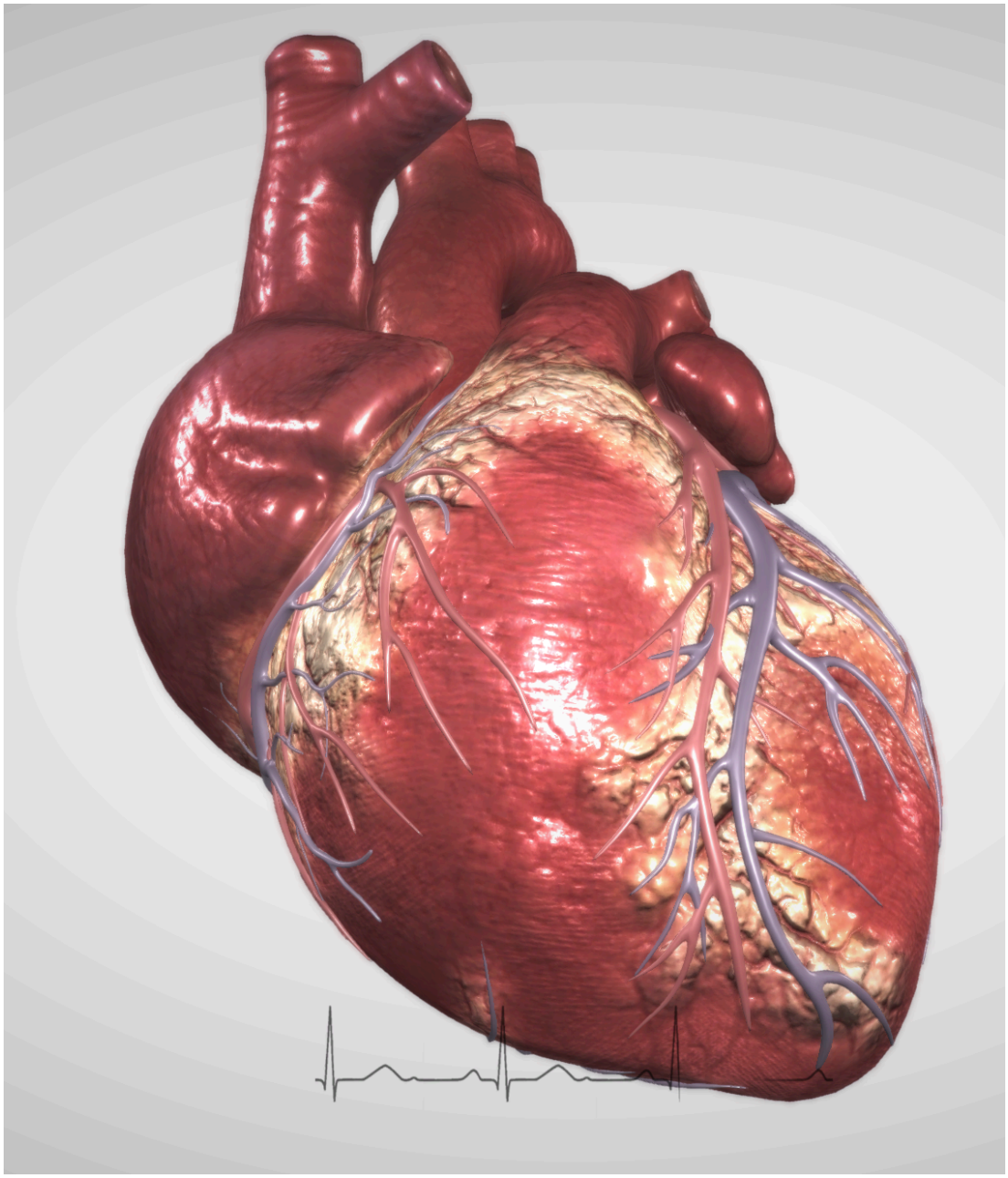
CARDIOLECTRA

CardioShowroom

Operating Manual



CONTENTS

Presentation

The CardioShowroom (CSR) by CARDIOLECTRA is an interactive program for conveying knowledge in the field of cardiovascular medicine.

At the core of the program, there is a beating heart animated in 3D, which can be seen at the center of the program's main screen.

The interactive, intuitive 3D representation of a heart, which can be rotated, sliced, made transparent or zoomed in on, and interactive animations illustrate the anatomy and functions of a healthy heart.

With one click, the heart opens and makes the blood vessels, valve structure and cardiac conduction system visible.

The program uses comprehensible texts and allows the user to experience the anatomy and functions of a healthy heart in 3D.

The heart can be rotated freely in all directions using a mouse or touchpad.

Available Languages

The CSR is multilingual and available in German/English/Spanish/Dutch.

Orders

At https://license.cardiolectra.com/#/order you can download the program version of the CSR that suits your needs after entering your order data.

After your order, you will receive an E-mail providing you with your license key, the license duration and the link to download your program as either a macOS or PC version.

You will also receive an invoice by mail within seven days of placing your order.

Program Installation

Follow the link provided to you in your order confirmation E-mail and download the program. A network connection is required to first download and then to start the program. After starting, the program is able to run without requiring a network connection. Close and exit the program by clicking the "Escape" button.

Technical Specifications

Hardware Requirements

- PC or PC notebook: Windows 10 (at least or newer)/minimum of 4GB RAM
- Graphics card: HD Graphics 620 or comparable
- Monitor: Full HD or higher resolution
- Apple: minimum Notebook MacBook Pro, MacBook, MacBook Air (from 2018 to date), each with Retina Display.
MacBook Air up to 2017 and all iPad Air models are not sufficient for 3D displays.
- Microsoft Surface Pro notebook
- Hewlett Packard Spectre notebook
- Multitouch displays 32" - 55"
- VR and AR glasses

Operating Systems

- Windows
- macOS/iPadOS

Software Base

The CSR is NOT a medical device. The CSR is NOT off-the-shelf (OTS) software. The CSR is custom-developed software based on the Unity 3D platform. The CSR is virus-tested. Storing and using the CSR on your computer does not require any special virus protection. The CSR communicates via individually developed licensing software.

Data Retrieval

The following data is requested via the Internet during download or each time the Windows or macOS ver- sion is started: license key, operating system type and CSR version. The CSR does not request personal user data or company data.

Data Security, Patient Data, Company Data

The data transmission is AES encrypted. The CSR does not locally store any personal information other than the license key (mentioned above). The CSR does not process patient or company data at any time.

User Data

Each user has an individual user account based on their E-mail address. In addition to the information required to place an order, the following user data is stored: license key, number of program calls, program version, language, platform.

Start Screen

The start screen shows

on the top right, there is a (**1**) Hamburger Menu Icon and a (**2**) Magnifying Glass (revealing a search window when clicked).
At the bottom right, there is a (**3**) Gear Wheel for program settings.
At the bottom center of the screen, there is a (**4**) Speed Slider.
Just below the heart, there is a (**5**) Running ECG of the current heartbeat.
At the bottom left, the (**6**) Program Version is displayed.

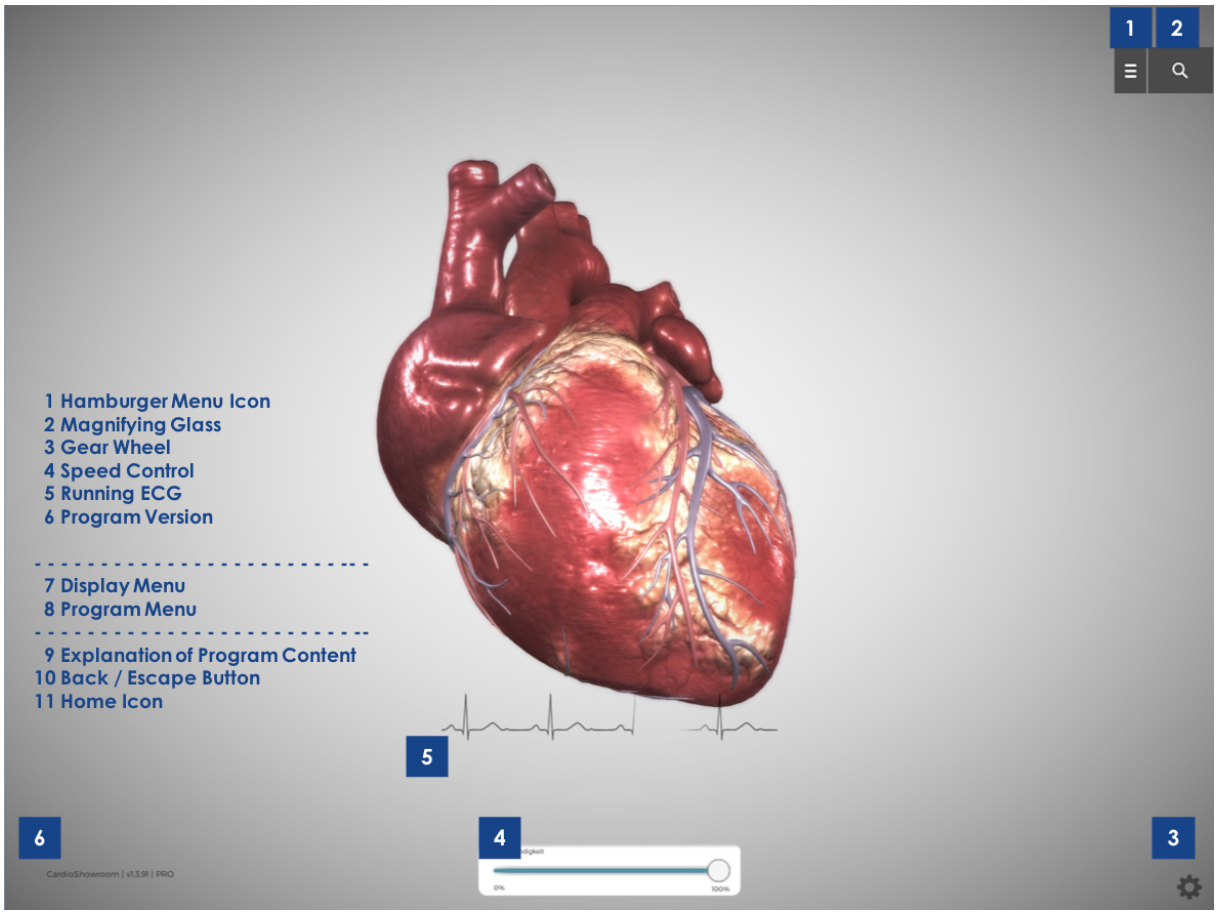


Figure 1: Start screen, (7) - (11) are not visible in this view

Surface and Components

When you click on the Hamburger Menu Icon, you will see the

the (**7**) Display Menu in the upper left corner. The CardioShowroom can be displayed in four different views.

At the top right and to the right of the (**1**) Hamburger Menu Icon Button and the (**2**) Magnifying Glass, the (**8**) Program Menu appears with its three sub-categories of

- Anatomy
- Function
- Disease & Therapy

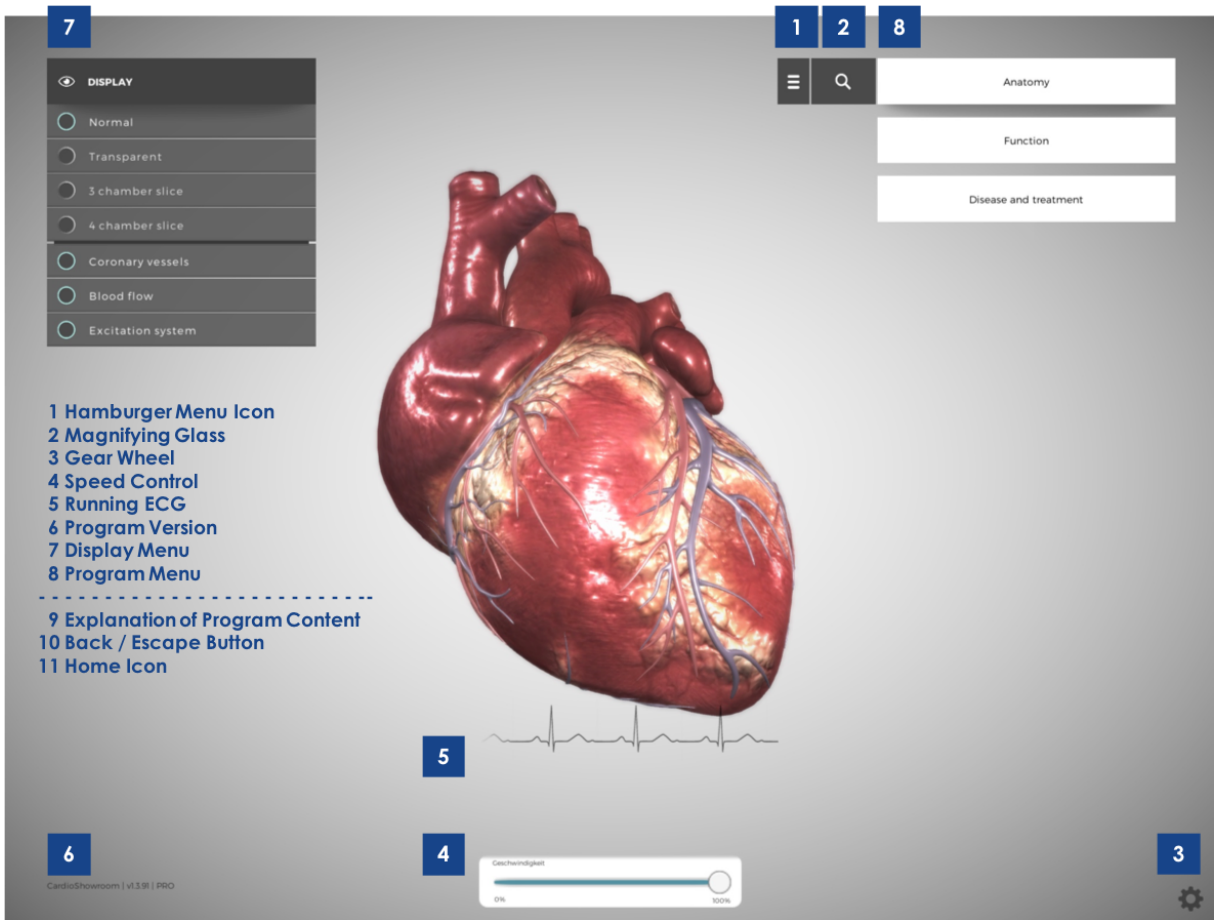


Figure 2: Start screen with expanded Display Menu (7) and (8) Program Menu; (9) - (11) are not visible in this view

Hamburger Menu Icon

Using the (**1**) Hamburger Menu Icon button to the left of the (**8**) Program Menu, both the (**7**) Display Menu and the (**8**) Program Menu can be made to disappear from view, allowing for more space to view the 3D heart.

Magnifier

The program offers a search function, marked by the (**2**) Magnifying Glass. If you click on the magnifying glass symbol, a text field opens in which you can enter a search term. A drop-down menu then offers a selection of terms. By clicking on the corresponding term, you can go either directly to this function or to this part of the program.

Gear Wheel for Program Settings

If you click on the (**3**) Gear Wheel, the currently selected program settings appear.
The language can be selected (German, English, Spanish and Dutch). The personal license key, the validity period and the product type are displayed. The postal address and Cardiolectra's contact E-mail address are displayed. Should the user have any questions about the program, he/she can contact this E-mail address.

Speed Control

The Speed Control (**4**) is located at the bottom center and under the 3D heart. Some details of the animations are only clearly visible and recognizable to the human eye if the speed of the visualization is temporarily and significantly reduced.

The speed slider is used to increase and reduce the speed of the visualization, especially of animations in regard to individual disease presentations. It is recommended that this aid be used intensively, especially during discussions with non-medical individuals (e.g. patients) or during presentations.

Explanations become even more understandable when accompanied by slowed down visualization. The speed can then again be increased at any time using the slider.

Display Menu

Views
The (**7**) Display Menu is located in the upper left corner and is divided into two parts.
In the upper part, there are four different views of the heart to choose from:

- Normal
- Transparent
- 3-chamber slice
- 4-chamber slice

Somewhat separated from these, there are 3 further buttons, used to either activate or deactivate the following views:

- Coronary vessels
- Blood flow
- Exitation system

Operation
In all views, the heart can be freely rotated with one finger on the touchpad or by using the middle mouse wheel, or zoomed in and out on with two fingers or scrolling up and down with the mouse

The "Normal" view is the basic setting of the program: The heart can be viewed as a complete organ as seen from the outside.

The "*Transparent*" view switches the heart to a transparent mode; the blood flow of the heart, the cardiac conduction system, the valves and the coronary arteries are clearly visible.

In the third view, "*3-chamber slice*", the heart is displayed as if it were cut open: The slice plane passes through the right atrium, the right ventricle and the left ventricle. The left atrium remains closed and not visible.

In the fourth view, "*4-chamber slice*", the heart is cut open even further. Now, all four chambers are visible, including the left atrium.

In the lower part of the Display Menu, there are three further menu items with which you can activate or deactivate the following displays

- Coronary vessels
- Blood flow
- Cardiac conduction system

Program Menu

Structure

Behind the three main categories, there are further sub-categories. Below the white text fields, there are gray text fields with (**9**) explanations of the program content.

As soon as a structure of the heart, a disease or a therapy has been selected, a dark text field with an understandable laymans text appears in the lower right corner explaining the topic in a few sentences.

If one clicks on one of the program categories and then clicks on further sub-categories, the (**11**) Home Icon appears between the Hamburger Menu Icon and the Program Content.

Below the Home Icon is the (**10**) Back Button, which can be used to return to the next higher level.

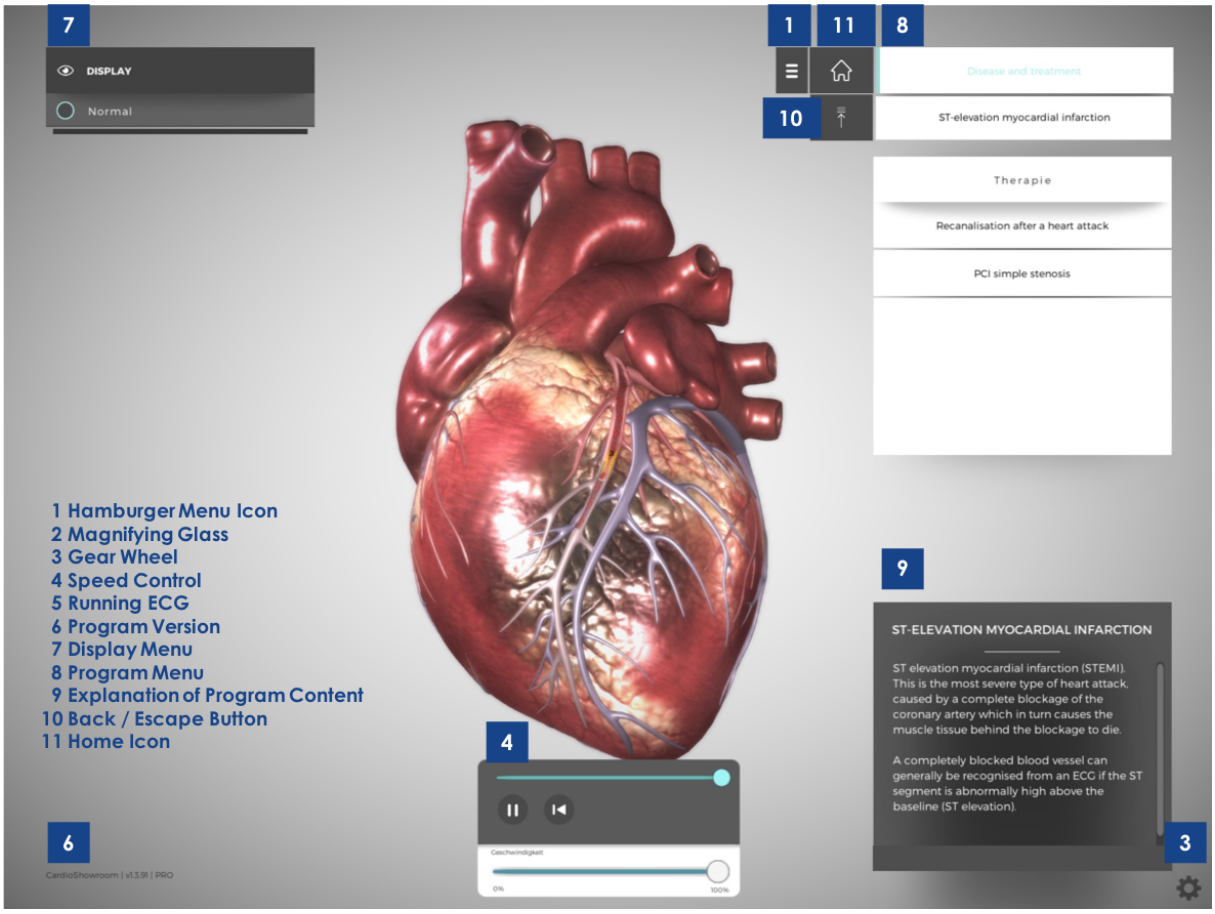


Figure 3: (8) Program menu with (9) explanations of program content

The actual Program Menu consists of three sub-categories:

- Anatomy
- Function
- Disease & Therapy

By far, the most content of the entire program can be found under "Disease & Therapy".

A more detailed description of the individual content points of the main menu is provided on page 12 of this manual.

Operation
The menu navigation of the Program Menu is designed to save space. If you click down one level, the level above slides to the left and is displayed as a vertical bar.

If you click down more than four levels, a sum symbol in the form of an arrow with crossbars above it appears on the left. Clicking on the arrow takes you back to the higher-level menu item.

Program Content

Anatomy

With the menu item "*Anatomy*", the healthy anatomy of the entire human heart can be viewed. Depending on which menu item has been selected, the 3D heart rotates the corresponding part of the heart for the viewer.

The selected region is made more clearly distinguishable by being presented in color and thus highlighted once selected, as the remaining regions of the 3D heart become slightly gray, thus fading into the background.

The anatomy is divided into the following four sections:

- Chambers
- Coronary vessels
- Cariac Conduction System
- Valves

The "*Chambers*" are subdivided into the right atrium, the left atrium, the right ventricle and the left ventricle. In regard to the ventricles, either the right ventricular or left ventricular outflow tract may be selected.

The menu item "*Coronary Vessels*" contains a list of all relevant coronary arteries and veins as well as their branches. When clicking on the respective menu item, for example, 'Middle Coronary Vein' (Figure 4), the 3D heart automatically rotates to this vessel section and the vessel section is highlighted in color.

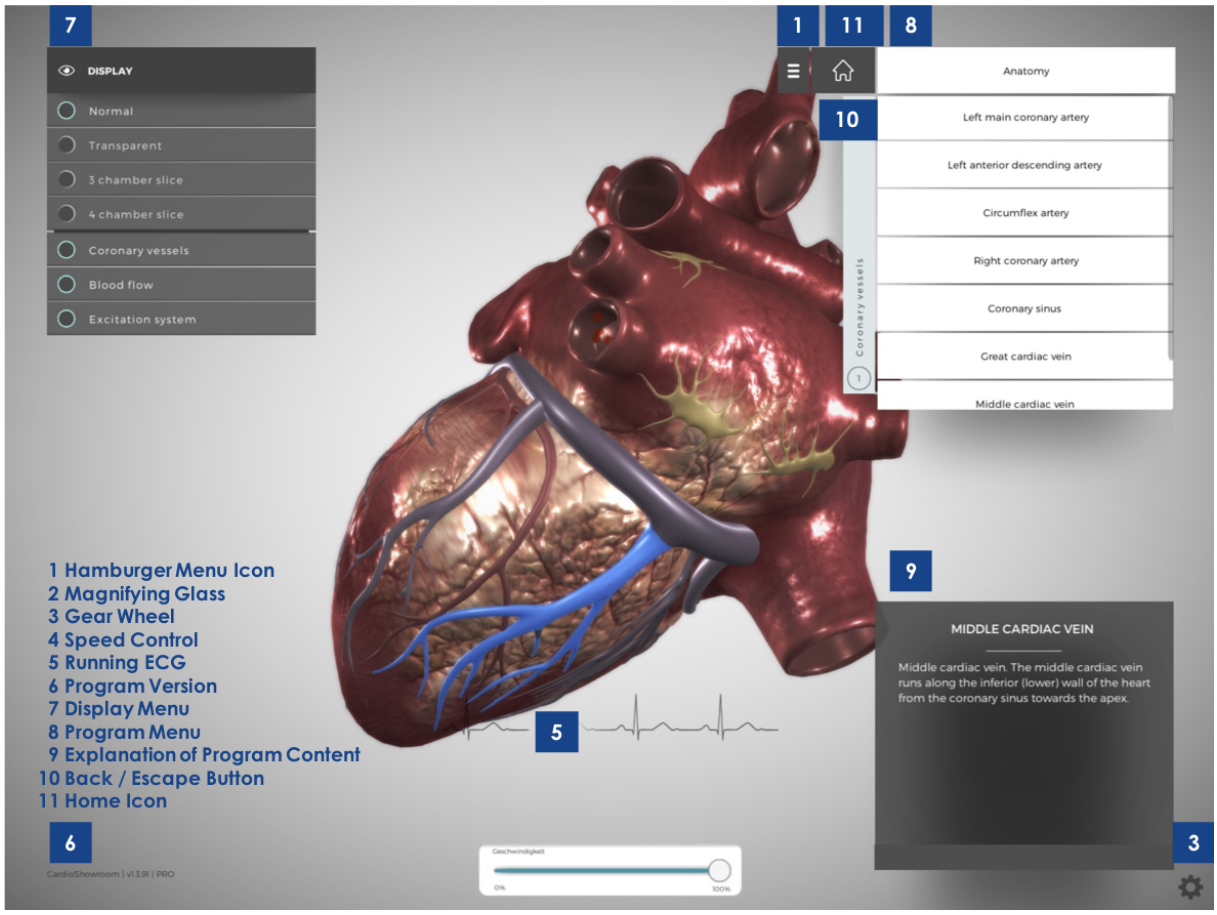


Figure 4: Middle Coronary Vein

Under the menu "*Conduction System*" you will find a list of the conduction system structures:

- Sinus node
- Internodal conduction tracts
- Atrioventricular node
- Bundle of His
- Tawara branches

If you click on the respective term, the corresponding structure is highlighted in the transparent heart model.

The menu item "Valves" contains a list of the four valves of the heart:

- Aortic valve
- Mitral valve
- Pulmonary valve and
- Tricuspid valve

If you click on the respective term, the corresponding valve is rotated towards the viewer in either the sliced or transparent view of the 3D heart and highlighted.

Function

Under "Function" you will find the following four menu items:

- Blood Circulation
- Excitation Process
- Pump Function
- Function of the Valves

Clicking on the respective term opens a display view of the 3D heart from the Display Menu, which is particularly well-suited for displaying the blood flow, the excitation process, the pump function or the valve function of the heart.

Disease & Therapy

The menu item "Disease & Therapy" is divided into five parts. The first four cover the four areas of modern cardiovascular medicine:

- Coronary heart disease
- Cardiac arrhythmia
- Structural heart disease
- Heart failure

The fifth part lists the treatment risks.

User guidance: How to present the animation of a disease

If you tap or click on the respective disease, it is automatically displayed on the 3D heart and a short animation is initiated. The speed of the animation can be adjusted with the (**4**) Speed Slider.

As soon as the animation has finished, it starts again from the beginning. The animation can be paused and restarted at any time by using the start and start button found above the tempo slider or rewound to the beginning of the animation with a corresponding video player icon. It is also possible to rotate and zoom in and out of the heart model with the mouse or touchpad while the animation is running.

The therapy menu is displayed in the lower part of the program menu, depending on the respective disease. Clicking on the corresponding therapy initiates a therapy animation. This animation can also be controlled as described above.

Coronary heart disease

Here you will find the menu items:

- Simple Stenosis
- Unstable Angina
- Heart Attck
- Prophylaxis

Under "*Simple Stenosis*", a medial stenosis in the anterior wall artery can be seen. The blood cells flowing towards the stenosis are clearly slowed down in the stenosis and behind it to symbolize a reduced blood flow.

> The therapy animation "*PCI Simple Stenosis*" shows the probing of the stenosis with a coronary wire, the dilatation with a balloon and the placement of a stent.
>
> Under "*Prophylaxis*", there is no separate animation but an explanatory text on this topic.

The animation of "*Unstable Angina* " symbolizes angina pectoris symptoms in the center of the image by radiating red circles.

> The Therapy Menu shows the therapy animation of a simple coronary stenosis with the same animation as under the menu item "*Simple Stenosis*".

Under "*Heart Attack*", a forming thrombus in the medial anterior wall artery is shown as an example. At the end of the animation, the coronary vessel is blocked and a large part of the anterior wall dies.

> The corresponding therapy menu includes recanalization of this stenosis as well as balloon dilatation and stenting of the stenosis.

Cardiac Arrhythmias

Cardiac arrhythmias are divided into *slow (bradycardic)* and *fast (tachycardic) cardiac arrhythmias*.

There are animations of the following *Bradycardias*:

- Sick sinus syndrome
- Bradycardia- tachycardia- syndrome
- Atrioventricular node disease
- Bundle branch blocks
- General prophylaxis of bradycardias.

The *Tachycardias* shown includesupraventricular tachycardias with the following:

- Typical atrial flutter
- Atrial fibrillation

Under " *Typical atrial flutter*", the course of the stimulation current in the right atrium around the tricuspid valve is shown. There is a clockwise animation and a counterclockwise animation for typical atrial flutter. A 4:1 conduction to the ventricle is shown: For every 4th round of excitation in the right atrium, there is one conduction to the ventricle. Below the heart, an example ECG of a typical atrial flutter is shown and is synchronous to the animation.

> The therapy animation of the typical atrial flutter shows a cavotricuspid isthmusablation, in which an ablation line is drawn from the right ventricle via the tricuspid valve to the inferior vena cava.

Atrial fibrillation is represented by numerous slightly migrating rotators in the left and right atria; the atria no longer move and the sinus node is silent. There is irregular conduction of the atrial stimulus current to the ventricles at the AV node, and the chambers contract irregularly.

> The therapy animation of atrial fibrillation shows four different variations of pulmonary vein isolation:
>
> - Radiofrequency pulmonary vein isolation
> - Cryoballoon pulmonary vein isolation
> - Pulmonary vein isolation with the laser balloon and
> - Pulmonary vein isolation with a PVAC catheter

Structural Heart Disease

The two most common valve diseases are included:

- *Aortic valve stenosis*
- *Mitral valve insufficiency*

Under "*Aortic valve stenosis*", the animation shows a slice passing through the heart exactly at the level of the aortic valve. Red arrows, which become smaller behind the valve, symbolize the accelerated blood flow through the severely calcified and narrowed valve.

> The therapy animation shows a percutaneous aortic valve replacement with a ballon-mounted prosthesis via a wire inserted into the left ventricle.

Mitral insufficiency is shown in a special slice through the mitral valve and the left atrium. Backflow through the leaking mitral valve is shown with yellow arrows returning into the atrium and pulmonary veins. In addition, some yellow blood corpuscles are shown flowing back into the atrium.

> The therapy animation for this shows a transseptal mitraclip procedure in which the valve is clipped in the middle, creating small openings to the right and left of the clip. The therapy animation shows that after clipping, blood cells no longer flow back into the atrium.

Heart Failure

This category includes:

- *General heart failure*
- *Left heart failure*

Two animations are shown, each displaying two lungs which can also be seen as transparent silhouettes to the right and left of the heart.

From the third and fourth heartbeat of the respective animation, in one case the entire heart is pumping worse in the other case only the left heart. The backflow of blood or interstitial water into the lungs is symbolized by a rising blue water level in the transparent lungs.

> Explanatory text on this topic can be found under the menu item "Prophylaxis of Heart Failure".

Treatment Risks

Here you can find an animation about the treatment risk of pericardial tamponade.

> The treatment of pericardial tamponade by substernal pericardiocentesis is shown in a separate animation.

As of
May 2021

Contact
Please contact us in case of any questions or comments about the product.

Cardiolectra GmbH | Lottumstraße 9 | 10119 Berlin | contact@cardiolectra.com | www.cardiolectra.com |