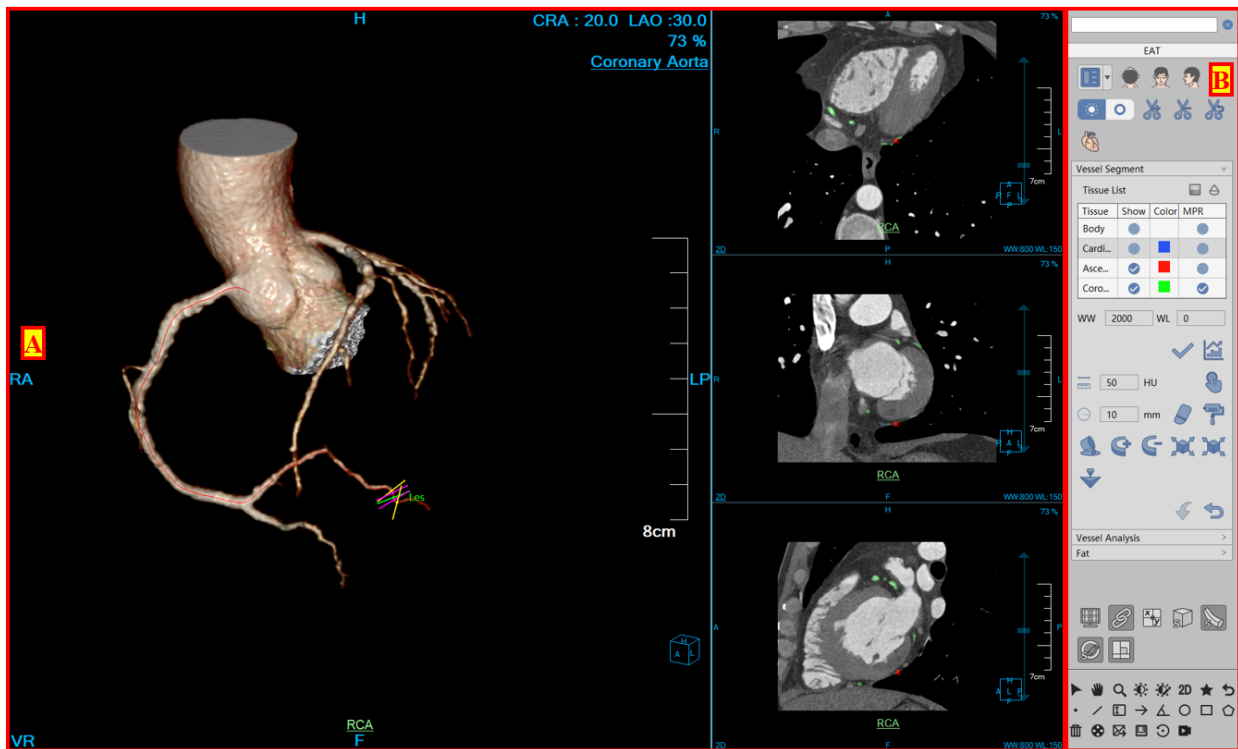


Figure 39-3 Operation Interface-segmentation

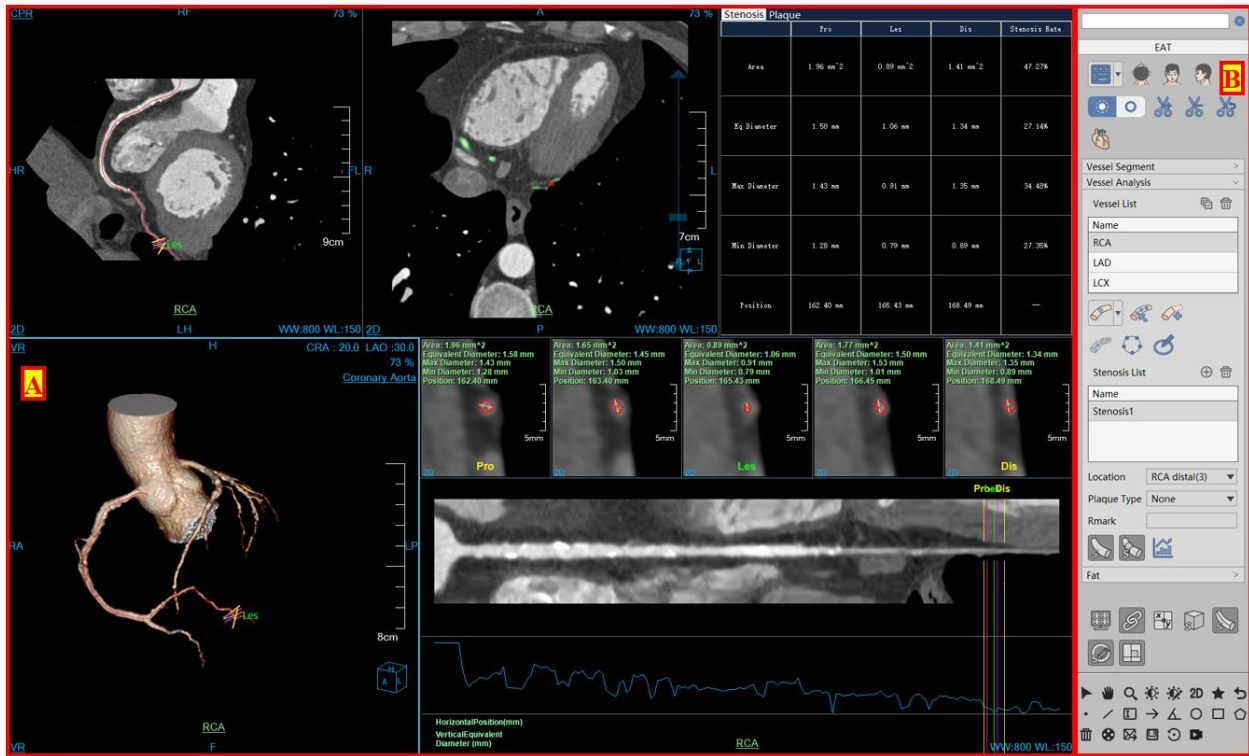


Figure39-4 Operation Interface-analysis

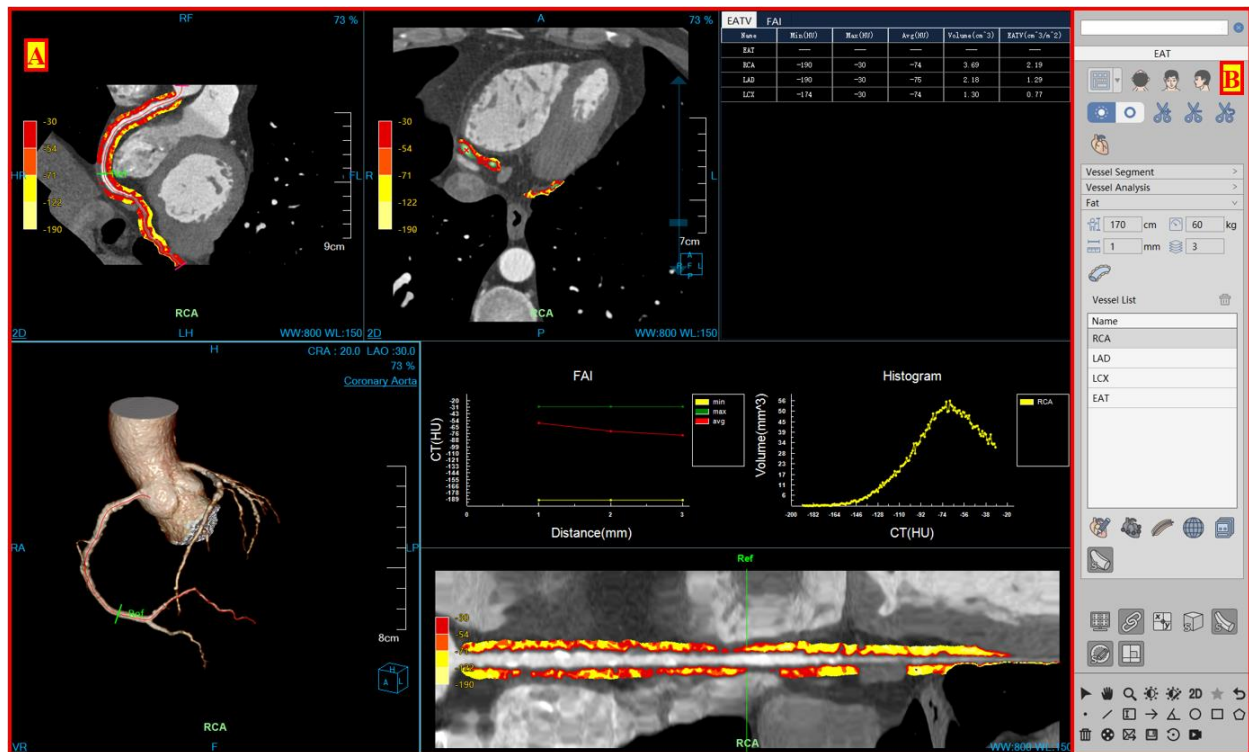


Figure 39-5 Operation Interface-fat

### 39.4 Automatic Analysis

Please refer to the description in Section 21.3 of Chapter 21.

## 39.5 Segmentation Tool

Please refer to the description in Section 21.4 of Chapter 21.









## 39.6 Analysis Tool

Please refer to the description in Section 21.5 of Chapter 21.

## 39.7 EAT Analysis

### 1. Interface

As shown in Figure 39-6, it mainly contains the following functions: parameter setting of peri-coronary fat, coronary vessel list, epicardial drawing tool, peri-coronary segment definition tool, fat region of interest definition tool. It mainly includes the following tools:

- Height : used to calculate EATV value
- Weight : used to calculate EATV value
- Layer Thickness : specifies the thickness of each layer of fat around the coronary artery
- Layer Number : specifies the number of layers of fat around the coronary artery to be counted
- Application Parameter : according to the parameter values set, the distribution statistics distribution information, EATV value and FAI value of epicardial fat, peri-coronal fat and fat of the region of interest are calculated.
- Epicardial Contour Tool : draw/edit epicardial contour
- Peri-coronary Segment Tool : define peri-coronary segments
- ROI Tool : define ROI areas

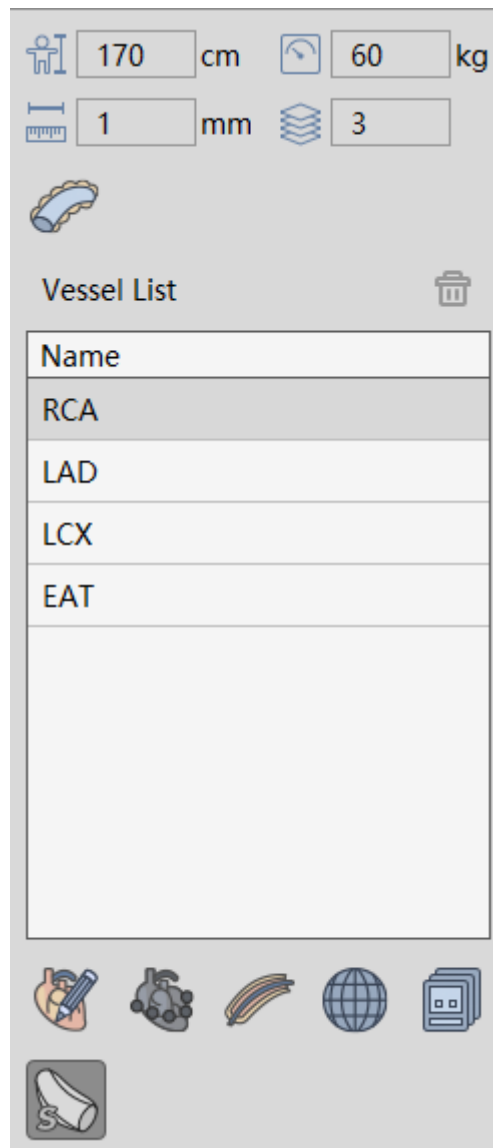


Figure 39-6 EAT Analysis Panel

## 2. Function

### 1) Epicardial Contour

**Drawing:** manually draw a closed contour on the Axial image to determine the epicardial fat area. Multiple epicardial contours can be drawn continuously on the multi-layer image. Click the [OK] button to automatically calculate the epicardial fat information, as shown in Figure 39-7.

**Edit:** support the operations of undoing, restoring, confirming, and canceling . After editing the epicardial contour, recalculate the epicardial fat information, as shown in Figure 39-8.

EATV	FAI				
Name	HU(min)	HU(max)	HU(avg)	Volume(cm <sup>3</sup> )	EATV(cm <sup>3</sup> /m <sup>2</sup> )
EAT	-190	-30	-82	45.65	27.12

Figure 39-7 Epicardial Value Square Information

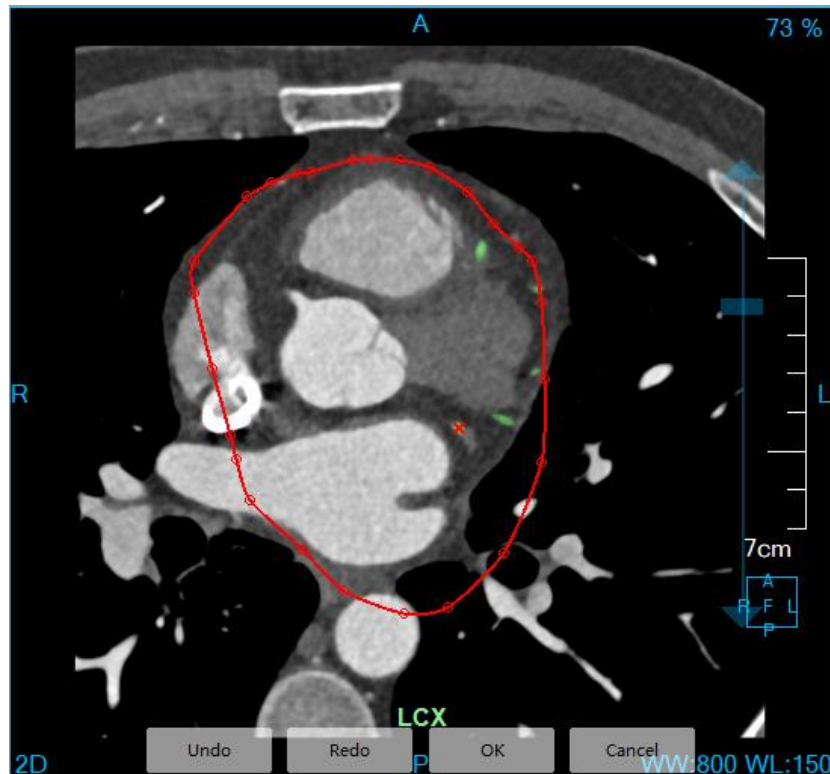


Figure 39-8 Epicardial Contour Editing

## 2) Define Peri-coronary Segment

Only on the CPR image, the start position and end position of the segment can be determined by mouse, and then the fat distribution information and FAI information of the segment can be automatically calculated. Meanwhile, you can also drag the start and end positions to change the phase range of the calculation.

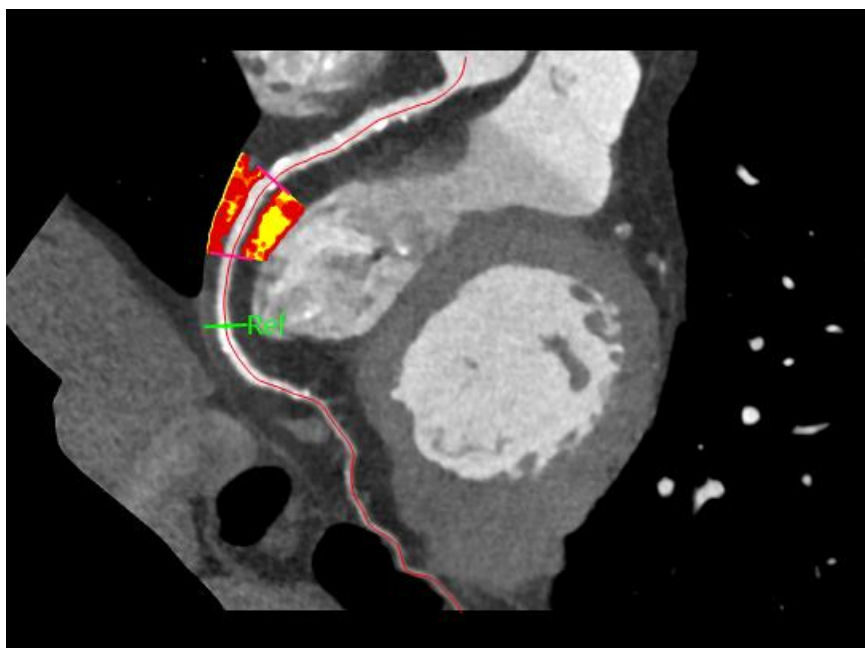


Figure 39-9 Peri-coronary Segment Fat Definition

According to the set extraction threshold value and calculation range, different tissues will be displayed on

CPR, MPR and straightening images according to the default pseudo-color scheme, as shown in Figure 39-10. The calculation information of peri-coronary fat is shown in Figure 39-11 and 39-12. The gray change curve of peri-coronary tissue and histogram of peri-coronary fat are shown in Figure 39-13.

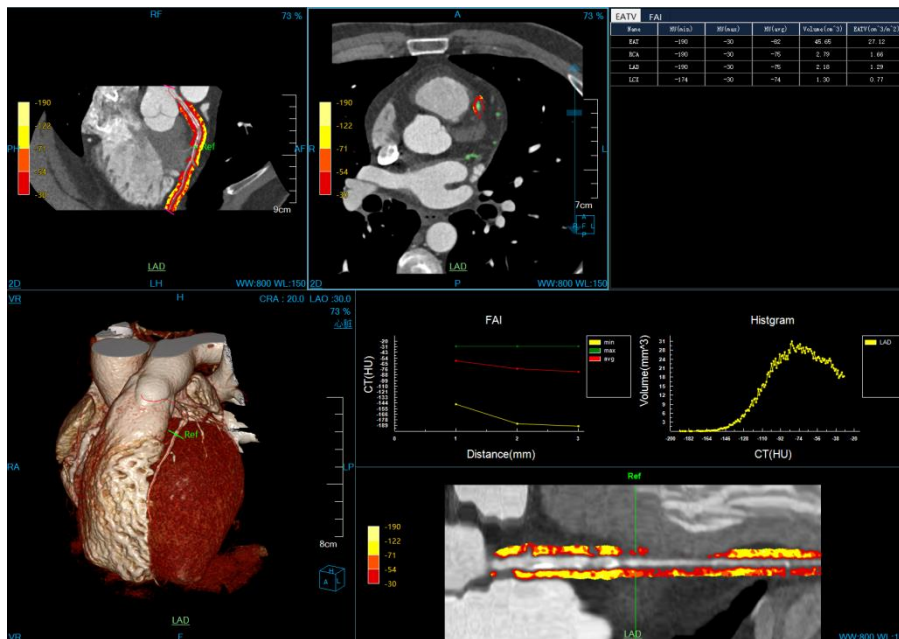


Figure 39-10 Peri-coronary Segment Value Square Calculation

	HU(min)	HU(max)	HU(avg)	Volume(cm <sup>3</sup> )	EATV(cm <sup>3</sup> /...
EAT	-190	-30	-74	5.60	3.33
RCA	-190	-30	-72	14.04	8.34
RCA_seg_1	-190	-30	-73	2.60	1.54
RCA_roi_1	-165	-30	-66	0.62	0.37
LAD	-190	-30	-83	11.75	6.98
LCX	-190	-30	-78	6.10	3.62

Figure 39-11 Peri-coronary Segment EATV

	HU(min)	HU(max)	HU(avg)	Volume(cm <sup>3</sup> )
1 mm	-118	-30	-53	0.07
2 mm	-146	-30	-69	0.20
3 mm	-164	-30	-76	0.25
4 mm	-162	-30	-77	0.29
5 mm	-149	-30	-75	0.31
6 mm	-159	-30	-73	0.32
7 mm	-179	-30	-70	0.33
8 mm	-190	-30	-75	0.32
9 mm	-190	-30	-76	0.27
10 mm	-190	-30	-75	0.23

Figure 39-12 FAI of Peri-coronary Segment FAI

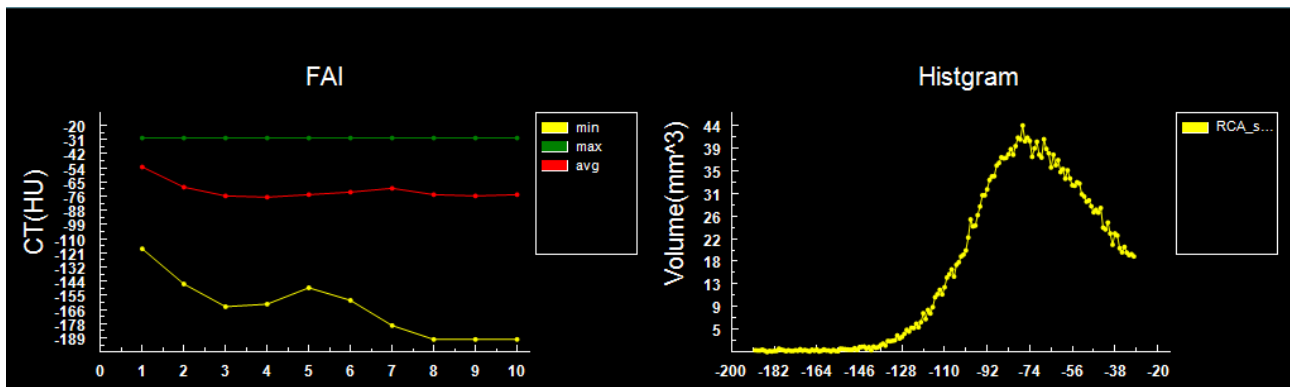


Figure 39-13 Peri-coronary Tissue Gray Scale Change Curve and Peri-coronary Fat Histogram

Double-click any false color bar in CPR, MRP or straightening window to set the threshold range and color scheme for analysis, as shown in Figure 39-14.

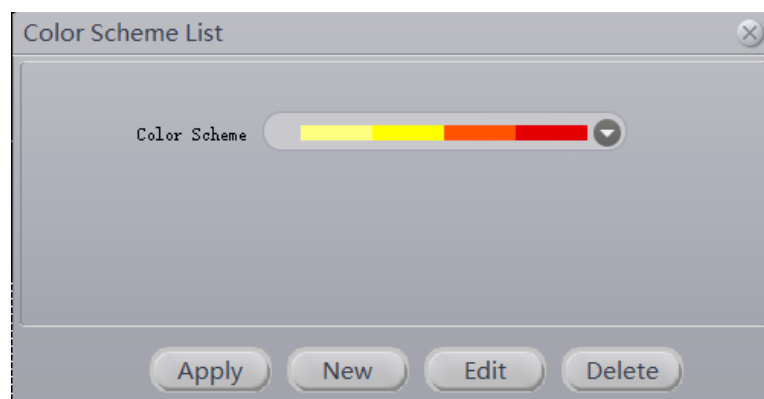
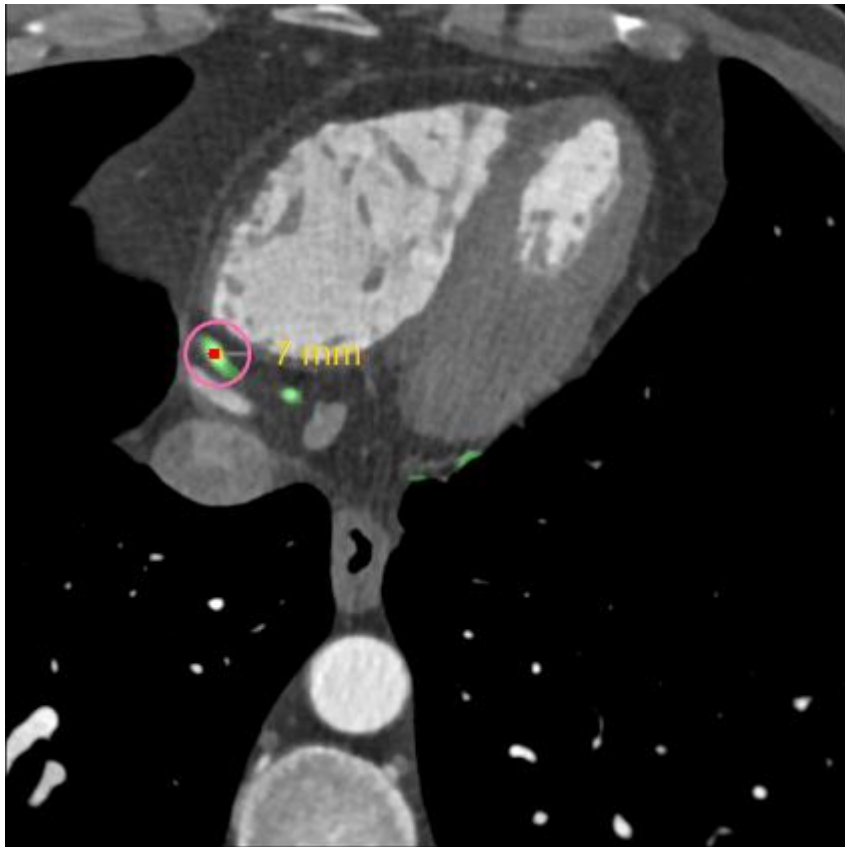


Figure 39-14 Customizing Pseudo-color Scheme

### 3) Define ROI

Only Axial images are supported, as shown in Figure 39-15. Click the mouse to determine the ROI center, and then drag the mouse to determine the ROI range. Finally automatically calculate the fat distribution information and FAI information of the ROI area.





**Figure 39-15 ROI Fat**

#### 4) Pseudo-color Display



Control whether pseudo-color is displayed.

## 39.8 Report Tool

Please refer to the description in Section 21.6 of Chapter 21.

## 39.9 Common tools

Please refer to the description in Chapter 21, Section 21.7.

# Chapter 40 Advanced Energy Spectrum Analysis (Option)

Advanced energy spectrum analysis, hereinafter referred to as AESA. Mainly based on dual-energy scanning images, by using intelligent image analysis, better display the body parts and tissues focused by doctors to provide single energy images, energy spectrum curves, simulated mixed KVP images and noise ratio images of optimal contrast. At the same time, it provides an intelligent gout crystallization analysis method, which can intuitively view the form and distribution position of gout crystallization, and can quickly obtain the volume of gout crystallization to provide convenience for clinical treatment and diagnosis.

## 40.1 Start

Firstly, the requirements for the loaded patient data are as follows: the patient examination data should contain at least two groups of series of low kV and high kV, which can both be reconstructed; The permitted maximum error of images in the two groups of series is 5; The layer thickness and layer spacing of the two series must be consistent.

Secondly, if the application is started for the first time, you can only select the required data from the patient management, and then click the [AESA] icon shown in the following figure to start the AESA application plug-in.

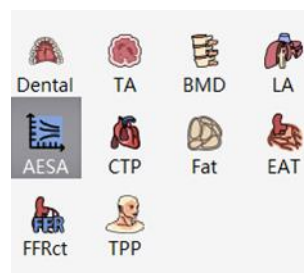
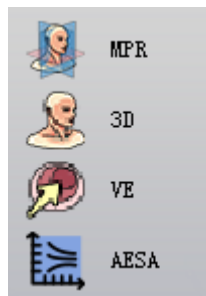


Figure 40-1 Start AESA Plug-in

If the AESA is not started for the first time, but is migrated to another application plug-in and moved back, click the [AESA] icon shown below to return to the AESA application plug-in.



**Figure 40-2 Switching to AESA Plug-in**

The operation process of AESA is divided into three steps : data loading, image quality optimization, and gout analysis.

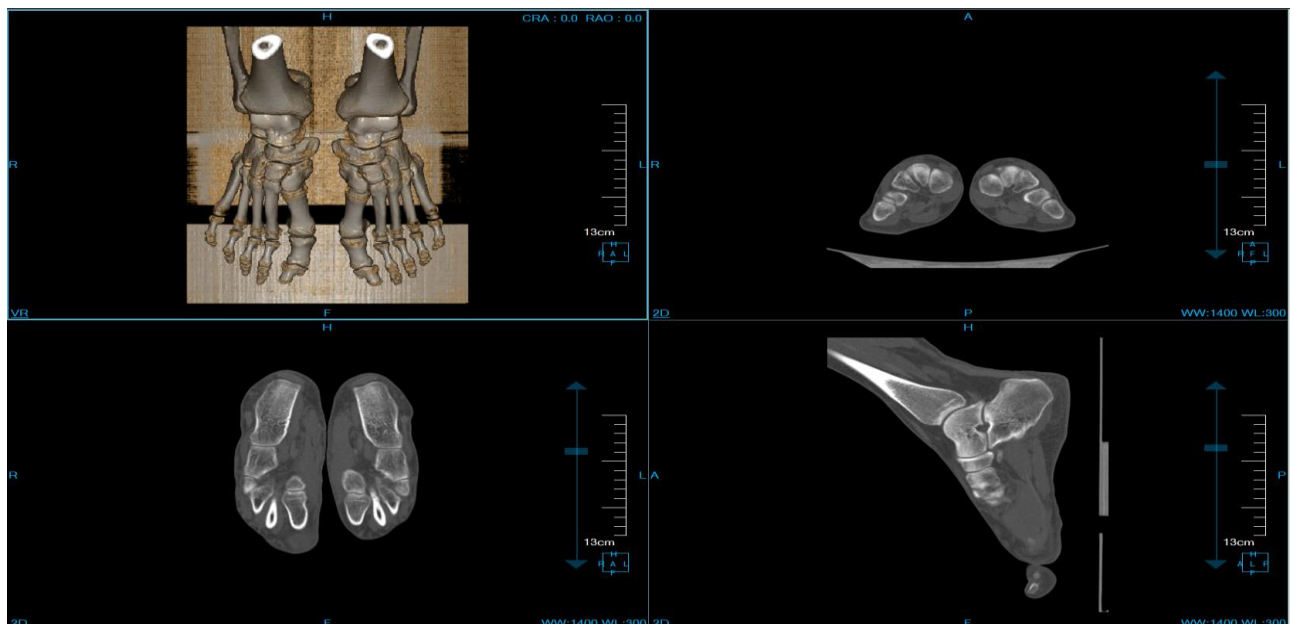
## 40.2 Data Loading

Select the data from the patient list of the patient management and click on [AESA]to load the data. Select the two groups of series of low kV and high kV in the pop-up series selection dialog box, and click [OK]to load the data to the AESA application plug-in.

## 40.3 View

### 1. Equivalent kVp view 1

The image displayed in the current view is the equivalent kVp image. The upper left side is the VR window. The upper right side is the MPR axial plane window. The lower left side is the MPR coronal plane window, and the lower right side is the MPR sagittal plane window.



**Figure 40-3 Equivalent kVp View 1**

### 2. Equivalent kVp View 2

The image displayed on the upper left is the low-energy image, and the rest are equivalent kVp images. The

upper left side is the MPR axial plane window; The upper right side is the MPR axial plane window. The lower left side is the MPR coronal plane window, and the lower right side is the MPR sagittal plane window.

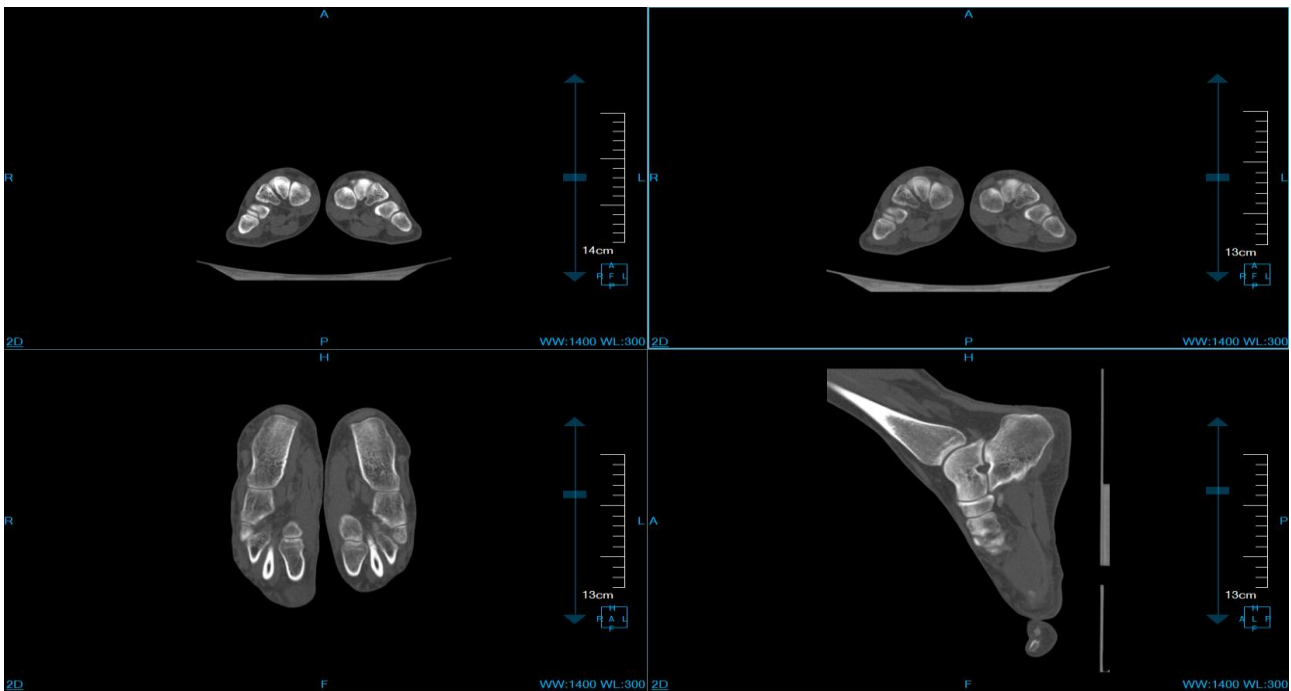


Figure 40-4 Equivalent kVp View 2

### 3. Equivalent kVp view 3

The image displayed on the upper left is high energy image, and the rest are equivalent kVp images. The upper left is the MPR axial plane window; The upper right side is the MPR axial plane window, the lower left side is the MPR coronal plane window, and the lower right side is the MPR sagittal plane window.

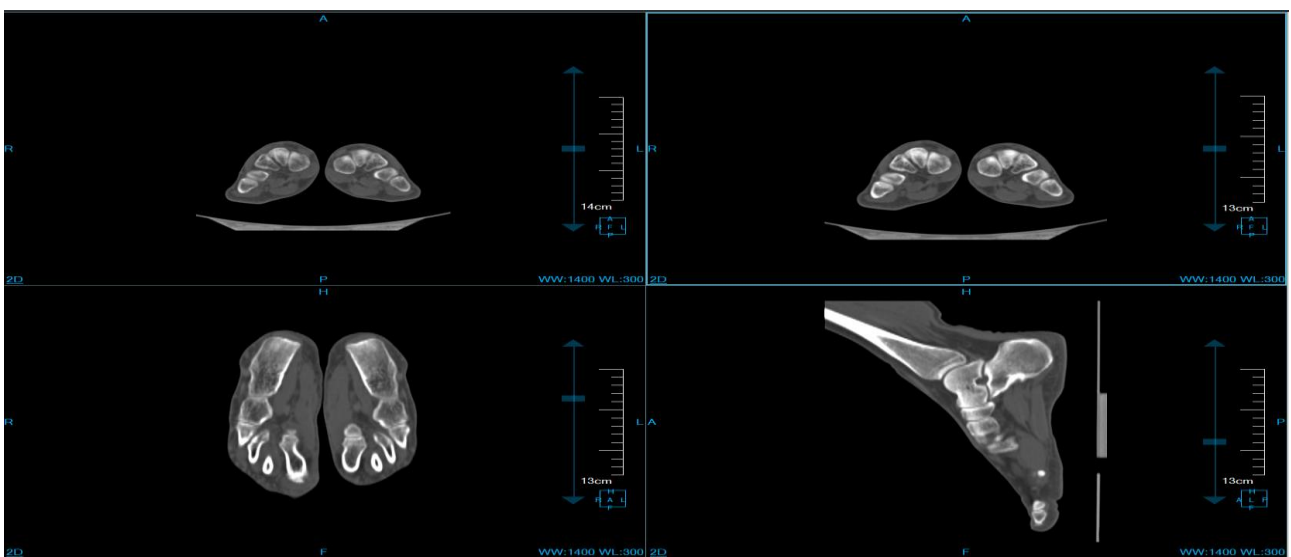
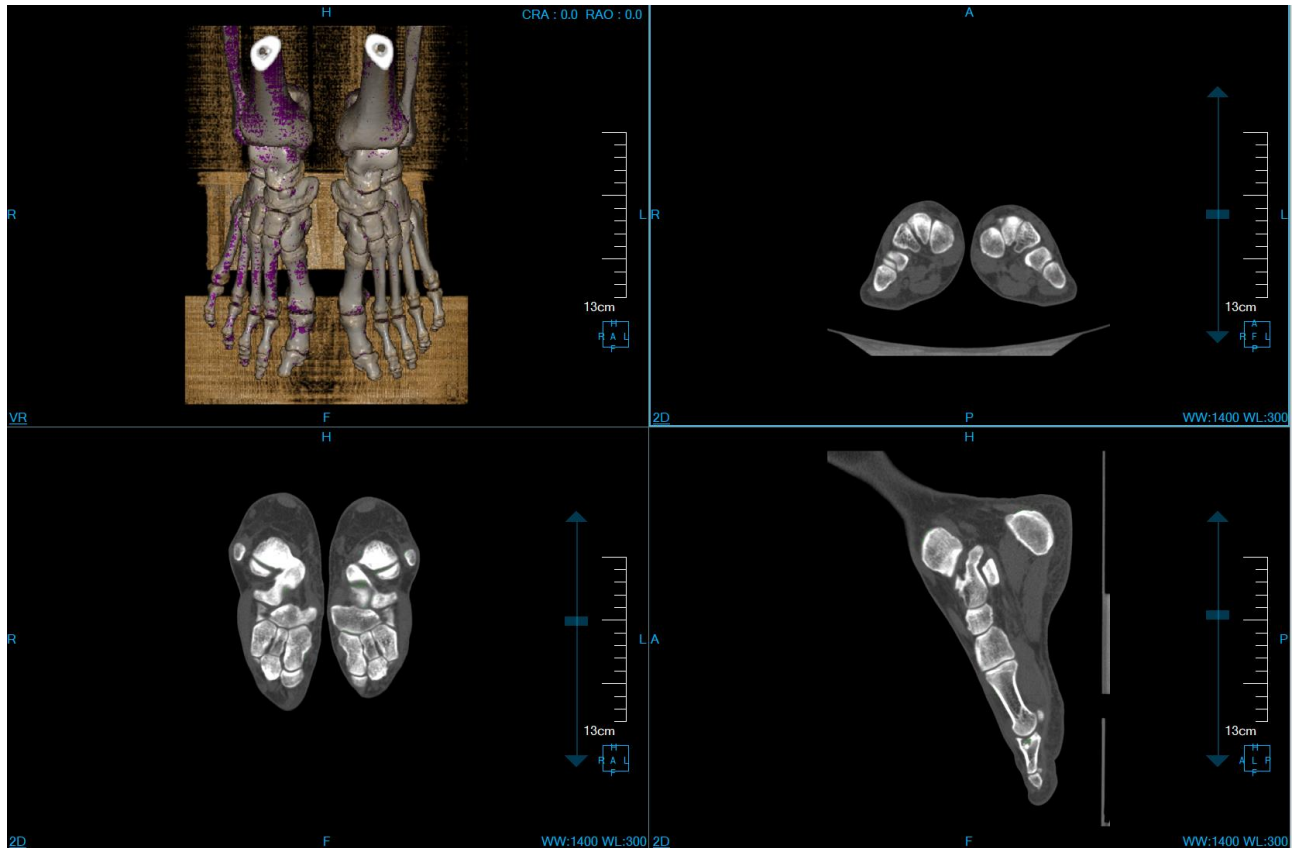


Figure 40-5 Equivalent kVp Equivalent kVp View 3

#### 4. Monoenergetic View 1

The current view displays a monoenergetic image. The upper left side is the VR window, the upper right side is the MPR axial plane window, the lower left side is the MPR coronal plane window, and the lower right side is the MPR sagittal plane window.



**Figure 40-6 Monoenergetic View 1**

#### 5. Monoenergetic View 2

The current view displays a monoenergetic image. The upper left side is the energy spectrum curve window, the upper right side is the MPR axial plane window, the lower left side is the MPR coronal plane window, and the lower right side is the MPR sagittal plane window.

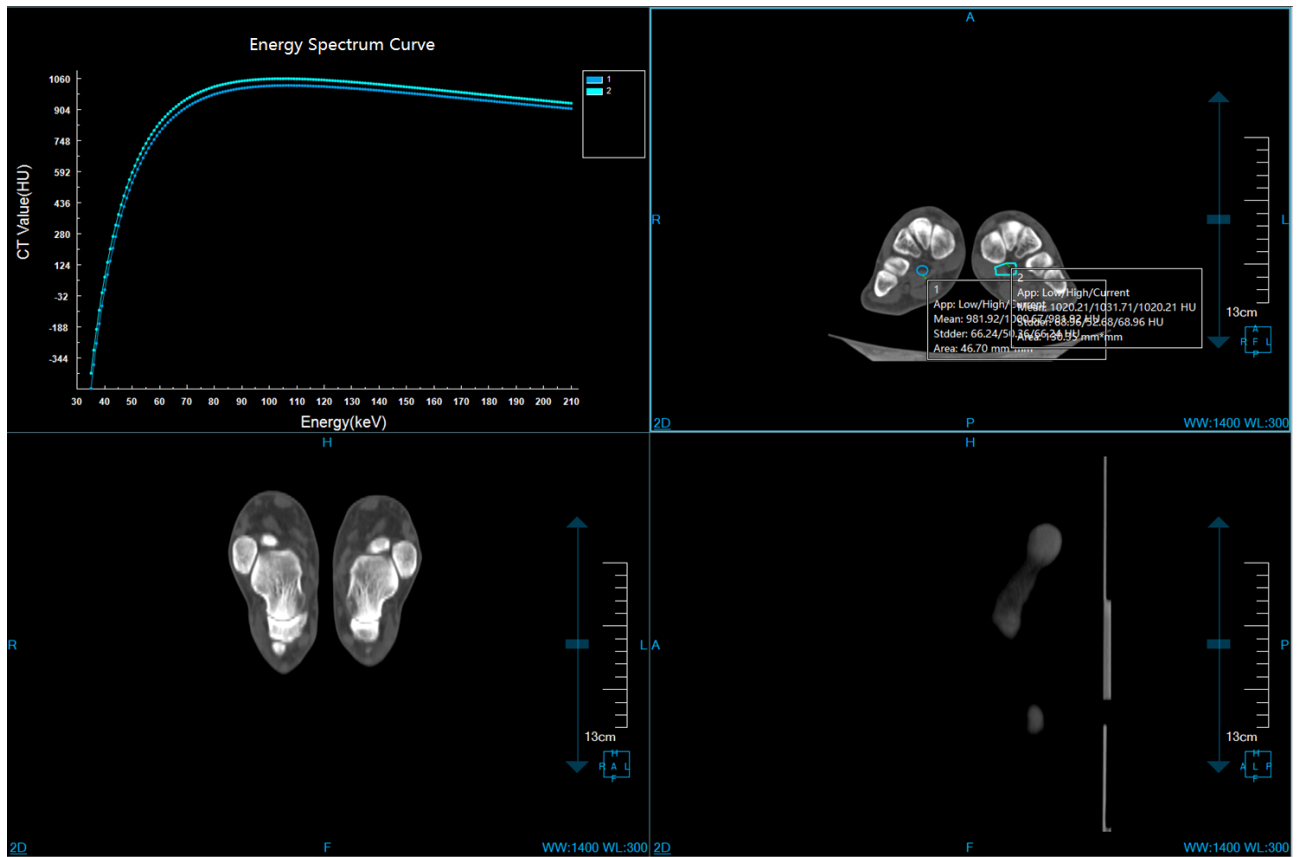








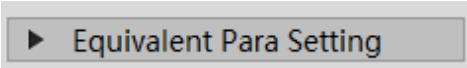










Figure 40-7 Monoenergetic View 2

## 40.4 Function Operation Panel


### 1. General Function Panel


-  : switch VR image orientation information, **cross section**, coronal plane, and sagittal plane..
-  : Cut the VR image.
-  : display/hide the overlap information.
-  : linkage/non- linkage
-  : display/hide the crosshair
-  : display/hide bounding boxes.

## 2. Image Quality Optimization Panel


- : initial parameter setting function. Set the equivalent Kev value of 80KVP, the equivalent Kev value of 90KVP, the equivalent Kev value of 100KVP, the equivalent Kev value of 110KVP, the equivalent Kev value of 120KVP, the equivalent Kev value of 130KVP, and the equivalent Kev value of 140KVP
- : switch to the equivalent kVp image optimization operation flow.
- : adjust the equivalent kVp image range, 80kV-140kV.
- : switch to the monoenergetic image operation flow.
- : adjust the monoenergetic image range, 40keV-210keV.
- : Layout Switch Button. The equivalent kVp workflow can switch between 2\*2 layout, low kV image contrast layout and high kV image contrast layout; Monoenergetic image workflow can switch 2\*2 layout and energy spectrum curve layout.
- : save equivalent kVp images / monoenergetic images to the data center.
- : Datum ROI Definition Tool, which can define datum ROI in the MPR cross-section.
- : Control ROI definition tool, which can define control ROI in the MPR cross-section.
- : Clear control and datum ROI.
- : ROI Definition Tool. After clicking, define the elliptic ROI or any shape ROI in the MPR axial plane.


## 3. Gout Analysis Panel


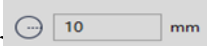
- : gout analysis parameter setting. From top to bottom, left to right parameters are soft tissue CT value of low kV image, soft tissue CT value of high kV image, slope, threshold lower limit and threshold upper limit.


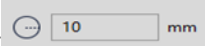
: Reset Gout Analysis Parameters. Reset the gout analysis parameters to the default value, and clear gout mark.


: Calculating Gout Results. Calculate gout results in the image according to the gout analysis parameters.


: Opacity Setting. Set the opacity of the selected tissue in the tissue list.


: Permeability Setting Function. Set the permeability value of the selected tissue in the tissue list.


: 3D Dyeing. the function of using a 3D sphere for tissue extraction on MPR image. The radius of the 3D sphere can be set using the [radius] parameter .


: 3D Erasure. the function of using a 3D sphere for erasing the extracted tissue. The radius of the 3D sphere can be set using the [Radius] parameter .


: Projection addition is suitable for the tissue extraction. Hold down the left button to demarcate a closed area, and the closed area is projected layer by layer to the upper and lower ends to form a volume area, which is the extracted tissue.


: Projection deletion is suitable for the tissue extraction. Contrary to projection addition, the function is used to delete a closed area from the extracted tissue formed by projecting the tissue layer by layer from the upper and lower ends.

: Inflation is suitable for the tissue extraction. A morphological algorithm is applied to the extracted tissue to combine the other tissues on the tissue boundary into the function to be extracted.

: Corrosion is suitable for the tissue extraction. The difference between inflation and corrosion is the function of removing a part of the boundary of the extracted tissue.

 Print Modeling: Send the selected tissue to the print modeling plug-in The premise is that the [Print Modeling] option is available.

: Undo. Return the tissue state back to the last extraction result state.

: Reset. Empty the extracted tissue area.



# Chapter 41 CT Myocardial Perfusion Analysis (Option)

Myocardial perfusion (CTP) analysis provides the functions such as data denoise, image registration, series recombination, myocardial segmentation, parameter calculation and so on, which can assess myocardial perfusion defects by analyzing the static or dynamic perfusion data quickly and easily so as to reflect the corresponding hemodynamic significance of coronary artery stenosis lesions more accurately.

## 41.1 Start

As a functional plug-in of the system, CTP plug-in is deployed in the advanced application module. After selecting a CT myocardial perfusion data from the patient management list, select "CTP" in the plug-in list to enter the plug-in.

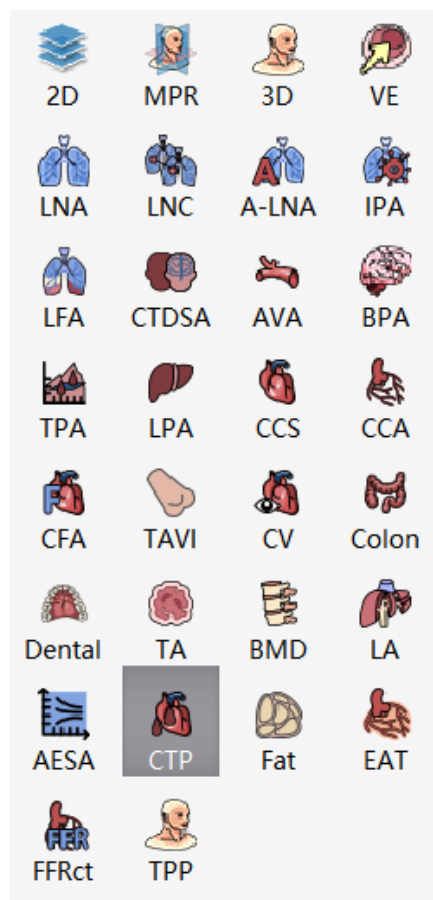


Figure 41-1 Start CTP Plug-in

After startup, if you want to switch to other advanced plug-ins, click the [CTP] button in the function switching panel of advanced application module to switch to the CTP plug-in again.

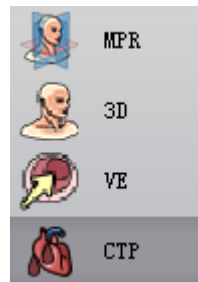


Figure 41-2 Switch CTP Plug-in

## 41.2 Data Loading

The data processed by this plug-in must be myocardial perfusion data, which can be either dynamic or static. If it's a dynamic myocardial perfusion data, it has to be multiple phase data combined in a series to be loaded in accordance with phase sequence and cardiac scan requirements. For other non-perfusion data, perfusion analysis cannot be guaranteed.

Note: the results of this plug-in cannot be used as the sole basis for diagnosis. Data need to be carefully examined before myocardial perfusion analysis.

## 41.3 View

### 1.Data Correction View

The data correction view is the default view, as shown in the figure. On the left is the maximum density projection window, which is used to display the maximum density projection of the current position of each phase image. The upper, middle and lower windows on the right respectively display the three MPR images of the current phase image, namely the axial plane, coronal plane and sagittal plane. This view can be automatically switched to when performing data correction operations.

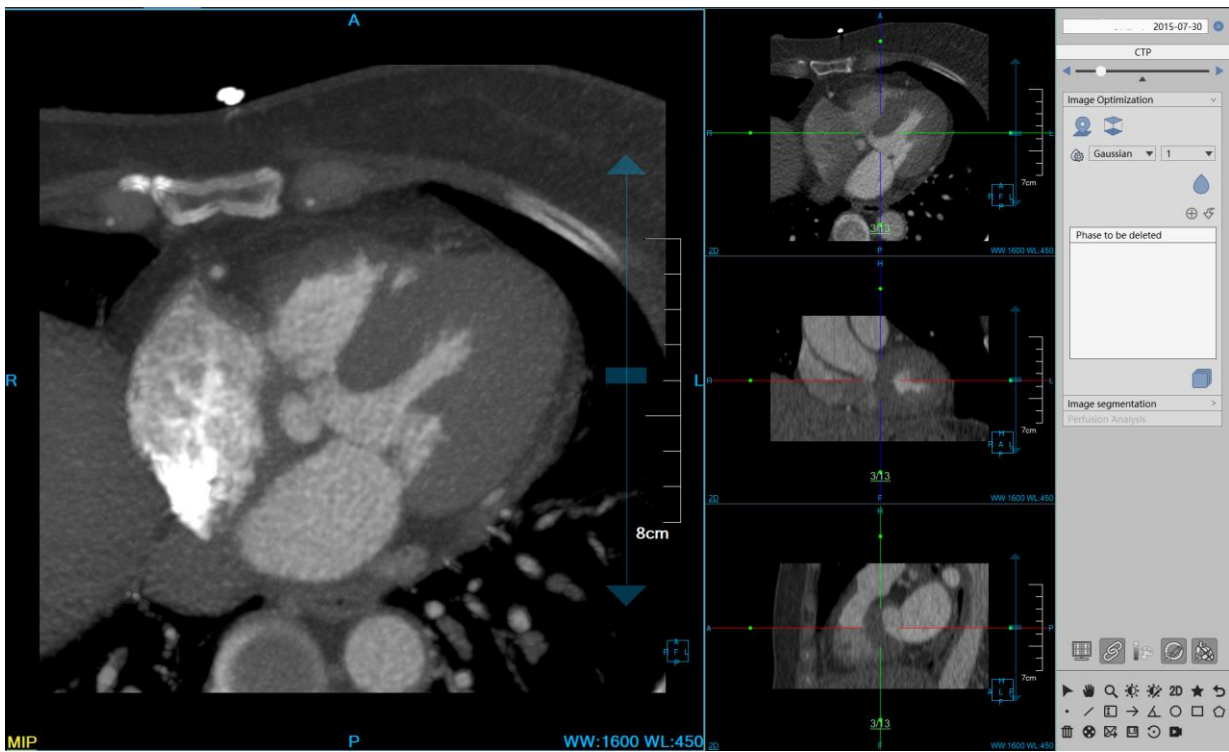


Figure 41-3 Data Correction View

## 2.Data Segmentation View

When entering the data segmentation function analysis, it will enter the view as shown in the following figure by default. The upper left window is used to display bull's eye image. The lower left window is used to display pseudo color image of myocardium, and the upper, middle and lower three windows on the right are used to display short axis image, horizontal long axis image and vertical long axis image of myocardium respectively.

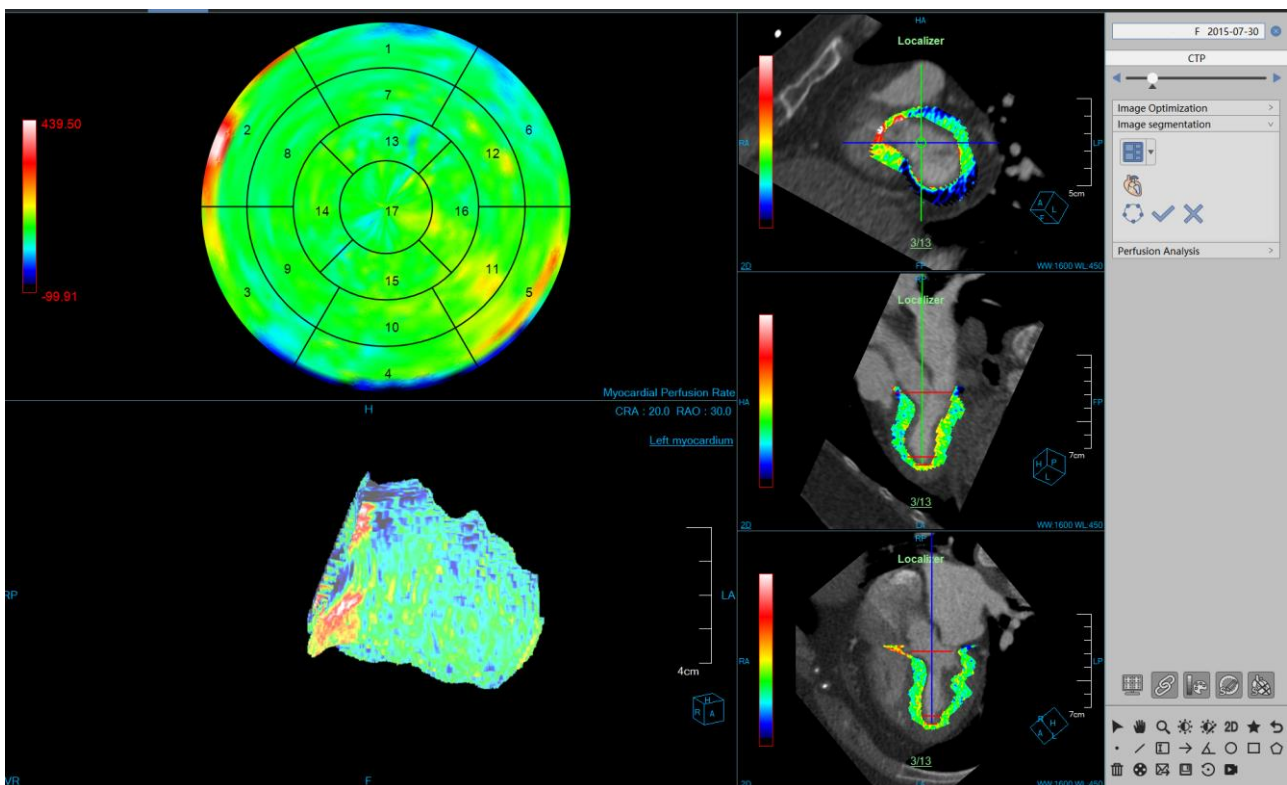


Figure 41-4 Data Segmentation View

The figure below is the contour edit view. Under the function of data segmentation, when the myocardial contour is viewed or edited, the following view will be switched to. Each window in the view displays the short axis view of the myocardium and its corresponding contour line

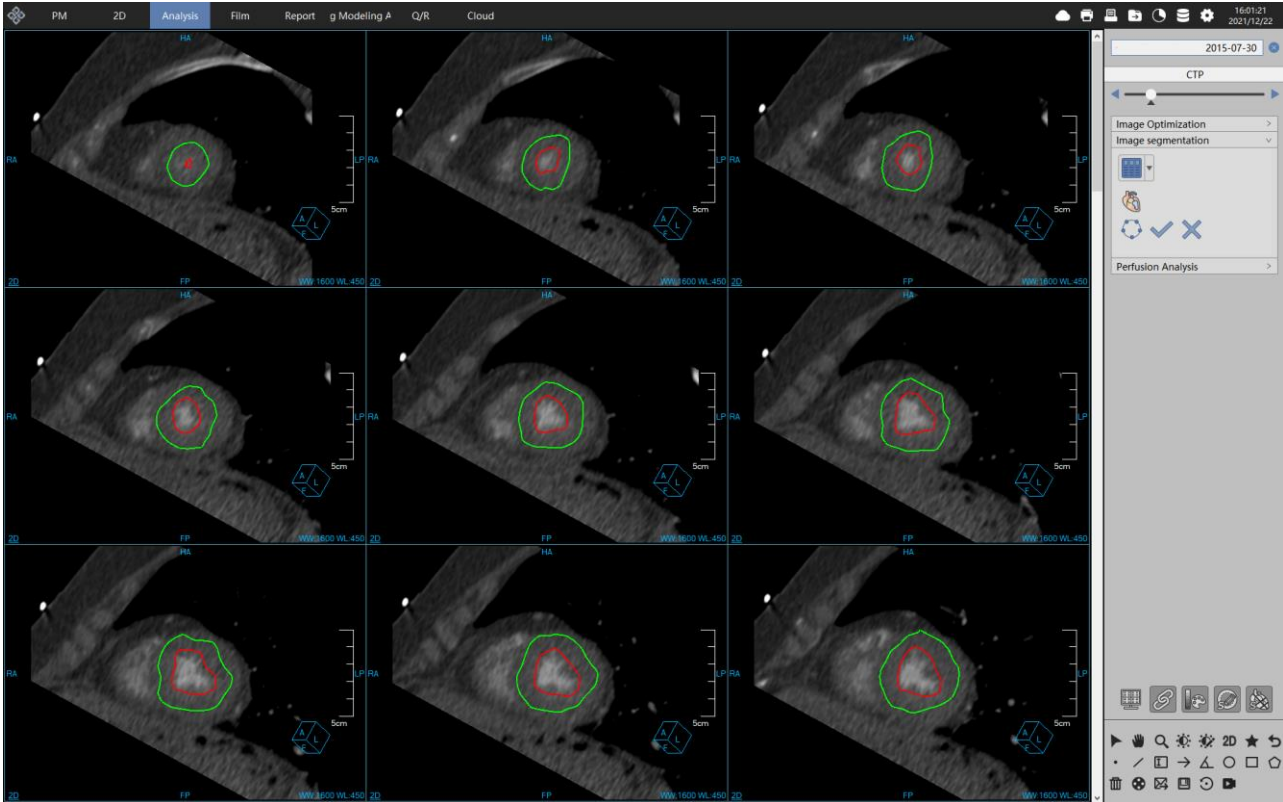


Figure 41-5 Data Myocardial View

### 3. Perfusion Analysis View

When entering perfusion analysis, the following view will be entered by default. The upper left window shows the axial plane of the data. The lower left window shows the TDC curve. The upper right window shows the 4 perfusion parameter diagram corresponding to the short axis of myocardium, and the lower right window shows the ROI analysis statistical table. The four perfusion images from top to bottom and from left to right successively are: myocardial blood volume (CBV), myocardial blood Flow (CBF), mean transit time (MTT) and peak time (TTP). The ROI analysis statistical table is used to display the mean value of all perfusion parameters of tissue ROI, including myocardial blood volume (ml/100g), myocardial blood flow (ml/100g/min), mean transit time (s), and peak to time (s).

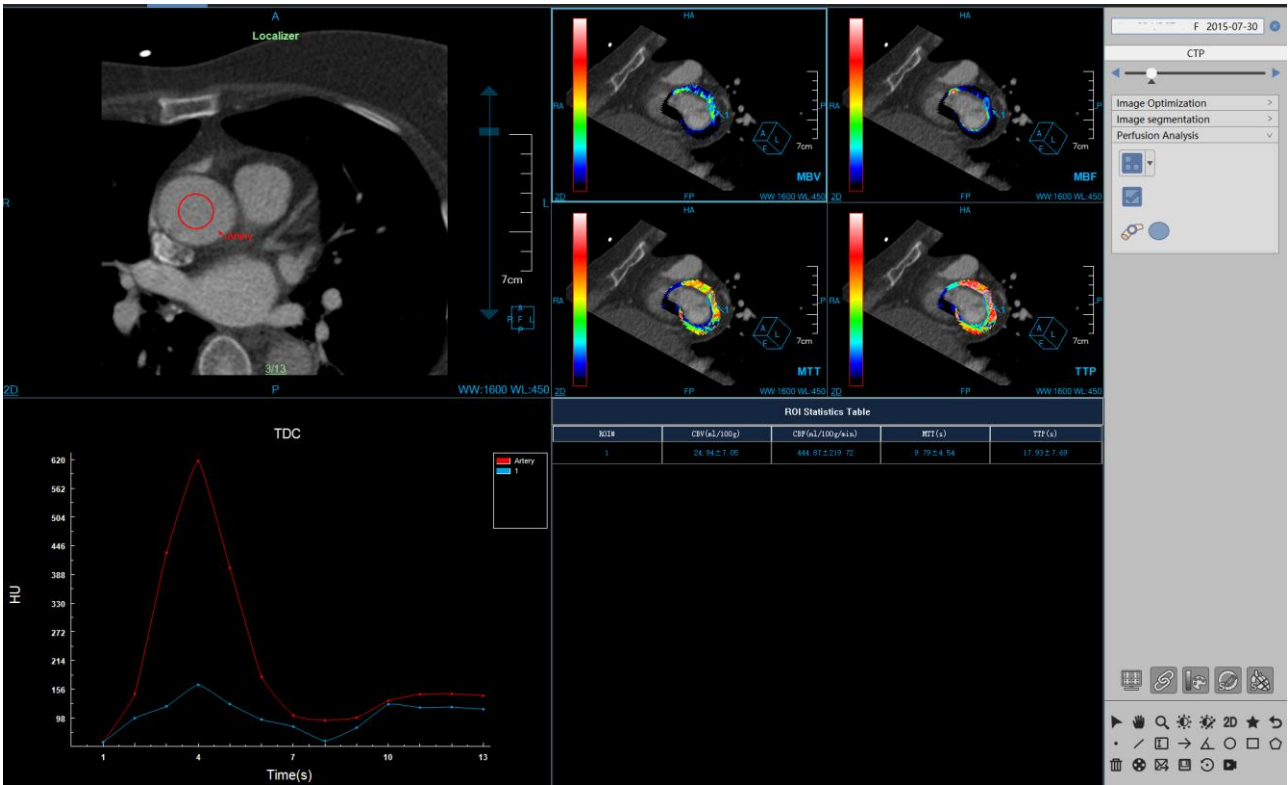


Figure 41-6 Myocardial Perfusion Analysis View

The figure below shows 4 perfusion parameter diagrams of perfusion analysis, with 4 columns of windows, respectively corresponding to each column window, from top to bottom, which are the short axis view, long axis view and bull's eye view.

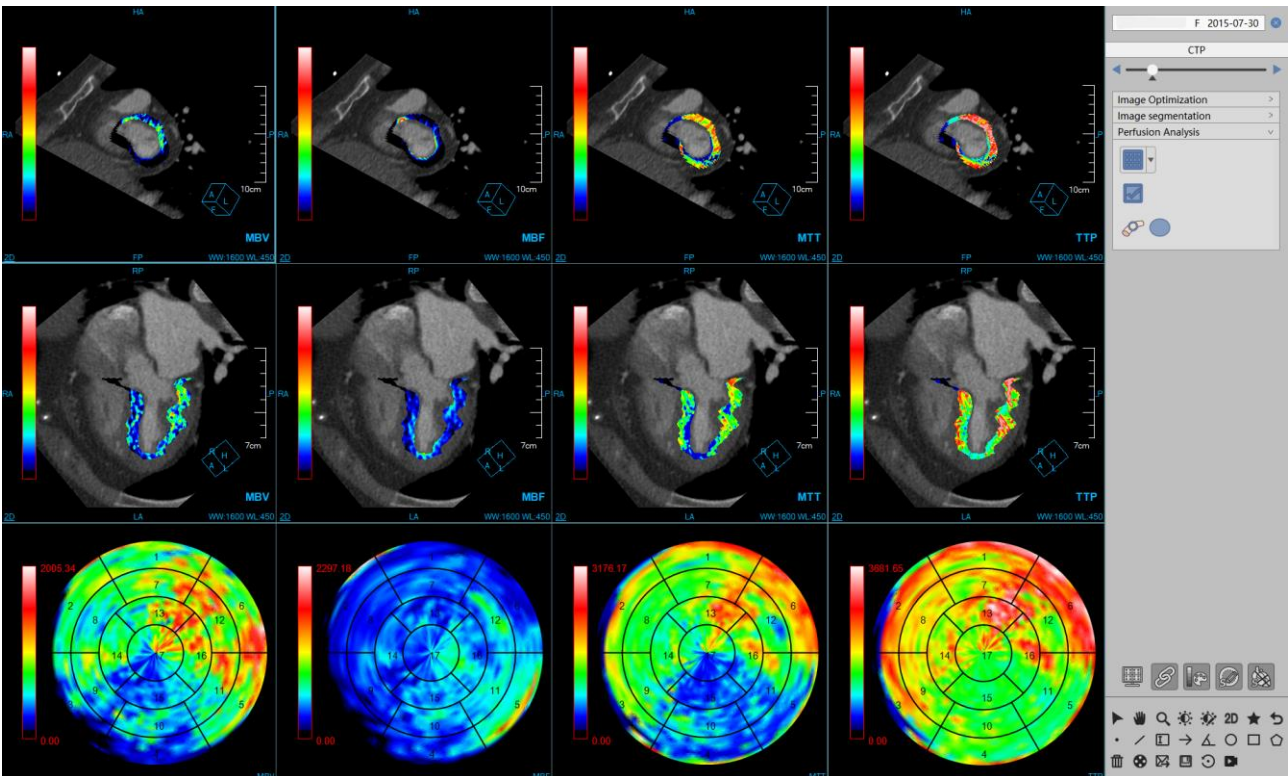


Figure 41-7 Myocardial Perfusion Parameter Diagram

## 41.4 Function Operation Panel

### 1. Overall Function Panel Introduction

The operation panel of the CTP plug-in is divided into four areas: data switching, phase image browsing, function analysis and common functions.

**Data Switching:** switch image series and delete check function by thumbnail;

**Phase Image Browsing:** provide the browsing of various phase images of myocardial perfusion and confirm the positioning phase images.

**Function Analysis:** provide data correction analysis, data segmentation and perfusion analysis functions

**Common Functions:** provide common function operations such as default operation, translation, zooming, adjusting window width/ window position, restoring default function buttons and so on;

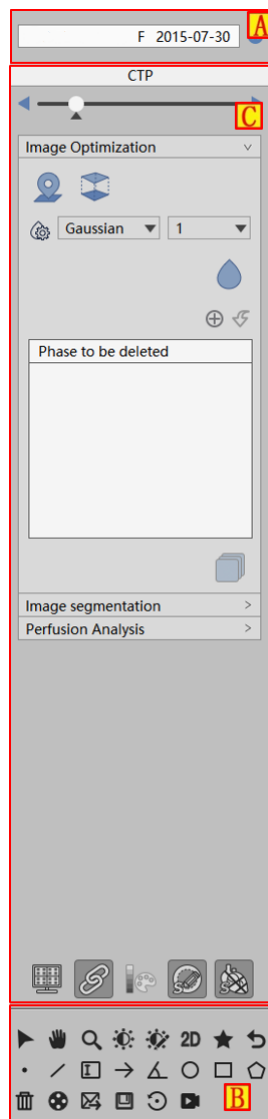


Figure 41-8 CTP Analysis Function Panel

**Image Browsing:** switch myocardial perfusion phase images

:determines the current phase image as the positioning phase image

:automatically play phase images in positive order or backwards

## 2.Data Correction Function



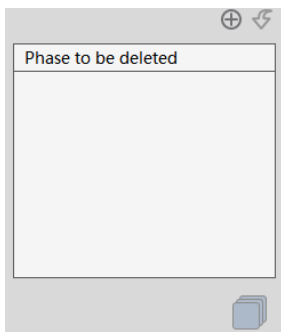
: set the current sequence is a fixed sequence;



: set the image smoothing method and smoothing times;



Image Registration, the data of other phase images are registering and aligned according to the positioning phase image;



Series editing operations are performed, please see the series editing in Section 27.2

of Chapter 27.

## 3.Data Segmentation Function



2\*3 Layout: display 1 bull's eye image, 1 VR image and 3 ventricular axial images;



3\* N Layout: display multiple short axis images for contour editing;



Positioning Line Analysis, the ventricles are re-segmented and recalculated according to the user's modified positions of the new cardiac base, cardiac apex and myocardial apex. Update images at the same time. It is available in layout 2\*3 layout.



Outline Edit Button, after clicking, the layout is switched to 3\* N and the outline is displayed at the same time. The image outline becomes editable state.



OK Button, according to the contour information modified by the user, the ventricle is re-segmented and recalculated, and at the same time the image is updated. It is only available in layout 3\* N layout.



Cancel Button, after clicking, cancel the edit result.

#### 4.Perfusion Analysis Function



2\*2 Layout: display 1 axial plane view, 1 TDC curve view, 4 perfusion parameter diagrams and ROI analysis statistical table.



3\*4 Layout: display 4 perfusion parameter graphs and their corresponding short axis view, long axis view and bull's eye view;



Perfusion Analysis Button, after clicking, perform perfusion analysis;



Extracting Aorta Button, after clicking, the ROI region of the aorta can be delineated on the axial plane.



ROI Region Extraction, after clicking, the perfusion ROI regions can be delineated on the four perfusion maps



# Chapter 42 Remote Query

## 42.1 Remote Query

### 1. Description

In the image workstation, image data can be queried and obtained from other devices that meet the standard through DICOM standard.

Query patient information according to a certain query conditions and obtain image browsing. Images can also be sent to designated third-party devices.

The operation interface is as shown in Figure 42-1:

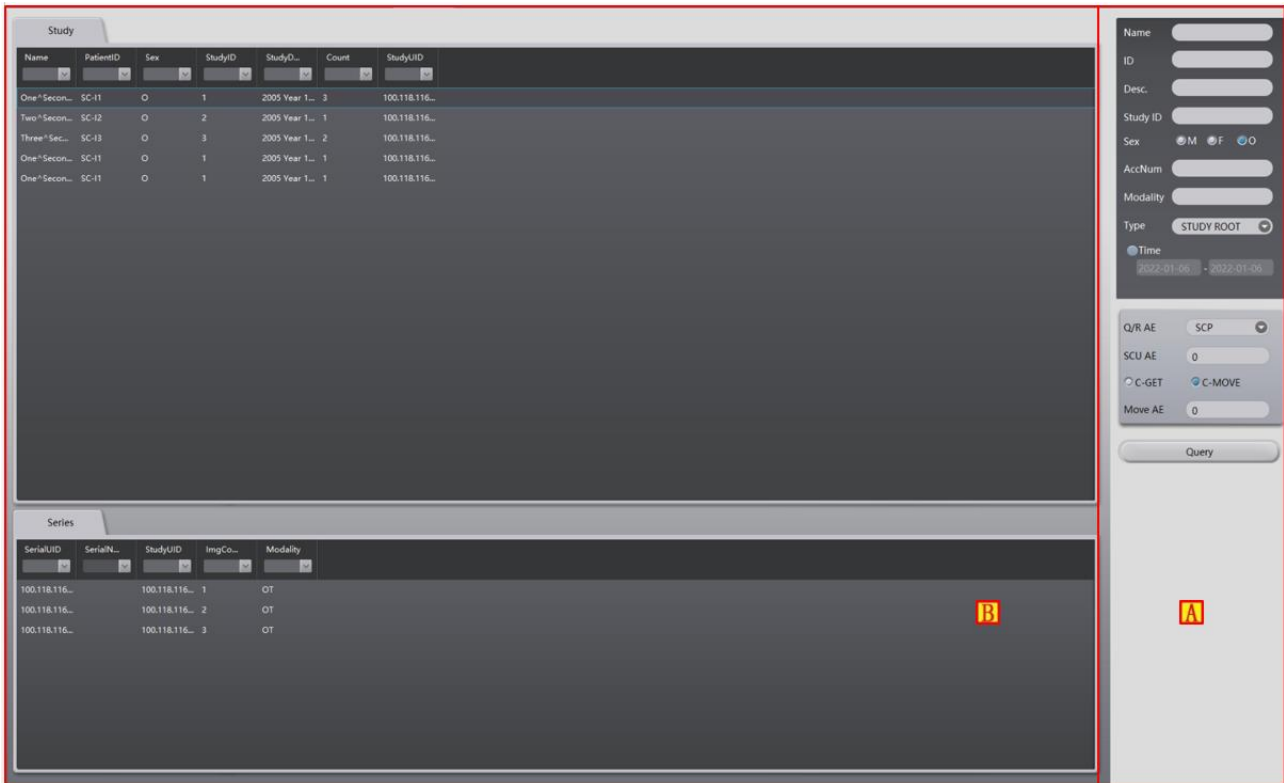


Figure 42-1 Remote Query Interface

Area	Function	Description
A	Information Retrieval Area	A variety of query condition options are provided, and you can get the data you need from other devices through condition combinations. See 17.22 Information Query.
B	Retrieval Result Area	This list shows the patient information retrieved by the system, showing the following information: identification, number of sub-items, time, description, number, and other information.

## 2.Operation

After the program is started, click the remote query button to enter the remote query interface, as shown in Figure 41-2.

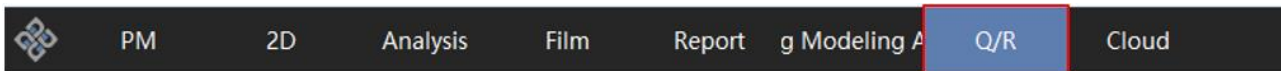


Figure 42-2 Function Area

## 42.2 Information Query

### 1.Description.

This function provides common query conditions to retrieve data from other devices' databases and display the retrieved data in the search list.

### 2.Operation

#### 1) Query Condition

The query condition area is in the upper left of the interface, and can be queried based on the condition combination of patient name, patient ID, study description, examination number, gender, ACCNUM, MODALITY, query level, and study time. (See Figure 41-3). Query type is divided into patient type query and study type query. After selecting the corresponding query type, the left view will switch to the view of patient category and study category.

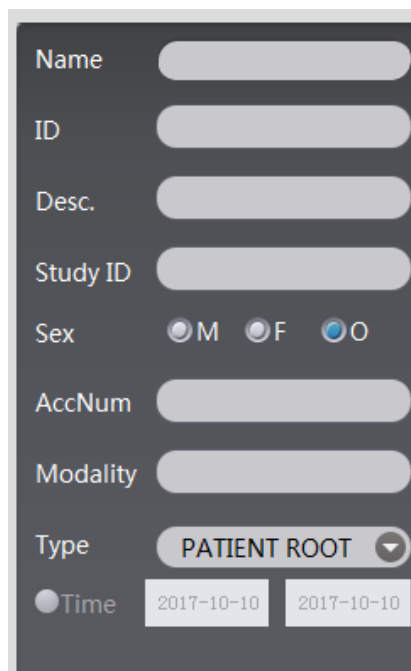
A dark-themed form with the following fields: 'Name' (text input), 'ID' (text input), 'Desc.' (text input), 'Study ID' (text input), 'Sex' (radio buttons for M, F, O), 'AccNum' (text input), 'Modality' (text input), 'Type' (dropdown menu showing 'PATIENT ROOT'), and 'Time' (two date input fields, both showing '2017-10-10').

Figure 42-3 Query Interface

## 42.3 Remote Mainframe Information Setting

### 1.Description

Set AE of the mainframe to be queried or the device AE. Use the operations of C-GET, C-MOVE when obtaining the image.

### 2.Operation

#### 1) Basic Operation

Select the mainframe and device to be queried. (for details, see the setting of remote mainframe SCP part in Setting) (see Figure 41-4)

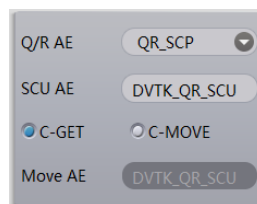


Figure 42-4 Remote Mainframe and Device

## 42.4 Query

### 1.Description

According to the query conditions and remote mainframe settings, query patient information from other devices.

## 42.5 Retrieval Result Area

### 1.Description

List the patient information that meets the retrieval condition in the remote device, as shown in Figure 41-5.

姓名	患者编号	性别	检查数量
One*Seco...	SC-11	其它	3
Two*Seco...	SC-12	其它	1
Three*Sec...	SC-13	其它	1

姓名	患者编号	性别	检查号	检查时间	序列数量	检查UID
	SC-11		1	2009年11月...	3	100.118.116...
	SC-11		1	2009年11月...	1	100.118.116...
	SC-11		1	2009年11月...	1	100.118.116...

序列UID	序列号	检查UID	检查数量	检查类型
100.118.116...		100.118.116...	1	OT

Figure 42-5 Retrieval Result Area

## 42.6 C-GET

### 1.Description

From the Remote mainframe setting panel, select the C-GET operation. Select the record you want to browse from the retrieval list, and right-click the GET operation that pops up. The selected image is downloaded from the remote device to the local computer and displayed in the 2D browser.

### 2.Operation

Right-click on the GET item in the pop-up menu.

## 42.7 C-MOVE

### 1.Description

From the remote mainframe setting panel, select the C-Move operation. Select the record you want to browse from the retrieval list, and right-click to select the MOVE operation that pops up. The selected image will be sent to the designated C-Move AE device from the remote device to browse and view the display.

### 2.Operation

Right-click on the GET item in the pop-up menu.

## Chapter 43 Cloud Diagnosis (Option)

### 43.1 Cloud Diagnosis Function

#### 1. Description

The cloud diagnosis function enters the Sino cloud home page by embedding the browser plug-in to start Sino cloud in the workstation. Users can log in to Sino cloud to realize cloud diagnosis related functions.

## Manufacturer Information

Manufacturer:

SinoVision Healthcare (Yangzhou) Co., Ltd.

Registered Address:

Building 16, No.49, Mid-Renmin Road, Dinghuo Town, Jiangdu District, Yangzhou, Jiangsu,  
P.R.China

Model: Insight Vision Workstation Plus

Validity: 10 Years

Postal Code: 225266

Tel: 0086-400-0522-685

EC-REP: MedPath GmbH

Add: Mies-van-der-Rohe-Strasse 8, 80807 Munich, Germany

Tel: +49(0)89 189174474

Fax: +49(0)89 5485 8884

Email: [info@medpath.pro](mailto:info@medpath.pro)

