OtoSim 2™

Installation and User Guide

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OtoSim 2™

Installation and User Guide   Page

1. Overview

Thank you for purchasing the OtoSim 2™ Otoscopy Training and Simulation System.

OtoSim Inc. has worked hard to develop an integrated and interactive simulation system that will significantly improve the effectiveness of otoscopy training. OtoSim 2™ provides the opportunity to effectively learn otoscopic techniques through hands-on experience in a simulated ear environment. It allows students to practice otoscopic techniques while reviewing different clinical scenarios with hundreds of high-fidelity images, and with direct and immediate instructor feedback.

This manual has a number of sections. Some sections are specific to using a PC or Mac computer, so you will need to skip over the sections not pertaining to your situation. *In addition, please run a single OtoSim™ Unit before attempting to run multiple units.*

The intent of this manual is to allow a person with basic computer knowledge to install the software. A computer with the OtoSim 2™ software preloaded and hardware preconfigured can be purchased from us. *If you work in a networked hospital environment, you may require assistance from your IT staff.* Alternatively, OtoSim 2™ can be run off of a stand-alone laptop to avoid network issues.

The actual instructions and screenshots may vary slightly from what is displayed on your screen, as there are many versions of operating systems.

The OtoSim™ Base Unit has no on/off switch or independent power. The images and the power supply are provided via the single USB cable. To power up the OtoSim™ Base Unit, connect the USB cable to the computer, and simply disconnect the USB cable to power down the unit when you are finished.

For those with more advanced computer knowledge, the OtoSim™ Base Unit is essentially an extension of the desktop monitor via a USB video feed. The OtoSim 2™ installation package will load drivers that enable this USB video.

When multiplexing (running more than one OtoSim™ Unit at the same time), connect the units one at a time and allow the computer to recognize them (show them as extended units from the desktop). Your computer screen may resize or flash black multiple times during the initial setup. It has been our experience that most computers can multiplex up to 6 OtoSim™ Units when used with a computer that meets our required specifications. (Please contact us if you want to multiplex more than 6 OtoSim™ Units.) You can multiplex by connecting to the USB outlets on your computer or by using a powered external USB hub. Please refer to *Section 6* for suggested configurations.

If you experience difficulty in setting up the OtoSim 2™ , feel free to send us an email (info@otosim.com) and set-up an appointment for technical support. We will typically respond within 24 hours, Monday to Friday.

We welcome your feedback on improving OtoSim 2™ and features you would like to see in future versions.

2. OtoSim 2™ Components

Your OtoSim 2™ Full System consists of an OtoSim™ Base Unit package and an OtoSim 2™ Upgrade Kit. If you did not receive all of the items pictured below, please contact us immediately. Please note that you will need an OtoSim™ Base Unit to run the OtoSim 2™ Upgrade Kit.

OtoSim™ Base Unit package includes:

    a) OtoSim™ Base Unit

    b) USB Cable (Type Mini-B to Type A)

    c) Pelican 1300 Protective Case

a)   b)   c)

OtoSim 2™ Upgrade Kit includes:

    a) OtoSim 2™ Instrumented Otoscope, Sensor Box, Right Earform, Left Earform, and Otoscope Cable

    b) USB Key with OtoSim 2™ Software and Installation & User Guide

    c) USB Cable (Type B to Type A)

    d) Pelican 1150 Protective Case

a)   b)   c)

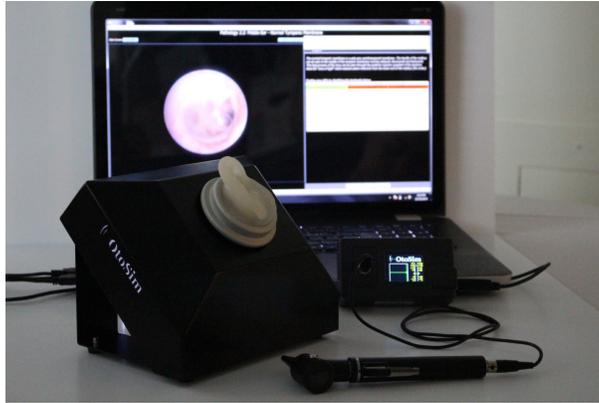

d)

Note: A computer (desktop or laptop) is required to run the OtoSim 2™ but
is not provided. Please refer to *Section 4: OtoSim 2™ System
Requirements* to identify a suitable computer to operate this simulation
system.

3. OtoSim 2™ Features

3.1 Basic Features of OtoSim 2™

Below is a summary of basic features for your OtoSim 2™ Full System:

- **Detailed text description** of ailments, ear and biopsy images provide sufficient material for instruction and self-guided tutorials;

- **Proprietary database** of over 380 high-resolution images from the OtoSim Library to instruct, practice and test students;

- **Annotated anatomical landmarks** included on almost 150 images;

- **Realistic earform** and canal for students to practice and improve their otoscopic technique. Through an actual otoscope, students can practice their examination technique with monocular vision while viewing through a realistic simulated-ear;

- **Realistic image projection** enabling students to view various normal and pathological conditions of the middle ear and external auditory canal conditions in a realistic earform;

- **Immersive full-screen viewing** with a simple, easy to use graphical user interface;

- **Uniques optics** maximizing image resolution and clarity;

- **Live landmark annotation** enabling instructors to highlight specific image characteristics;

- **Advanced Quizzes** with randomized, realistic clinical scenarios that test both medical and patient interaction skills;

- **Anatomy quizzes** where students must point to specific landmarks in time to answer the questions;

- **Instrument use tests** to aid students in practicing and improving their otoscopic technique;

- **Feature identification modules** to reinforce basic ear anatomy;

- **Search** to quicky find specific cases or review materials;

- **Multiplexing** to support up to 14 OtoSim™ Base Units to a single trainer laptop to effectively instruct groups at the same time.

Note: OtoSim recommends a maximum of 6 Base Units multiplexed to a single OtoSim-supplied USB hub for PC with Windows 8 (multiple USB hubs required for more than 6 units); 6 Base Units for PC with Windows 7, Vista or XP; and 4 Base Units for Mac. Please see *Section 6.3* for details.

3.2 Unique Features of OtoSim 2™

(1) OtoSim 2™ Instrumented Otoscope

The custom OtoSim 2™ Instrumented Otoscope contains position-detecting hardware that enables the OtoSim 2™ software to track the otoscope's movement and orientation.

The Instrumented Otoscope also tracks movements by controlling the display of the small cursor displayed on the ear.

(2) Realistic Ear Geometry

The OtoSim 2™ Earform mould replicates the human ear and texture to provide realistic simulation.

(3) OtoSim 2™ Content

The content of OtoSim 2™ includes training modules to practice otoscopy; testing routines to rate diagnostic accuracy and efficiency; and otoscopy images include detailed descriptions of each clinical scenario.

(4) OtoSim 2™ Software

OtoSim 2™ software has an intuitive, easy-to-use graphic interface.

Instructors can monitor what their students are viewing and highlight specific characteristics while students look through an actual otoscope and practice proper technique. This capability enhances student-instructor interactions.

(5) Close the Learning Feedback Loop

As students view and learn pathologies through the OtoSim 2™, instructors can interact with students by landmarking critical features of a pathology. This high degree of student-instructor interaction, combined with experiential learning in a realistic geometry, enables more efficient learning and knowledge retention.

4. OtoSim 2™ System Requirements

The minimum requirements for the computer driving the OtoSim 2™ are listed below. Any recent laptop will likely meet the requirements. You may choose to assign a dedicated unit or use your personal computer. *For software installations onto networked-computers, it is recommended to seek assistance from your IT department.*

- 350 megabytes (MB) of disk space for OtoSim 2™ software and DisplayLink driver software.

- Two available USB 2.0 ports, or one USB 2.0 and a powered external USB hub (sold separately).

- The DisplayLink driver will run on processors ranging from basic single Core CPUs, Dual, Quad Core and Core i3/i5/i7 CPUs. 1.2 GHz or above, with 512 MB RAM or more.

  - Please note that the processor speed, RAM capacity, and USB controller of your computer may affect multiplexing capabilities based on the following guidelines:

    o 1-2 OtoSim™ Units: 1.2 GHz CPU / 512 MB RAM

    o 2-5 OtoSim™ Units: 1.8 GHz CPU / 1 GB RAM

    o 6 OtoSim™ Units: 1.6 GHz Dual-Core CPU/ 2 GB RAM

    o 6+ OtoSim™ Units: please contact us for available options

  - For multiplexing, please use USB hubs defined as USB 2.0, with transfer rates of 480 MBPS (megabytes per second) and with an additional power source of 2.5 Amps or higher. Please refer to *Section 6* for suggested configurations.

- Any of the following operating systems: Mac OS X 10.7 (Lion), 10.8 (Mountain Lion), 10.9 (Mavericks), 10.10 (Yosemite); Windows 8, Windows 7 (32-bit or 64-bit), Windows Vista with Service Pack 1 or 2

(32-bit or 64-bit), Windows XP Home or Professional (including Tablet edition) with Service Pack 2 or 3.

Note: Microsoft is no longer supporting Windows XP. Although the OtoSim 2™ software is compatible to Windows XP, we don't recommend it.

- Minimum WEI score of 3 in "Graphics; Desktop performance for Windows Aero".

5. Base Unit Initial Setup

1) Before using the Base Unit, you should remove the retaining ring from the Base Unit by turning it counter-clockwise.

2) Place the OtoSim™ Earform into the cavity and secure it by tightening the retaining ring. (OtoSim™ Earforms are designed to fit into all existing OtoSim™ Base Units.)

6. Base Unit Hardware Configurations

Below are the schematics of the OtoSim™ Base Unit hardware. Remember that there is no on/off switch; the electric power and digital images are supplied through the USB cable.

It is recommended you become familiar with the single-unit configuration use before attempting to multiplex OtoSim™ Units (connect multiple units at the same time).

6.1 Location to Plug USB Cable into Base Unit

The USB port is located on the backside of the Base Unit. Insert the Type Mini B (smaller) end of the USB cable into the port on the Base Unit.

Be sure to align the USB cable plug and USB port on the Base Unit properly, to prevent damage to the port.

Be sure to loop the USB cable around the strain relief hook on the back of the Base Unit, to prevent pressure and damage to the port.

6.2 Connecting One Base Unit to the Computer

The OtoSim™ Base Unit can be connected to a desktop computer or a laptop by inserting the Type A (larger) end of the USB cable into the port on the computer.

Refer to *Section 4* for system requirements to run OtoSim 2™. ***When connecting to networked-computers, it is recommended to seek assistance from your IT department.***

6.3 Multiplexing – Connecting Multiple Base Units to the Computer

Fourteen Base Units are capable of running off of a single PC computer when all 14 Base Units are connected to OtoSim-supplied USB hubs. Due to factory settings, only 4 Base Units can run simultaneously from a Mac computer, when the units are connected to an OtoSim-supplied USB hub. OtoSim has tested a variety of USB hubs and highly recommend the use of the OtoSim-supplied hub for safe operation. Please ensure the following when multiplexing Base Units:

- OtoSim recommends a maximum of 6 Base Units multiplexed to a single OtoSim-supplied USB hub for PC with Windows 8 (multiple USB hubs required for more than 6 units); 6 Base Units for PC with Windows 7, Vista or XP; and 4 Base Units for Mac.

- The USB hub is kept exposed in an area with good air circulation during use (i.e. not covered up).

- When not in use, disconnect the USB hub and the Base Units (i.e. **do not leave** any OtoSim™ Unit running overnight).

- We do not recommend more than 8 hours of continuous use.

- Do not connect other high-current draw USB devices to the hub when OtoSim™ Base Units are connected to the hub, even if there are available USB ports on the hub.

7. Windows: Software Installation

These instructions will guide you through the setup of your OtoSim 2™ software on a Windows PC. The following steps only need to be done once to load the software onto your computer.

Note: For software installations onto networked-computers, please request assistance from your IT department.

DO NOT PLUG IN THE BASE UNIT OR OtoSim 2™ SENSOR BOX UNTIL THE SOFTWARE INSTALLATION IS COMPLETE.

* You do not need to remove OtoSim 1™ software (OtoSim™ 1.1, 1.2 or 1.3) if it is already installed. Both OtoSim 1™ and OtoSim 2™ can be on the same computer and run independently. They cannot, however, run at the same time.

7.1 OtoSim 2™ Software Installation

1) Insert the provided USB key with the software into your computer. Double-click on the installation file.

2) Please read the "Licenses terms and conditions". If you agree, check "I agree to the License terms and conditions" and press "INSTALL" to begin the installation.
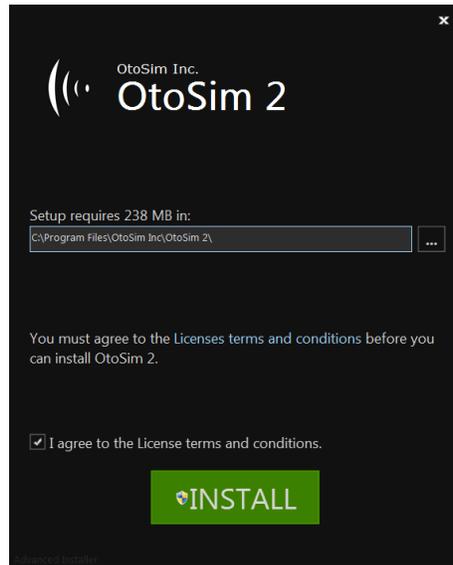
3) Before copying the OtoSim 2™ software to the computer, the installation package will install the pre-requisite software – DisplayLink. While the DisplayLink drivers install, the following screen will appear. (Do not change any settings or plug in any OtoSim™ Base Units while the installation progresses. The computer's display may flash or turn off temporarily during this process.)
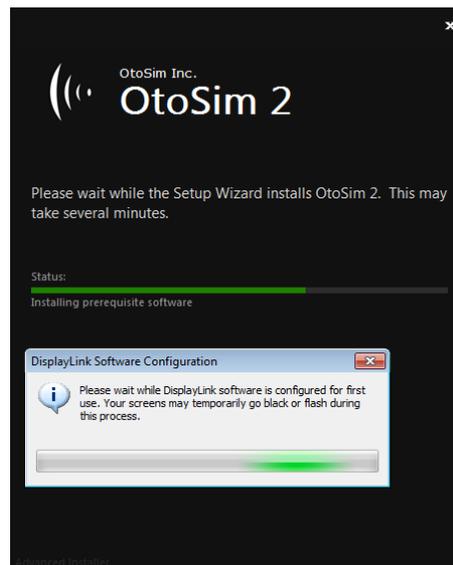
4) Once the installation is complete, follow the prompts to restart the computer.
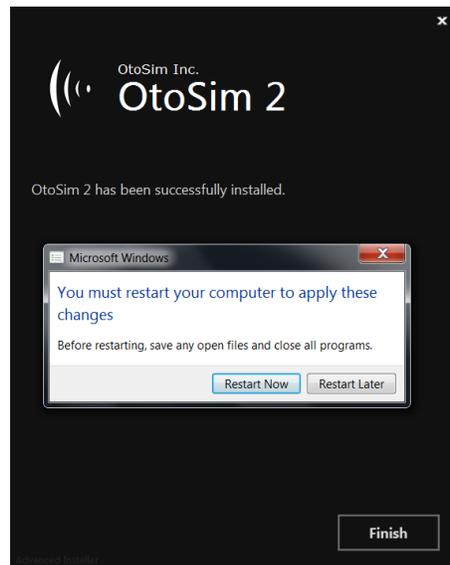
Note: The Base Unit should remain disconnected from the computer during the rebooting process.

15) Congratulations, you have successfully installed the OtoSim 2™ software and DisplayLink drivers! The next step is the Display Setup. Go to *Section 7.2.1* if you are using Windows XP, *Section 7.3.1* if you are using Windows Vista, Windows 7 or Windows 8 to set up the Base Unit.

7.2 Windows XP Display Setup

7.2.1 Windows XP: Verifying the Display Setup

1) Connect the OtoSim™ Base Unit to an available USB port on the computer (see *Section 6* for supported configurations)

2) Go to "Display Properties" by either a) going through the Control Panel and selecting the "Display Properties" icon; or b) right-clicking on the desktop and selecting "Properties" from the pop-up menu.

3) Select the "Settings" tab and verify that the secondary monitor (OtoSim™ Base Unit) appears as monitor #2. It should appear to the right of the main

monitor (monitor #1), and the **top edges** of the two monitors should be aligned (see diagram below).
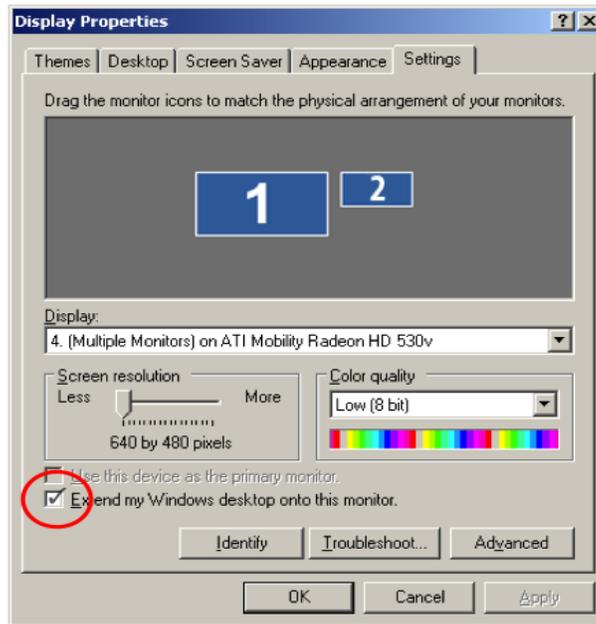
4) Ensure that the "Extend my Windows desktop onto this monitor" option is checked under the Settings tab of the Display Properties Panel (see diagram above).

5) To ensure connectivity, please click the "Identify" button and the number corresponding to the monitor will appear for several seconds. This can be seen on the LCD screen through the OtoSim™ Earform on the Base Unit.

Note: The main monitor and the screen on the OtoSim™ Base Unit may flicker on and off for several seconds at a time. This is an indication that the computer is in the process of detecting the connected Base Unit.

7.2.2 Windows XP: Connecting Multiple Base Units

Note: We recommend you operate the system with a single unit before using multiple Base Units at once.

To connect multiple Base Units, please follow either A) or B) depending on your situation:

A) Direct Connection to Computer

Multiple Base Units can be individually connected to the available built-in USB ports of your computer. However, you will be limited to the number of available USB ports. Repeat the steps in *Section 7.2.1* above, for each Base Unit to be connected, up to a maximum of 6 Base Units (depending on computer performance, as stated in *Section 4*). It is recommended to connect each Base Unit one at a time, and not all at once.

OR

B) Connection to Computer via USB Hub

Multiple Base Units can be connected via a USB hub with the following instructions. We highly recommend using an OtoSim-supplied USB hub to multiplex Base Units. Refer to *Section 6* for safe operation procedures when using a USB hub.

    i.   Connect the USB hub first and allow the associated hub drivers to install.

    ii.   Plug in the first Base Unit into the USB hub and allow time for the computer to detect this monitor.

    iii.   Repeat the steps in *Section 7.2.1* above, for each Base Unit to be connected, up to a maximum of 6 Base Units with Windows XP (depending on computer performance, as stated in *Section 4*). It is recommended to connect each Base Unit one at a time, and not all at once.

Congratulations, you have completed the Display Setup. Please close the "Display Properties" window and proceed to use the software!

7.3 Windows Vista/7/8 Display Setup

7.3.1 Windows Vista/7/8: Verifying the Display Setup

1) Connect your OtoSim™ Base Unit to an available USB port on the computer (see *Section 6* for supported configurations)

2) Go to "Display Properties" by either a) going through the Control Panel, selecting the "Display Properties" icon and selecting the "Screen resolution" side menu; or b) right-clicking on the desktop and selecting "Screen Resolution" from the pop-up menu.

3) Verify that the secondary monitor (OtoSim™ Base Unit) appears as monitor #2. It should appear to the right of the main monitor (monitor #1) and the **top edges** of the two monitors should be aligned (see diagram below).
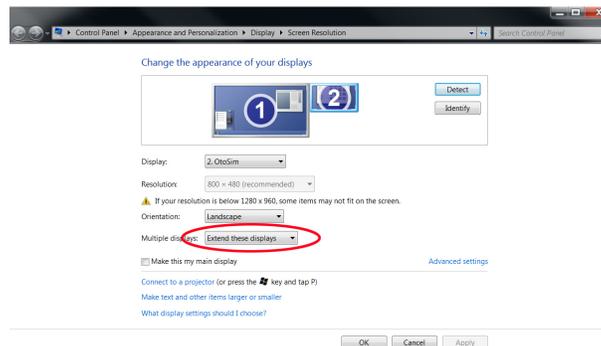
4) Ensure that "Extend desktop this display" is selected under the "Multiple Displays" category (see diagram above).

5) Ensure that the "Extend" option is selected under the "Connect to a Projector" link found in the bottom area of the window (see diagram below).
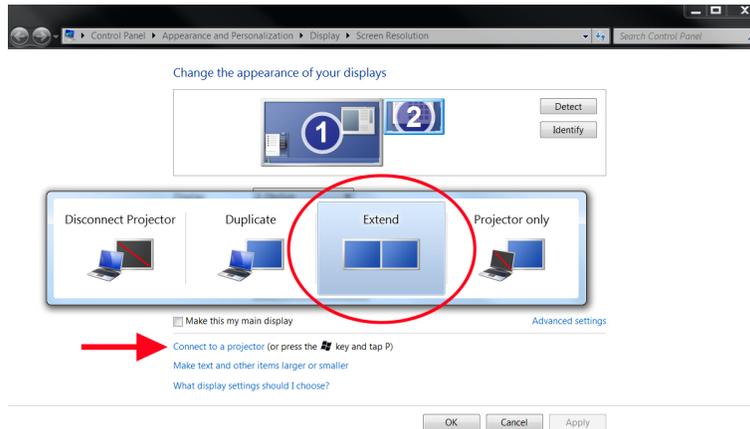
6) To ensure connectivity, please click the "Detect" button and then click the "Identify" button. The number corresponding to the monitor will appear for several seconds. This can be seen on the LCD screen through the OtoSim™ Earform on the Base Unit.

Note: The main monitor and the screen on the OtoSim™ Base Unit may flicker on and off for several seconds at a time. This is an indication that the computer is in the process of detecting the connected Base Unit.

7.3.2 Windows Vista/7/8: Connecting Multiple Base Units

Note: We recommend you operate the system with a single unit before using multiple Base Units at once.

To connect multiple Base Units, please follow either A) or B) depending on your situation:
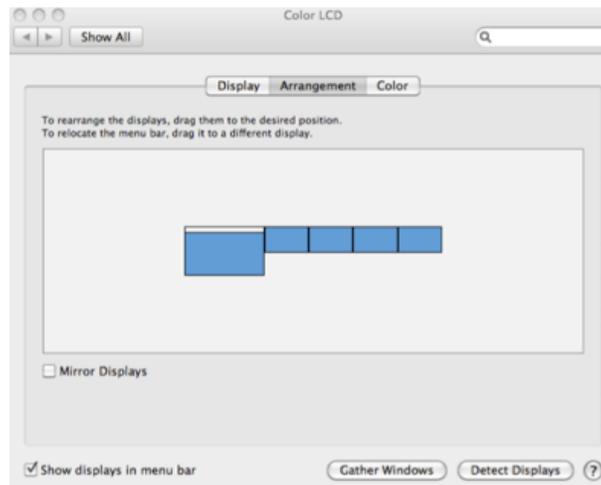
A) Direct Connection to Computer

Multiple Base Units can be individually connected to the available built-in USB ports of your computer. However, you will be limited to the number of available USB ports. Repeat the steps in *Section 7.3.1* above, for each Base Unit to be connected, up to a maximum of 6 Base Units (depending on

computer performance, as stated in *Section 4*). It is recommended to connect each Base Unit one at a time, and not all at once.

OR

B) Connection to Computer via USB Hub

Multiple Base Units can be connected via a USB hub with the following instructions. We highly recommend using an OtoSim-supplied USB hub to multiplex Base Units. Refer to *Section 6* for safe operation procedures when using a USB hub.

    i. Connect the USB hub first and allow the associated hub drivers to install.

    ii. Plug in the first Base Unit into the USB hub and allow time for the computer to detect this monitor.

    iii. Repeat the steps in *Section 7.3.1* above, for each Base Unit to be connected, up to a maximum of 6 Base Units with Windows 7, Vista or a maximum of 14 Base Units with Windows 8 (depending on computer performance, as stated in *Section 4*). It is recommended to connect each Base Unit one at a time, and not all at once.

Note: The image below is representative of 6 Base Units attached to the computer via a USB hub. The 7th monitor is the 6th Base Unit. The 1st monitor represents the main monitor of the computer.

Congratulations, you have completed the Display Setup. Please close the "Screen Resolution" window and proceed to use the software!

8. Mac OS X: Software Installation

These instructions will guide you through the setup of your OtoSim 2™ software on a Macintosh computer. The following steps only need to be done once to load the software onto your computer.

Note: For software installations onto networked-computers, please request assistance from your IT department.

DO NOT PLUG IN THE BASE UNIT OR OtoSim 2™ SENSOR BOX UNTIL THE SOFTWARE INSTALLATION IS COMPLETE.

* You do not need to remove OtoSim 1™ software (OtoSim™ 1.1, 1.2 or 1.3) if it is already installed. Both OtoSim 1™ and OtoSim 2™ can be on the same computer and run independently. They cannot, however, run at the same time.

8.1 OtoSim 2™ Software Installation

1) Insert the provided USB key with the software into your computer. Double click the installation file to install OtoSim 2™ on your computer.

2) Double click the "DisplayLink Software Installer.pkg" file. (The DisplayLink drivers are required for the OtoSim™ Base Unit to function.)
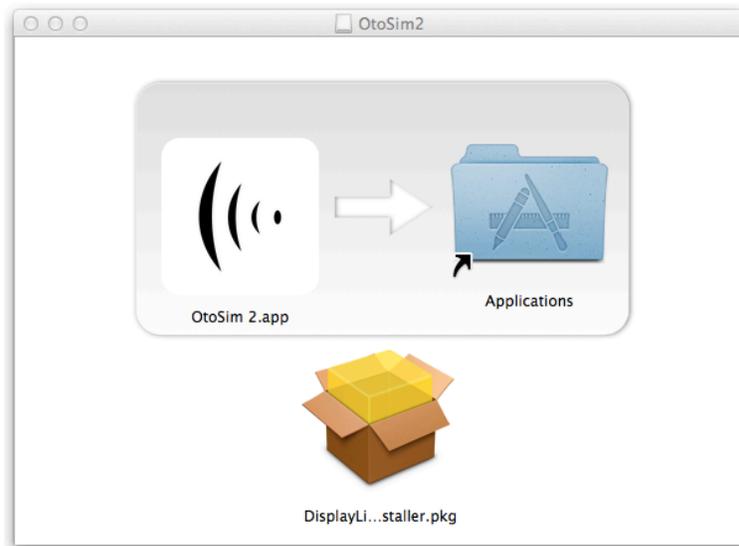
6) Press "Continue" to proceed.
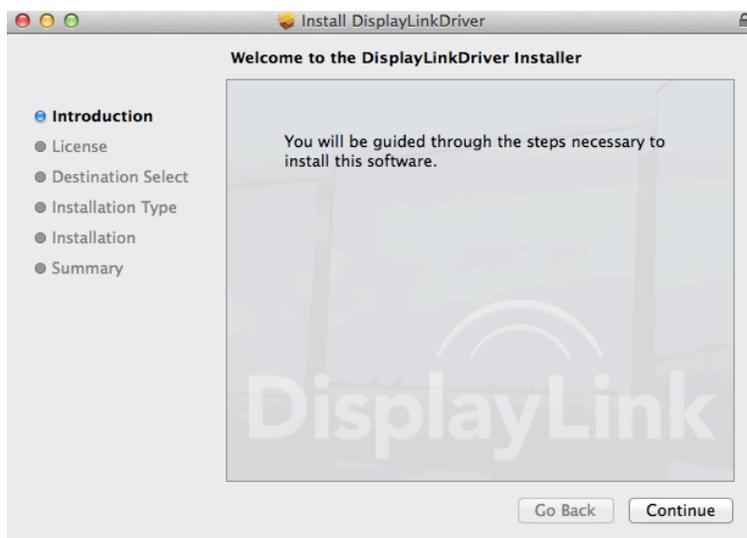
7) You must accept the DisplayLink license agreement to proceed with the installation. If you accept the license agreement, press "Continue" and then "Agree" to proceed with the installation.
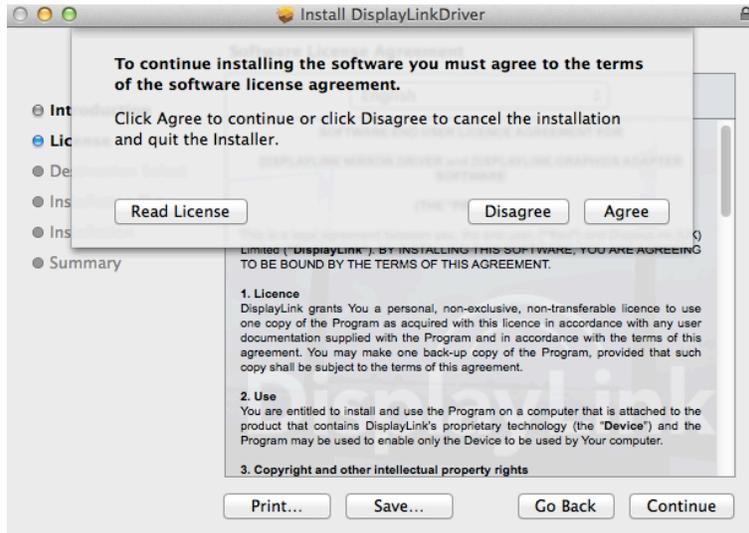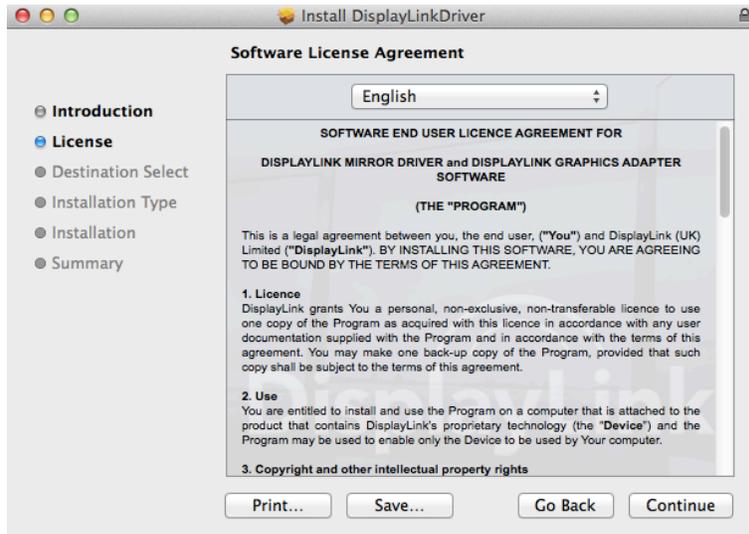
8) Press "Install" to continue with the installation. You will need to enter an administrator's password to proceed.

9) When the DisplayLink software has been installed, you will be required to restart your computer. Press "Restart" to continue. (Do not change any settings or plug in any OtoSim™ Base Units while the installation progresses.)
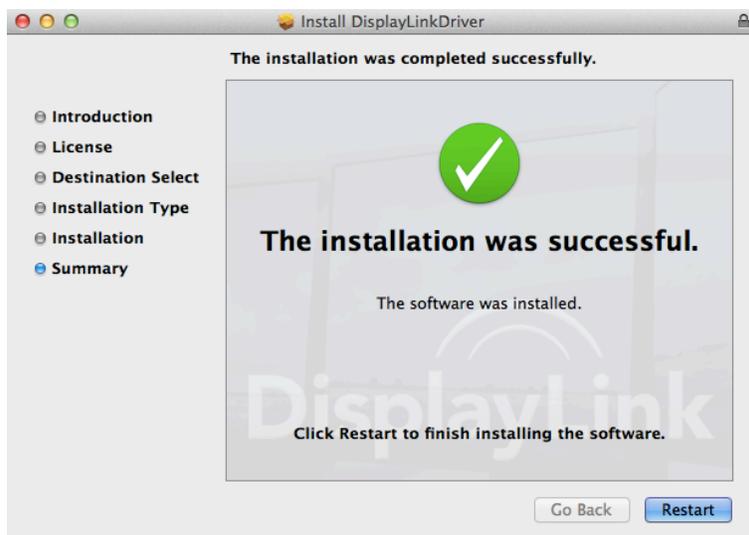
10) Congratulations, you have successfully installed the OtoSim 2™ software and DisplayLink drivers! Go to next section to set up the Base Unit.

8.2 Mac OS X Display Setup

8.2.1 Mac OS X: Verifying the Display Setup

1) Connect the OtoSim™ Base Unit to an available USB port on the computer (see *Section 6* for supported configurations). Allow a few seconds for the computer to detect the Base Unit.

Note: The main monitor and the screen on the OtoSim™ Base Unit may flicker on and off for several seconds at a time. This is an indication that the computer is in the process of detecting the connected Base Unit.

2) Click on the monitor icon at the top right of the menu bar, and select "Display Preferences". Or, you can access "Display Preferences" by clicking on the icon on the top left of the computer, selecting "System Preferences", and double-clicking on the "Displays" icon.
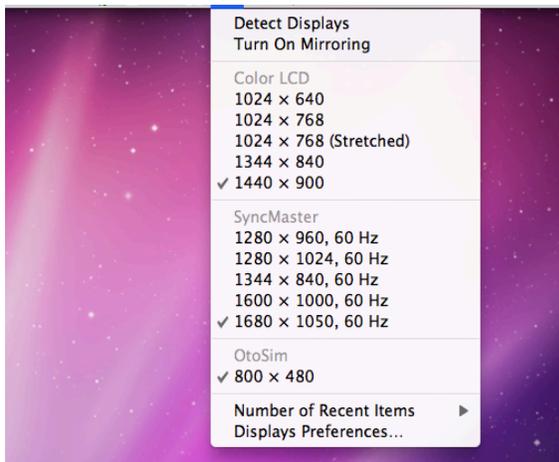
3) In "Display Preferences", click on the "Arrangement" tab and ensure that the secondary monitor (OtoSim™ Base Unit) is placed to the right of the main monitor and the **top edges** are aligned (see diagram below).
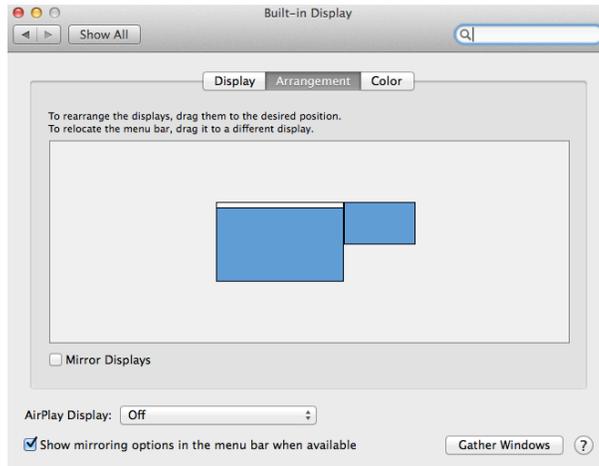
Note: Click on the "Gather Windows" button to move the Display Preferences windows onto the main monitor.

8.2.2 Mac OS X: Connecting Multiple Base Units

Note: We recommend you operate the system with a single unit before using multiple Base Units at once.

To connect multiple Base Units, please follow either A) or B) depending on your situation:

A) Direct Connection to Computer

Multiple Base Units can be individually connected to the available built-in USB ports of your computer. However, you will be limited to the number of available USB ports. Repeat the steps in *Section 8.2.1* above, for each Base Unit to be connected, up to a maximum of 4 Base Units (depending on computer performance, as stated in *Section 4*). It is recommended to connect each Base Unit one at a time, and not all at once.

OR

B) Connection to Computer via USB Hub

Multiple Base Units can be connected via a USB hub with the following instructions. We highly recommend using an OtoSim-supplied USB hub to multiplex Base Units. Refer to *Section 6* for safe operation procedures when using a USB hub.

      i. Connect the USB hub first and allow the associated hub drivers to install.

     ii. Plug in the first Base Unit into the USB hub and allow time for the computer to detect this monitor.

   iii. Repeat the steps in *Section 8.2.1* above, for each Base Unit to be connected, up to a maximum of 4 Base Units (depending on computer performance, as stated in *Section 4*). It is recommended to connect each Base Unit one at a time, and not all at once.

Note: The image above is representative of 4 Base Units attached to the computer via a USB hub.

Congratulations, you have completed the Display Setup. Please close the "Display Preferences" window and proceed to use the software!

9. OtoSim 2™ Sensor Box and Otoscope Hardware Configurations

9.1 Setting Up the OtoSim 2™ Sensor Box

The OtoSim 2™ Sensor Box is designed to be used only with the OtoSim 2™ provided Instrumented Otoscope.

1) Connect the four-pronged circular cable to the bottom of the otoscope.

2) Connect the other end of the cable to the hole at the top of the Sensor Box, as shown below. Now the Sensor Box and the provided Instrumented Otoscope are connected.

3) Connect the Sensor Box to the computer, using the USB Cable. When powered up, the Sensor Box will display a green graph with the motion of the otoscope. (You may have to restart the OtoSim 2™ Sensor by

unplugging the USB cable and plugging it back in before you see the green motion graph.)

Note: The two graphs at the bottom of the screen are intended solely as a diagnostic to verify that all the tracking circuitry is functioning correctly. If you do not see any motion when you move the otoscope, the Sensor Box may be malfunctioning. If the Base Unit displays "Not connected", then you should ensure the cable between the Sensor Box and the Instrumented Otoscope is snugly connected and undamaged.

4) When the OtoSim 2™ software is connected, the Sensor Box should now display the following screen.

9.2 Using the Otoscope

The Otoscope should be held vertical when in use. This ensures the most accurate tracking, and is also consistent with medical best practices. The unit **will not** function correctly if held sideways.
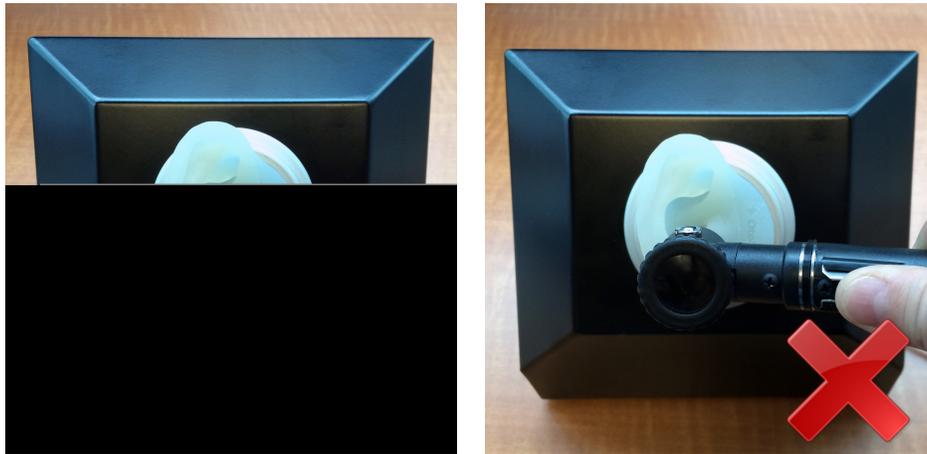
9.3 Storing the Otoscope

The otoscope may be stored when not in use by attaching it to the side of the unit as pictured below:

10. OtoSim 2™ Software Use and Navigation

The following section will describe the major features of the OtoSim 2™ software and the contents of each section.

Please use only the Instrumented Otoscope provided with your OtoSim™ Base Unit when using the OtoSim 2™ software. Only the provided Instrumented Otoscope has the required tracking circuitry to connect with the OtoSim 2™ software.

10.1 Navigating through the OtoSim 2™ Software

10.1.1 Main Menu

When OtoSim 2™ starts up, you will see the Main Menu screen below.
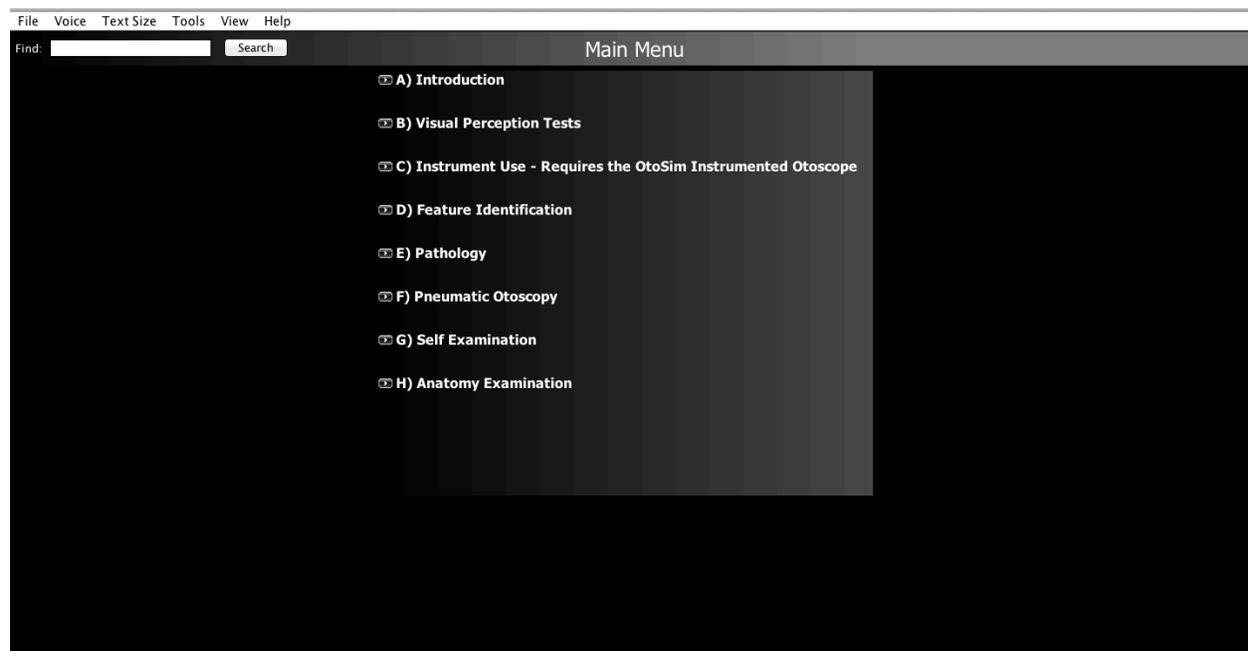
On this page, you can click on each Module Header to expand the contents of that module and to explore the program. *Sections 10.4* through *10.11* summarize the content of the various modules.

Viewed sections will be highlighted red. However you may still revisit any of these sections.

10.1.2 Searching

If you are searching for a specific section, you can type into the "Find" box at the top. Suggestions will be highlighted in yellow as you type. To clear the search suggestions, simply press the "Clear" button.
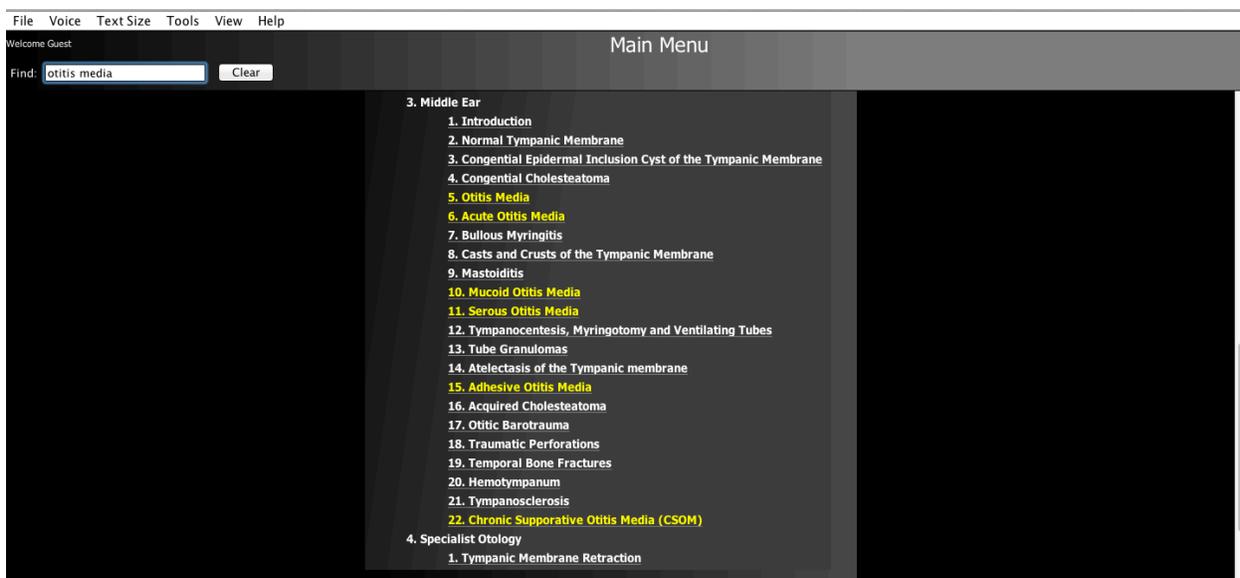
10.2 The Main Interface

Each screen has an interface similar to the one below, which displays all the available functionality of the application. Each of these functions will be described in detail below.
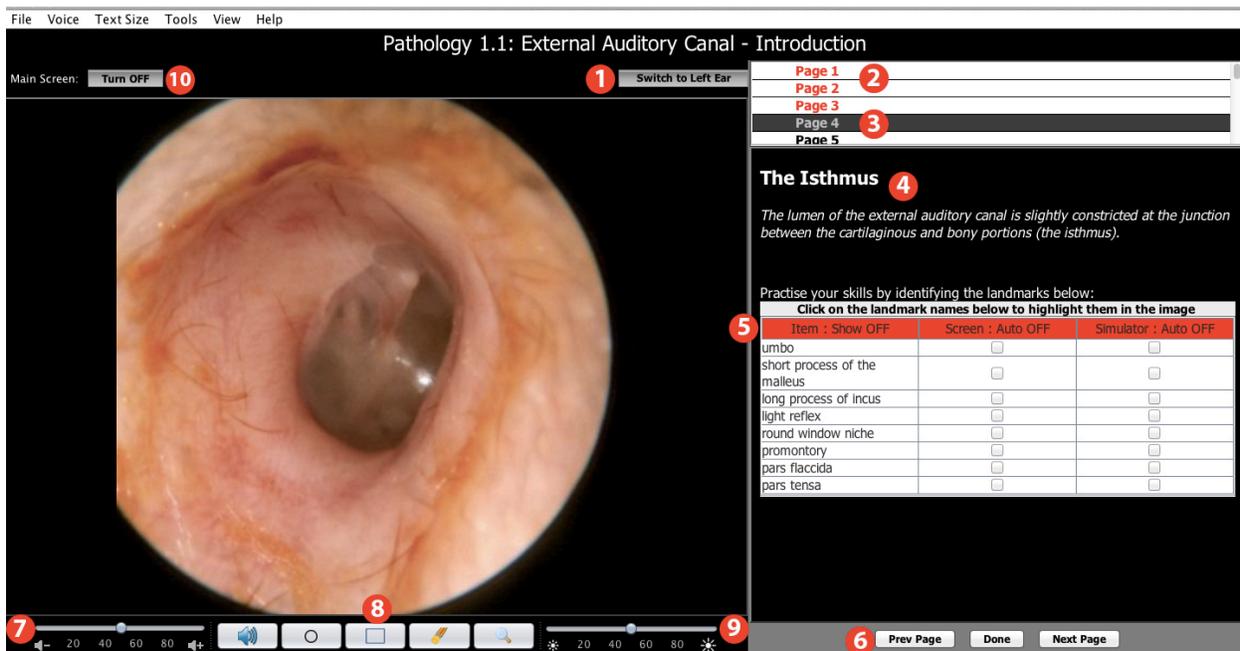
1. The button "Switch to Left Ear" or "Switch to Right Ear" on the top-right of the image allows you to switch between viewing left or right ears. This change is also reflected in the OtoSim™ Base Unit when viewed through the Instrumented Otoscope.

2. The page list on the right of the screen displays the available images. Images you have viewed are displayed in red, while un-viewed images are displayed in black. You can always return to viewed images again.

3. The currently selected image is denoted by a gray band.

4. Below the list of images, there is a description of the image. In this case, an example of "The Isthmus" is shown.

5. Some images are annotated, and the table of annotations will be listed below the image description. By turning on the first column (by clicking on its red header), the landmark will be shown on the screen and on the Base Unit. By turning on the second column, landmarks will be hidden until clicked on with a mouse. By turning on the third column, the landmark and tracking of the Instrumented Otoscope will be visible on the main screen but will be hidden on the Base Unit until targeted with the Instrumented Otoscope.

6. The "Prev Page" and "Next Page" buttons will cycle through the various examples. The "Done" button will return you to the main menu.

7. The slider on the bottom left controls the volume for annotations that are read by the computer.

8. The control buttons are for (left to right): 1) Muting all sounds, 2) Drawing ellipses on the main window, 3) Drawing rectangles on the main window, 4) Erasing all annotations, and 5) Magnifying a portion of the main window.

9. The second slider (bottom center) controls the brightness of the image. It should rarely need to be used.

Note: All OtoSim images have been carefully calibrated to be as realistic as possible. So if an image appears very dark, that's likely because a real ear with that disorder would be very dark as well. The modified image will be viewable in both the main screen and the OtoSim™ Base Unit.

Note: The green targeting cross-hair (Viewfinder) may not be displayed at all times. The "View" menu at the top allows selection and control of the Viewfinder. The Full-screen Viewfinder (green cross-hair) is displayed by default and will only show if it is required, such as during the tool use tests. However, a Viewfinder of choice can be displayed to aid a trainee in orientating themselves by selecting the appropriate option under the "View" menu.
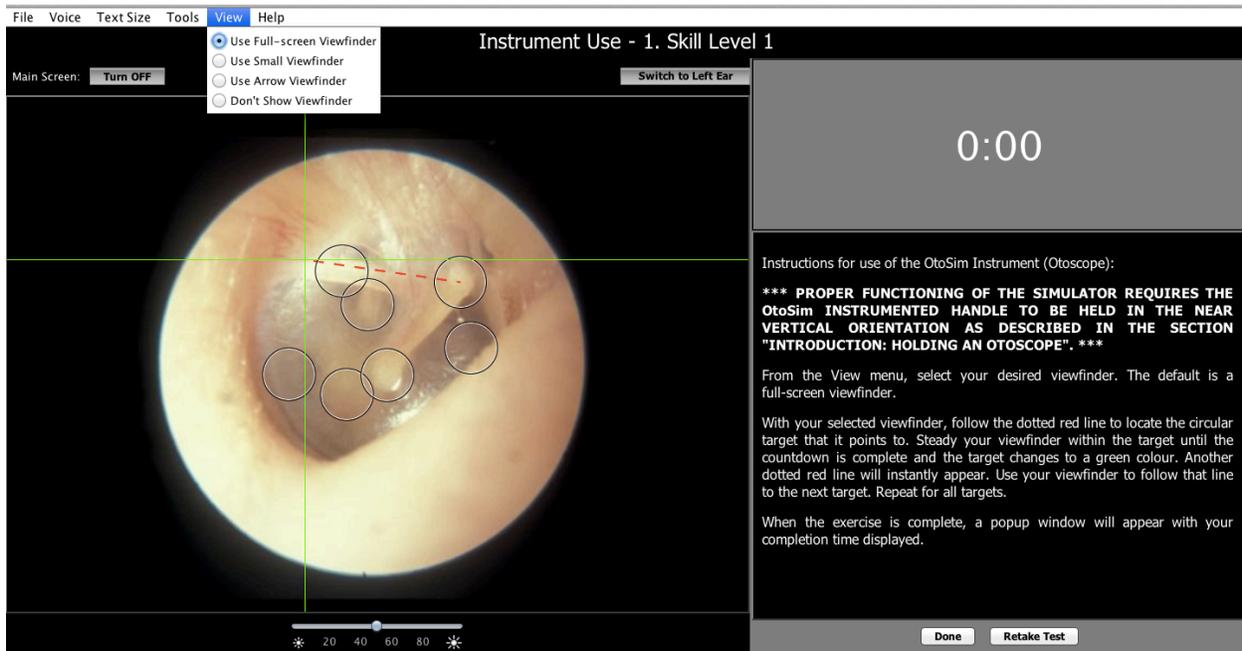
10. The "Turn OFF" button allows you to cover up the main screen so that a trainee must look through the OtoSim™ Base Unit to orient themselves or examine the image. This can be very helpful for self-directed learning.
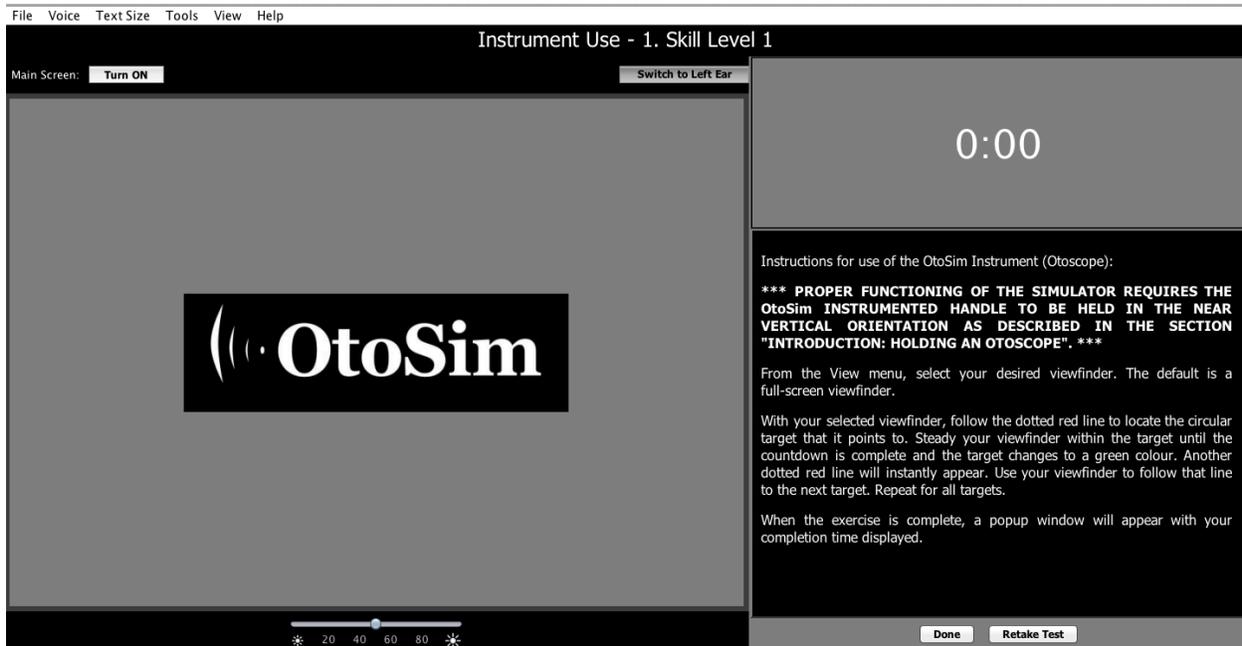
10.3 Menu Bar Options

At the top of the screen, there is a menu bar that contains many useful options. To access these options, click on the menus at the top of the screen.
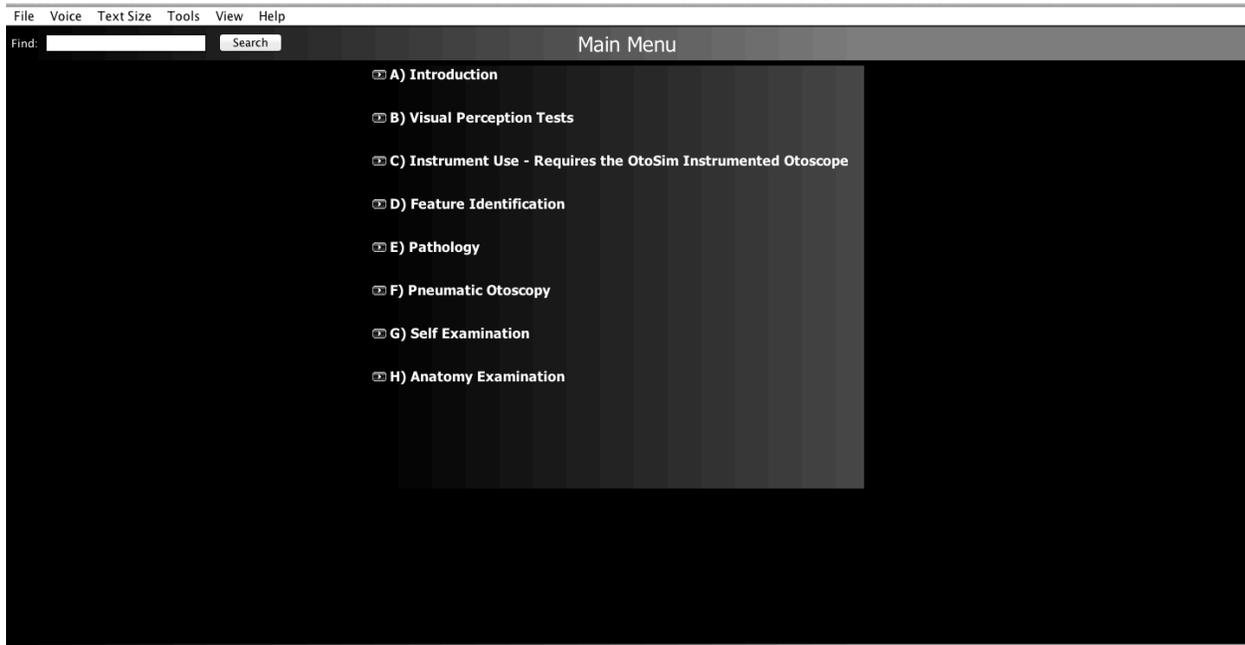
1. The File menu allows you to exit the program. Alternatively, you can use the "X" button on the top right corner (top left on Mac OS X).
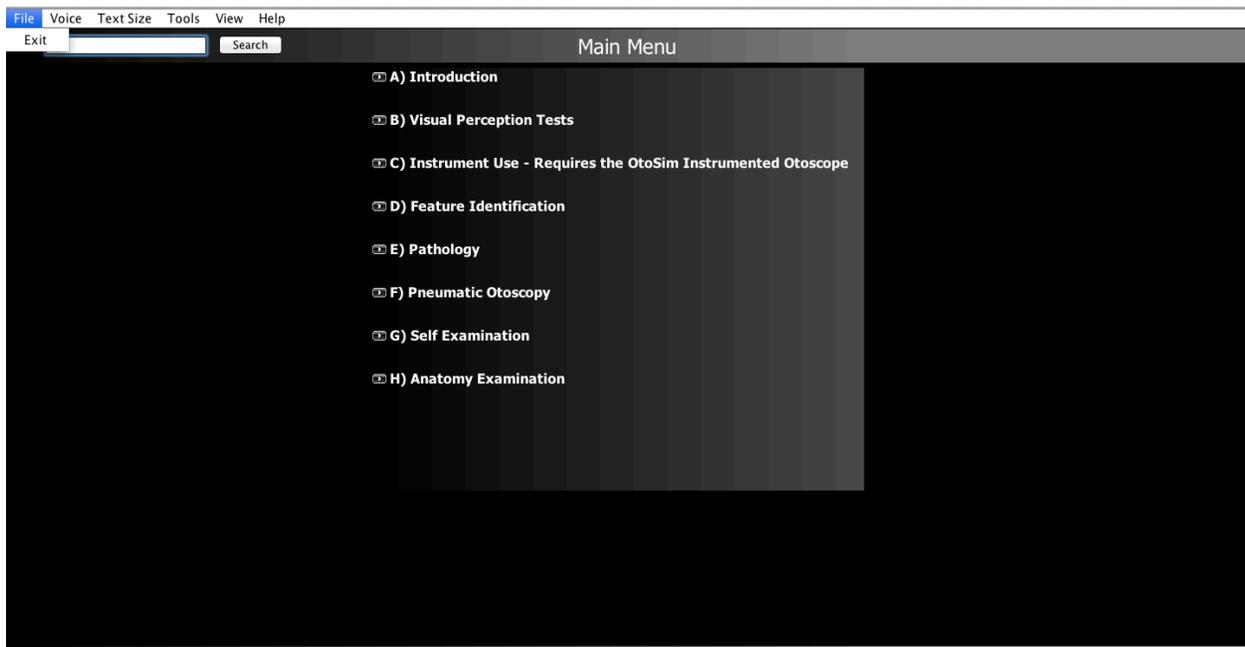
2. The Voice menu allows you select between a male or female voice reading annotations. The default voice is male.
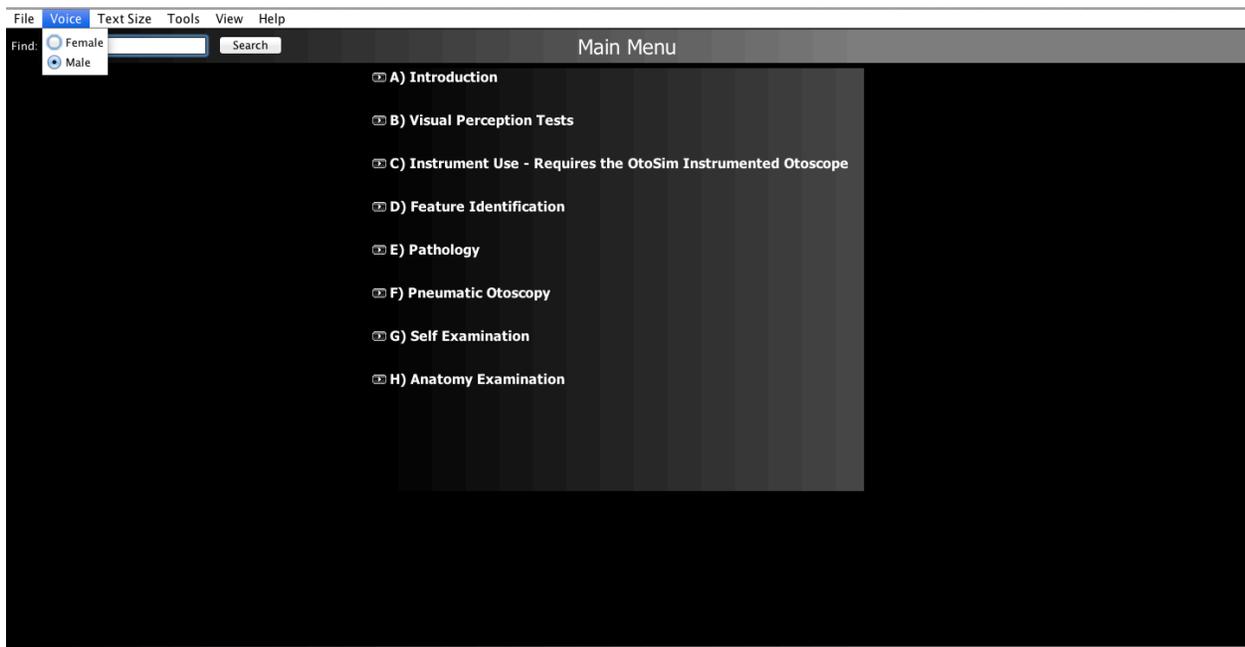
3. The Text Size menu allows you to make text larger or smaller throughout the program.
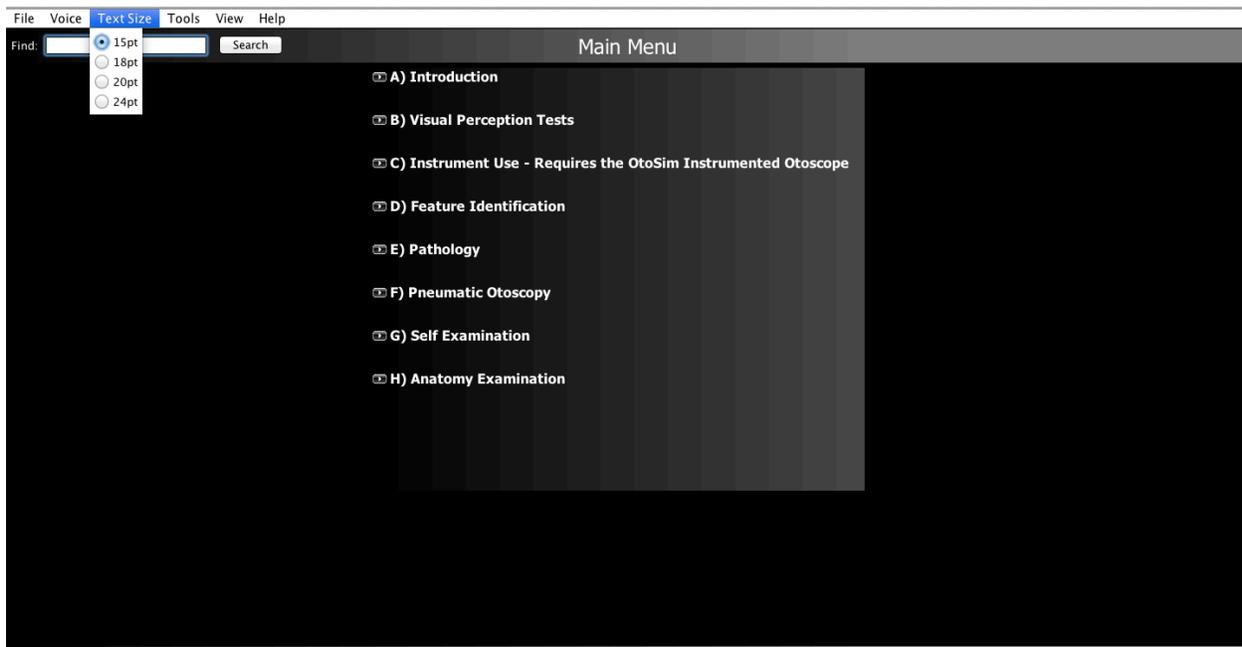
4. The Tools menu allows calibrating your Instrumented Otoscope. Position the scope as shown in the picture and click on the "Calibrate Now" button. We suggest checking calibration regularly and to calibrate as frequently as required.

Position your OtoSim Instrument as shown and press "Calibrate Now"!

Calibrate Now   Cancel
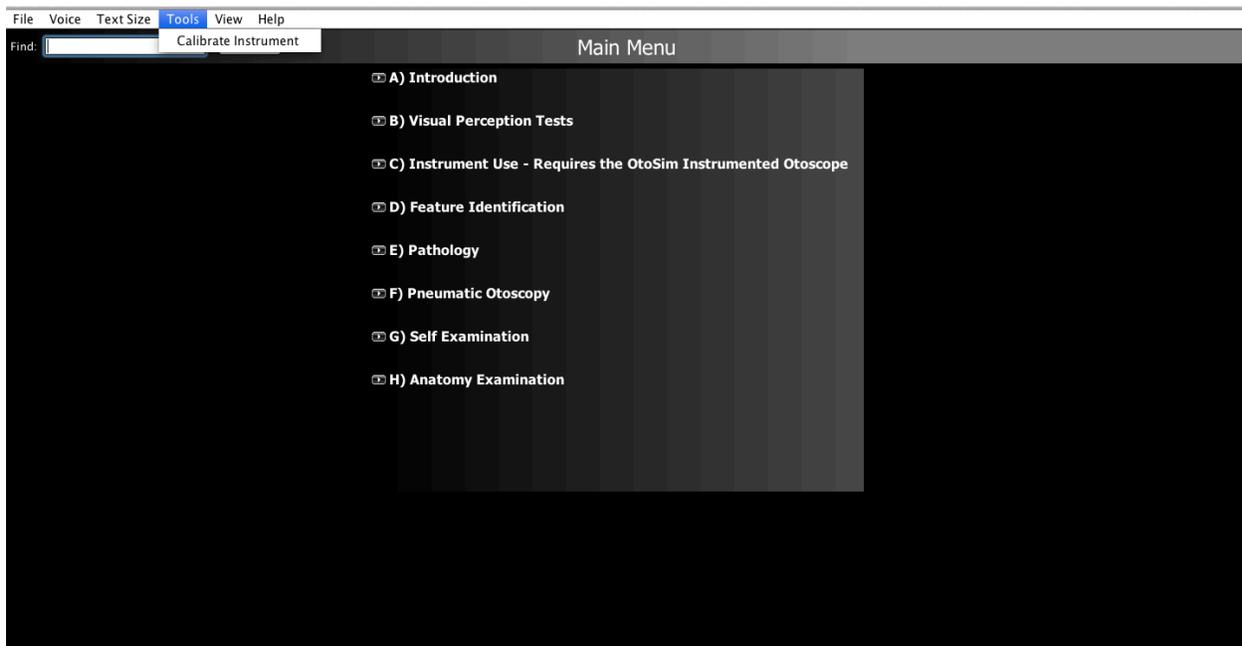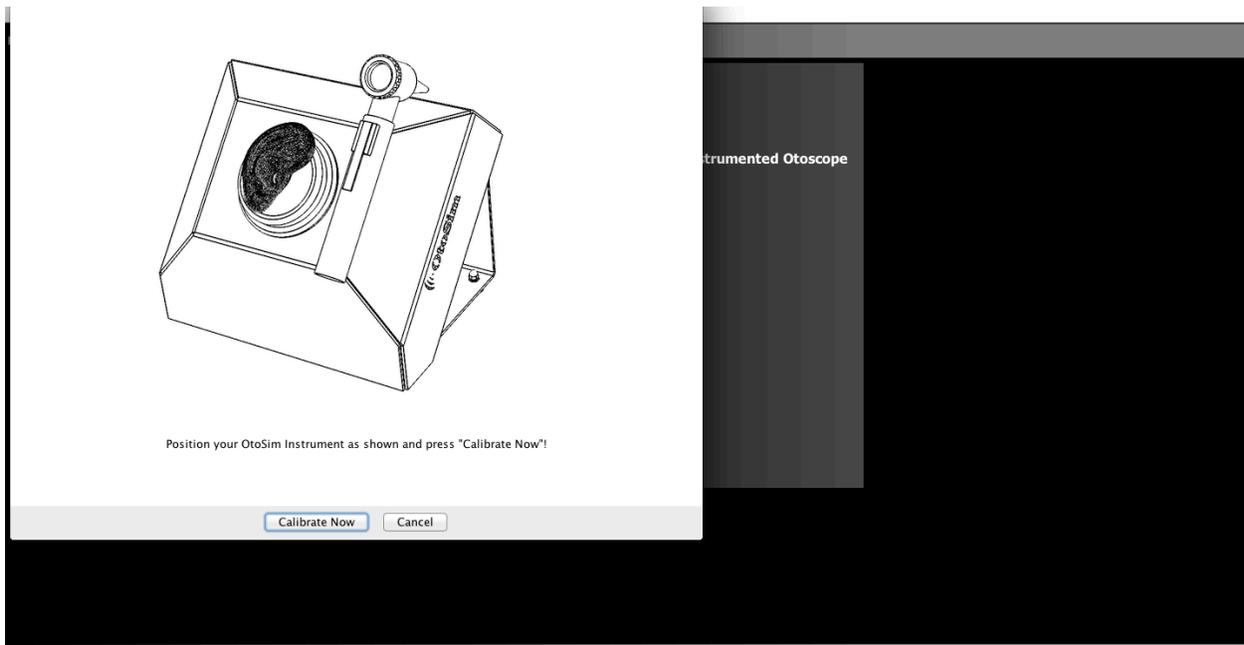
5. The View menu allows you to change how the View Finder displayed in the OtoSim™ Base Unit and on the instructor window is drawn.

- The "Use Full-screen Viewfinder" option will use a cross that spans the entire screen. This is recommended for beginners who often find themselves disoriented in the OtoSim™ Base Unit.
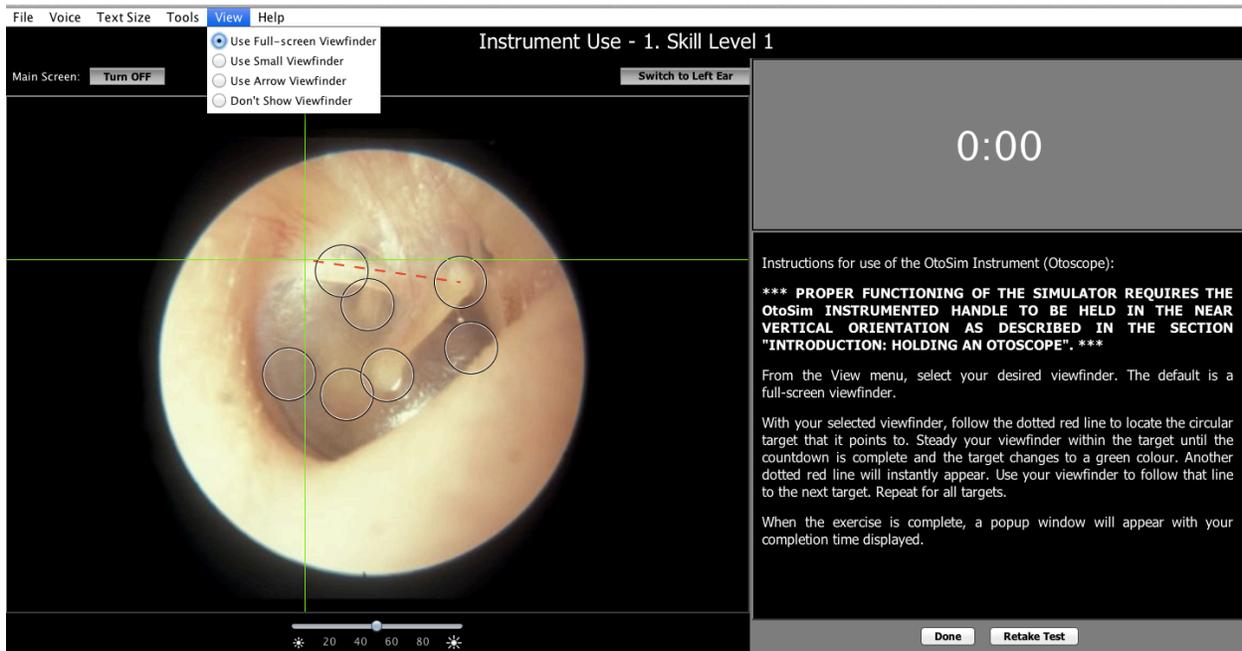
- The "Use Small Viewfinder" option will only draw a small cross at the focal point of the screen. This may be useful for moderately advanced users.
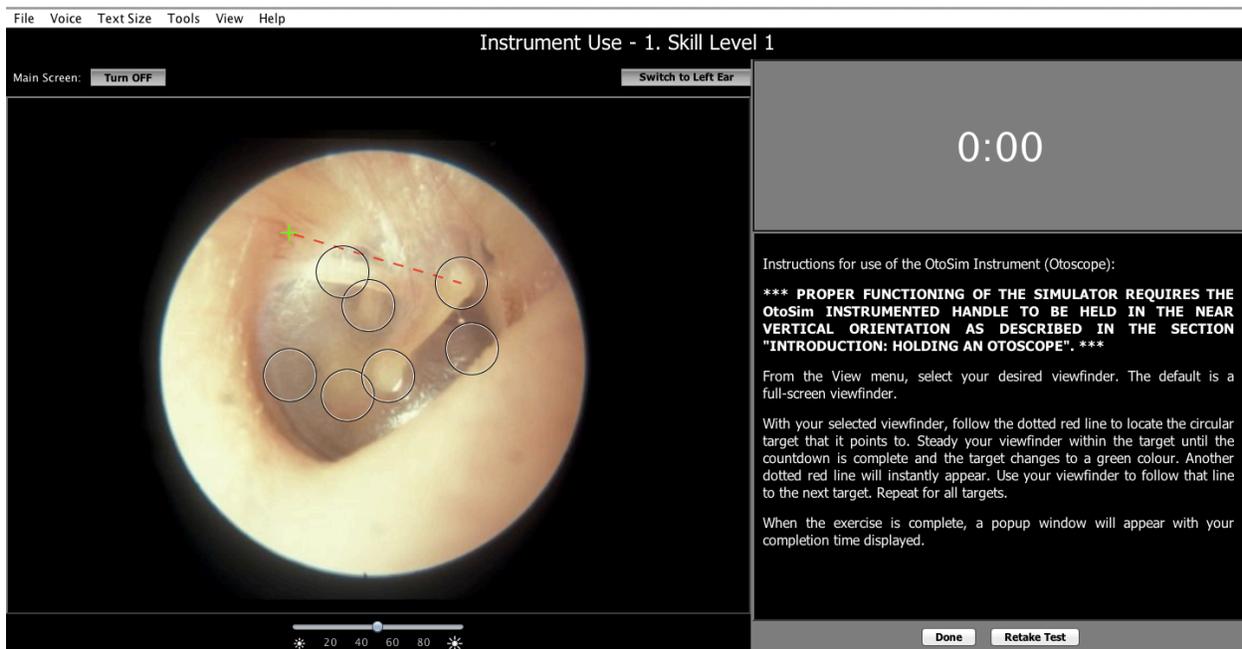
- The "Use Arrow Viewfinder" option will draw a small arrow at the focal point of the screen. This may be useful if the other crosses are difficult to see.
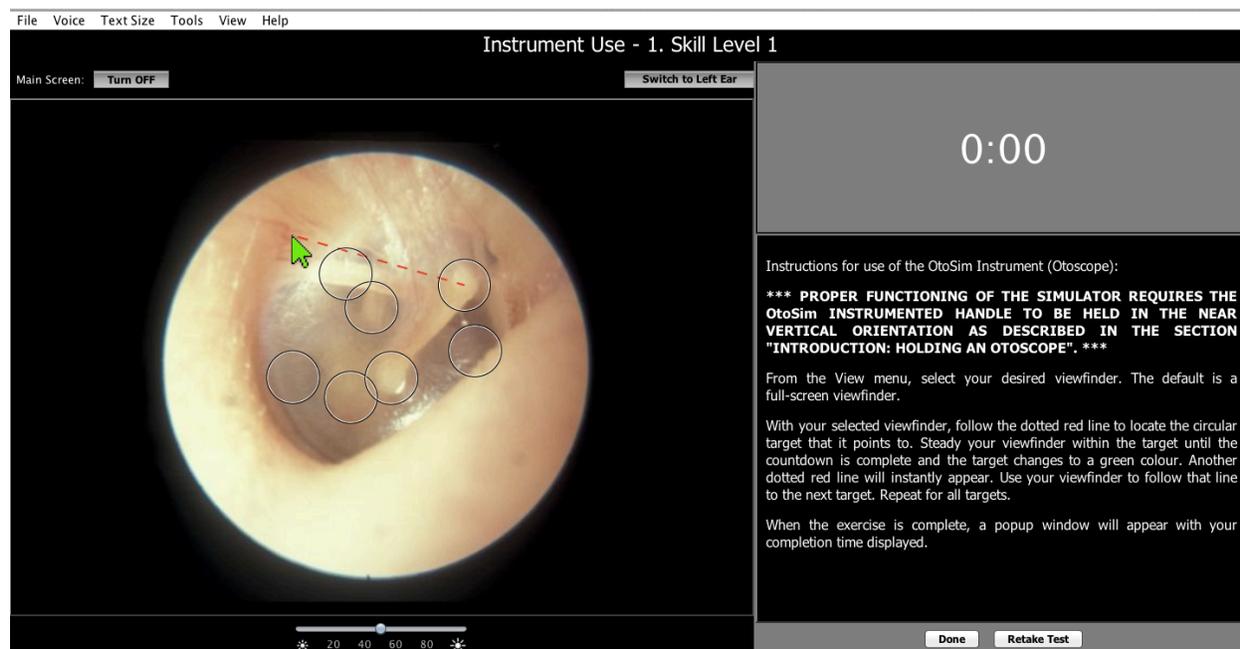
- The final option "Don't Show Viewfinder" will not draw any cross or arrow. This is the default option as it presents the most realistic view of the ear. In situations where a cross is required, such as in the Instrument Use section, a cross will be displayed.
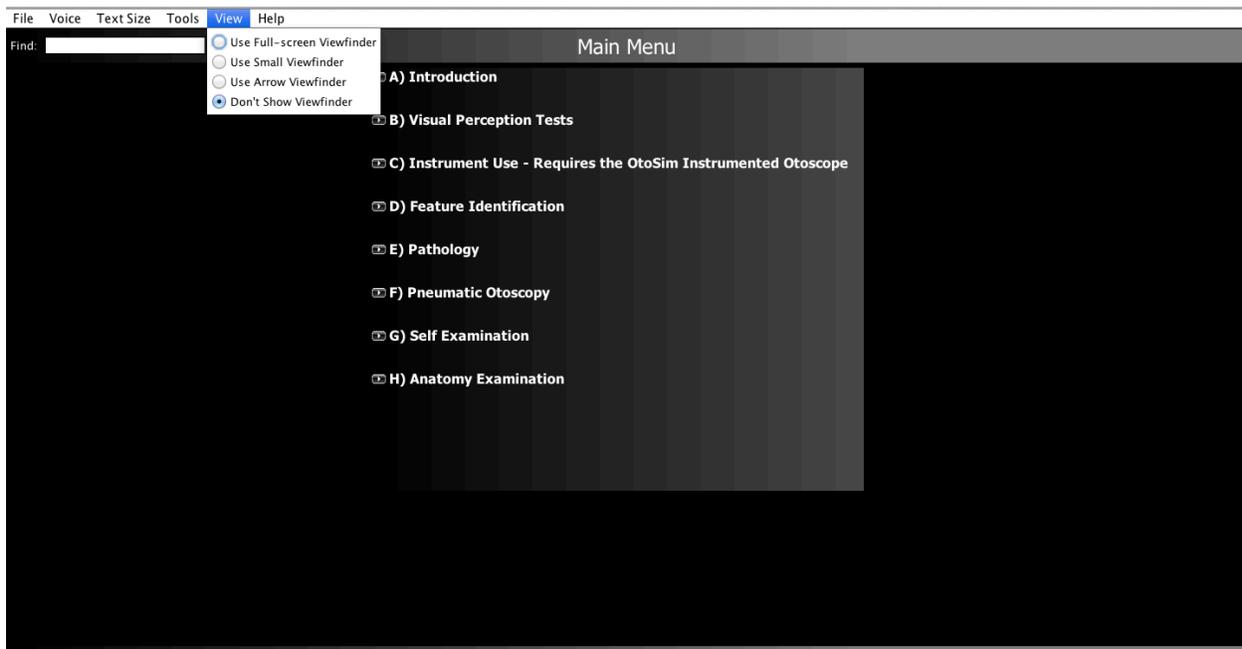
6. The Help menu allows you to view this manual again and learn about the people who helped make OtoSim a reality.
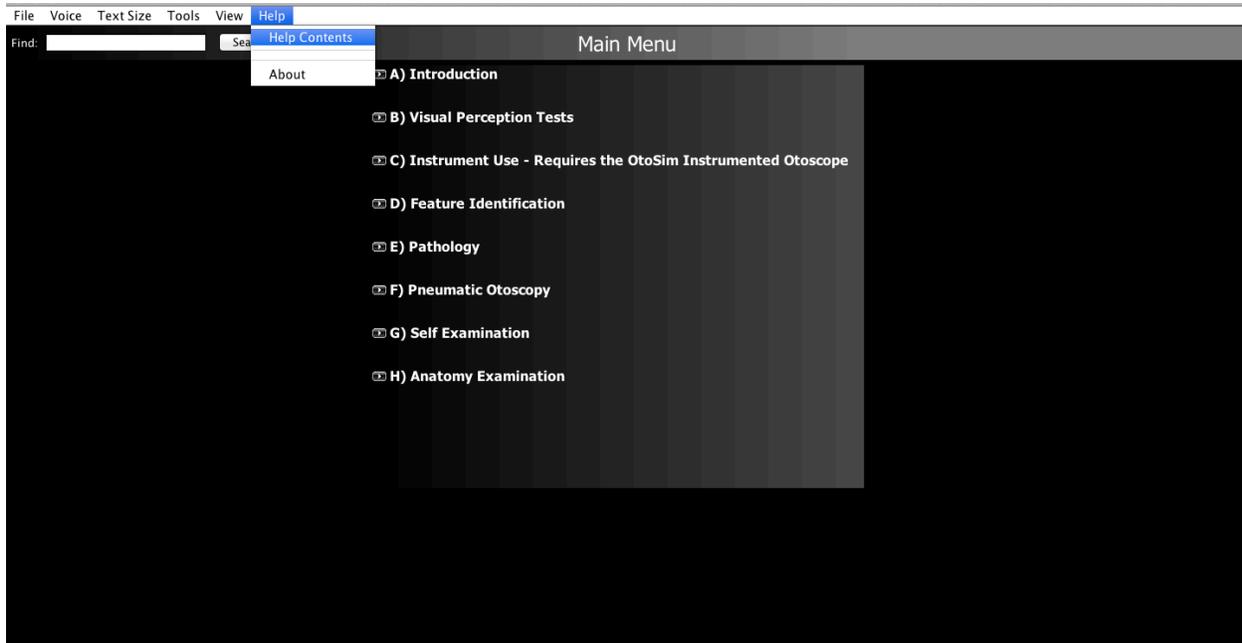
OtoSim 2 Training & Simulation System
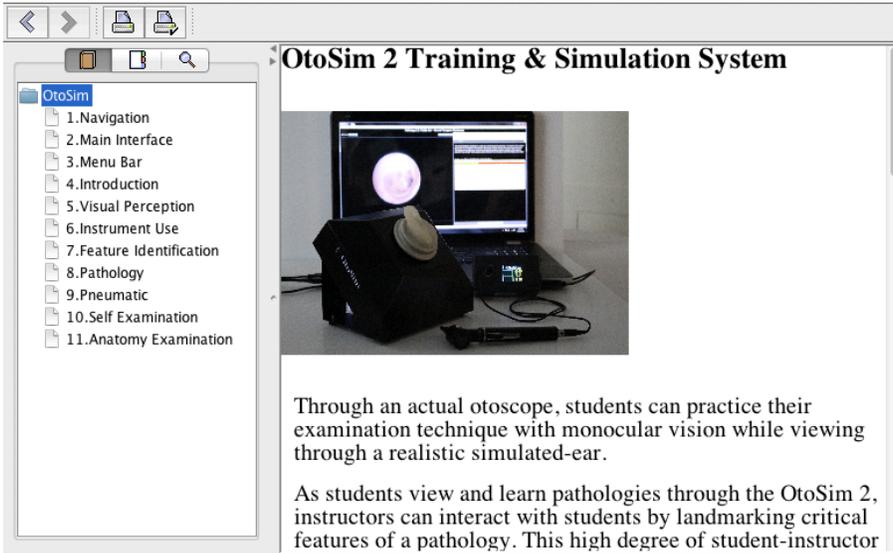
Through an actual otoscope, students can practice their examination technique with monocular vision while viewing through a realistic simulated-ear.

As students view and learn pathologies through the OtoSim 2, instructors can interact with students by landmarking critical features of a pathology. This high degree of student-instructor

OtoSim
1.Navigation
2.Main Interface
3.Menu Bar
4.Introduction
5.Visual Perception
6.Instrument Use
7.Feature Identification
8.Pathology
9.Pneumatic
10.Self Examination
11.Anatomy Examination

File   Voice   Text Size   Tools   View   Help

Help Contents
Find: Sea   About

Main Menu

A) Introduction

B) Visual Perception Tests

C) Instrument Use - Requires the OtoSim Instrumented Otoscope

D) Feature Identification

E) Pathology

F) Pneumatic Otoscopy

G) Self Examination

H) Anatomy Examination
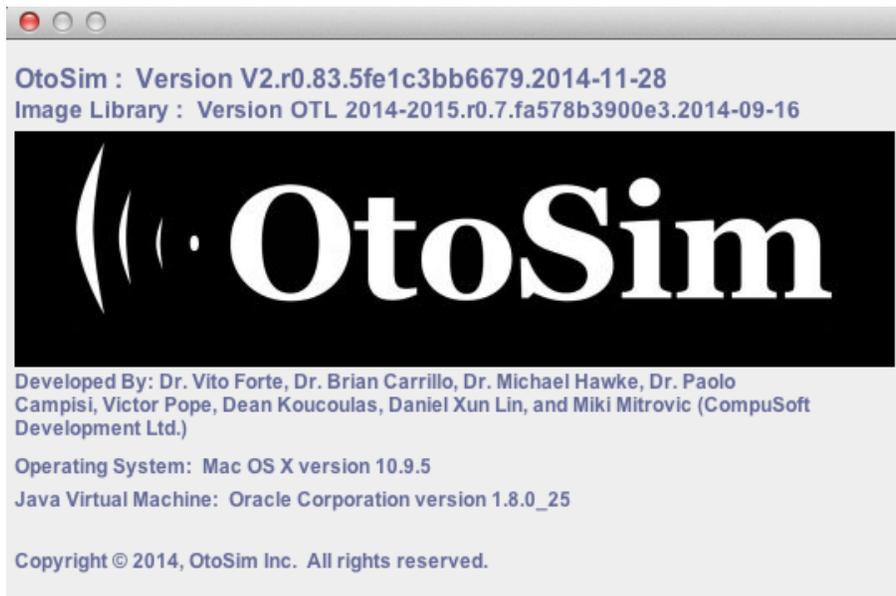
10.4 Introduction

These sections are self-explanatory.
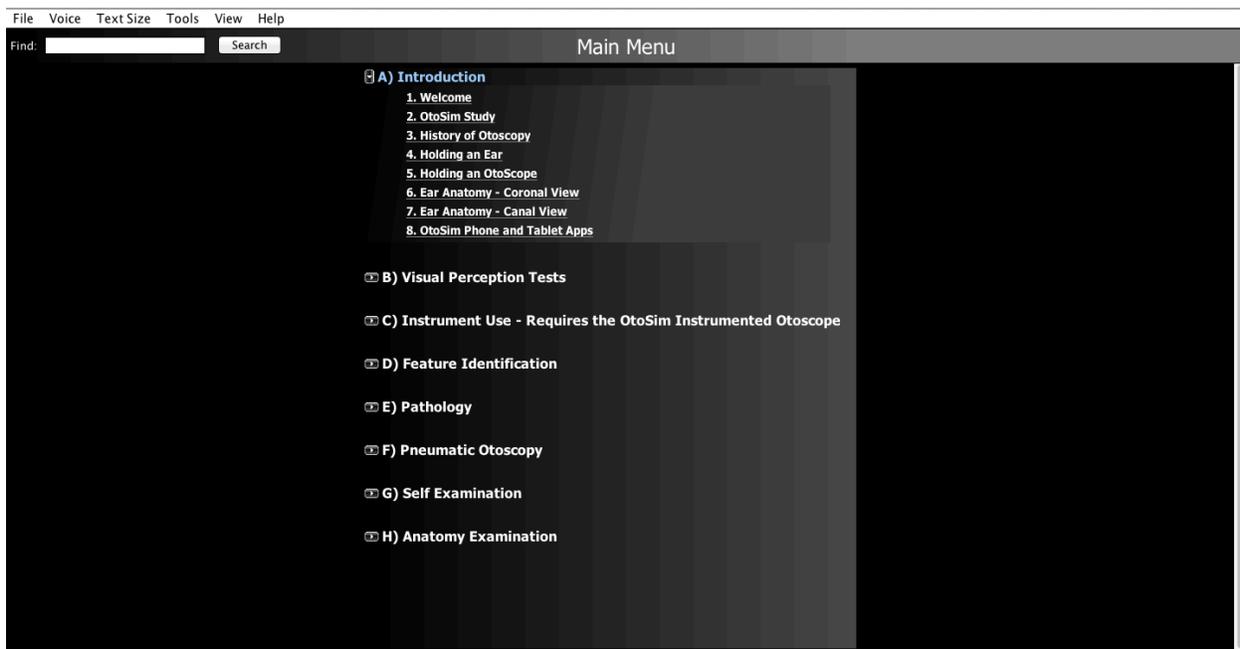
10.4.1 Welcome

Welcome

Congratulations on the purchase of OtoSim 2 and in taking the first step towards improving the effectiveness and accuracy of your otoscopic skills! Based on the global success of OtoSim, ongoing customer feedback, research, and our desire to deliver the highest, best value for the money simulator for achieving proficiency in your otoscopic skills, we introduce OtoSim V2.0. We hope you will explore and enjoy the many new interactive features of OtoSim V2.0 designed and developed with both instructor and student in mind, from novice to expert. We trust you will find it both instructive and enjoyable to use. You will notice a significant improvement in your skills as you continue to use and practice with OtoSim V2.0. Always improve yourself to provide better quality of care to your current and future patients.

Sincerely, OtoSim Inc.

Legal Notice: The otoscopic photographs in this application, unless otherwise specified, are the property of Dr. Michael Hawke, and are used with the author's permission. These photographs may not be reproduced without the specific permission of Dr. Hawke. Similar photographs for non-commercial educational purposes may be downloaded from www.hawkelibrary.com. Portions of the text have been derived from 'Diseases of the Ear: clinical and pathological aspects' by Michael Hawke, MD and Anthony F. Jahn, and are used with the author's permission.

Done

10.4.2 OtoSim Study

OtoSim Study

Research has demonstrated that OtoSim increases the diagnostic accuracy of medical students by 44%. A three-hour session using OtoSim increased the accuracy of diagnosis of various ear pathologies from 54% to 78% (www.OtoSim.com). OtoSim provides the opportunity to learn effectively through simulated hands-on experience. The interactive simulation allows students to practice otoscopic techniques alone or under the direct supervision and feedback of a trainer. The student is exposed to different clinical scenarios with a variety of high fidelity images. Instructor feedback and guidance can be provided immediately to the students via OtoSim's interactive platform thus significantly improving the effectiveness of otoscopy training.

Press "Next Page" button below to see expanded sections

Prev Page   Done   Next Page

10.4.3 History of Otoscopy

History of Otoscopy
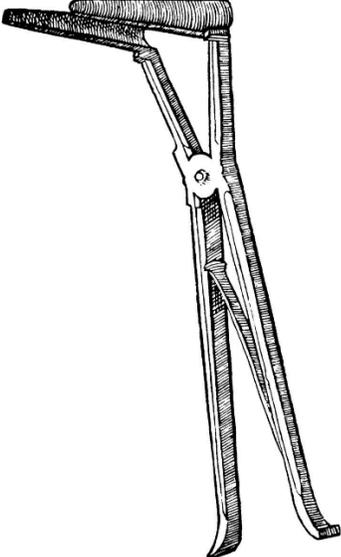
"You see, gentlemen, that we always come in a dreary circle, again to our starting point, viz. the fact that the profession, up to the present time, have not understood how to examine the ears, such being the case, we must find in this fact, a reasonable ground for the general unsatisfactory condition of the treatment of ear afflictions. (Anton Von Troltsch 1864 The diseases of the ear, their diagnosis and treatment. A textbook of aural surgery translated and edited by D.B. St John Roosa, William Wood & Co., New York.)

Ear disease has afflicted mankind since the days of prehistory. The severe sequelae and deadly nature of certain ear disorders were well known and described in classical Greek, Latin and Arabic medicine, although adequate knowledge of the anatomy of the ear was not forthcoming until more than a millennium later. Appropriate methods of ear examination are of even more recent origin. As with any deep seeded structure, it is necessary to illuminate the area to be examined. The lack of appropriate technology for lighting the depths of the external ear canal delayed the development of instruments for the visual examination of the ear canal and tympanic membrane until the 19th century. The history of otoscopy, the direct inspection of the external canal and tympanic membrane, mirrors the mechanical and technical developments of the 19th and early 20th centuries.

The first aural specula were devised to help extract foreign bodies from the ear canal, and not to examine the tympanic membrane. Guy de Chauliac, the famous 14th century surgeon, stated in his Collectorium artis chirurgicalis medicinae, published in 1363, that 'to diagnose different foreign bodies in the ear canal, it was best to inspect the ear, illuminated by sunlight, with the outer ear canal widened by means of a speculum'.

Fabricius Hildanus (1560-1634), city surgeon at Berne (then in Germany), is generally credited with devising the first aural speculum, and modified versions of this same speculum are in use to the present day. He was the first German surgeon to emphasize the need for an accurate knowledge of anatomy. Hildanus also described the neural interconnection between the external ear canal and the larynx

Prev Page   Done   Next Page

10.4.4 Holding an Ear

Holding an Ear
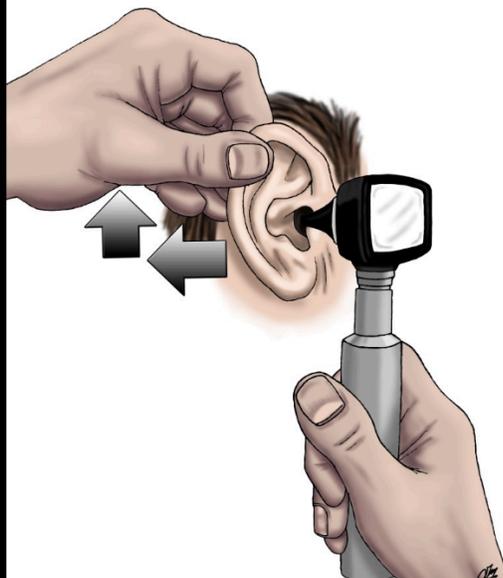
In order to straighten the external auditory canal for otoscopic viewing in the adult, the pinna is held gently between the thumb and the index finger and the ear is pulled posteriorly and superiorly. When examining the right ear, use your left hand to pull the ear; when examining the left ear, use your right hand to pull the ear.

For examining the child, pull gently in the direct posterior direction.

Done

10.4.5 Holding an Otoscope

It is critical that the OtoSim 2™ Instrumented Otoscope be held in the vertical position as shown for proper functioning and control of the Viewfinder. Further details are available in the *Section 10.6 Instrument Use*.

10.4.6 Ear Anatomy-Coronal View

Selecting the "Item: Show ON" button at the top of the first column demarcates the anatomical structure on the main screen. This particular example highlights the pinna.

Selecting the "Screen: Auto OFF" button (Red turns Green) at the top of the second column now allows the student to practice identifying anatomical structures on the main screen using the point and click of the mouse. When correctly identified the annotation will appear around the structure on the main screen and the program will automatically advance to the next structure down the list until all are correctly identified. This particular example highlights the pinna.

10.4.7 Ear Anatomy-Canal View

Selecting the "Item: Show ON" at the top of the first column demarcates the anatomical structure on the main screen. This particular example highlights the light reflex.

Selecting the "Screen: Auto OFF" button (Red turns Green) at the top of the second column now allows the student to practice identifying anatomical structures on the main screen using the point and click of the mouse. When correctly identified the annotation will appear on the main screen and the program will automatically proceed to the next structure down the list until all are correctly identified. This particular example highlights the umbo.

Selecting the "Next Page" button removes the tympanic membrane artistically revealing structures in the middle ear. Use the "Item: Show OFF" and "Screen: Auto OFF" buttons at the top of each column in a similar fashion as explained previously in *Section 10.4.6*. This particular example highlights the umbo.

Selecting the "Next Page" button removes the lateral temporal bone revealing the surrounding pertinent anatomy. Again toggle between columns until all anatomical structures are correctly identified. We hope you enjoyed the learning experience. This particular example highlights chorda tympani.

10.4.8 OtoSim Phone and Tablet Apps

File   Voice   Text Size   Tools   View   Help

OtoSim Phone and Tablet Apps

Carrier 📶   1:08 PM   ▬

‹ Index   Foreign Bodies

FOREIGN BODY (right ear)
A piece of cotton, long forgotten, lies hidden in the deep canal of this adult.

The ear canal is narrow, convoluted, and generally protected from foreign bodies. Nonetheless, a variety of extrinsic materials may become lodged in the ear either by accident, through neglect, or by deliberate insertion. The signs and symptoms produced by foreign bodies depend on the size, location, and composition of the foreign body. Large objects which cause complete obstruction of the ear canal will cause a conductive hearing loss and some discomfort. If the epithelium has been damaged, either by insertion or attempts at removal, there may be pain and bleeding from the ear. Organic foreign bodies such as vegetable or insect material often provoke a more severe inflammatory response with accompanying pain, swelling, and discharge.

Section 2.3, Page 1 of 6   ⚙

If you teach otoscopy and pneumatic otoscopy, we sincerely hope that the OtoSim application you are currently using has and will continue to aid your instruction. If you are a student, we strongly recommend that you liberally make use of the OtoSim Simulators that may be available to your training program.

In addition, OtoSim has a variety of companion apps for your phone and/or tablet device. These apps are perfect for student use. If you are interested in continuing your education using OtoSim products, please visit www.otosim.com to see what is available.

[Prev Page]   [Done]   [Next Page]

Please visit www.otosim.com for available Apps and other products.

10.5 Visual Perception Tests

Through years of experience, the inventors of OtoSim Inc. encountered many trainees with visual challenges. One important criterion in an effective diagnosis is the use of monocular vision through an otoscope.

To ensure that practitioners have adequate visual acuity, OtoSim includes standard visual perception tests to be used with the Otoscope, which are designed to test monocular vision. It is recommended that before reviewing the content of the program, each user tests their vision using the Otoscope, and takes the necessary actions to correct one's vision.
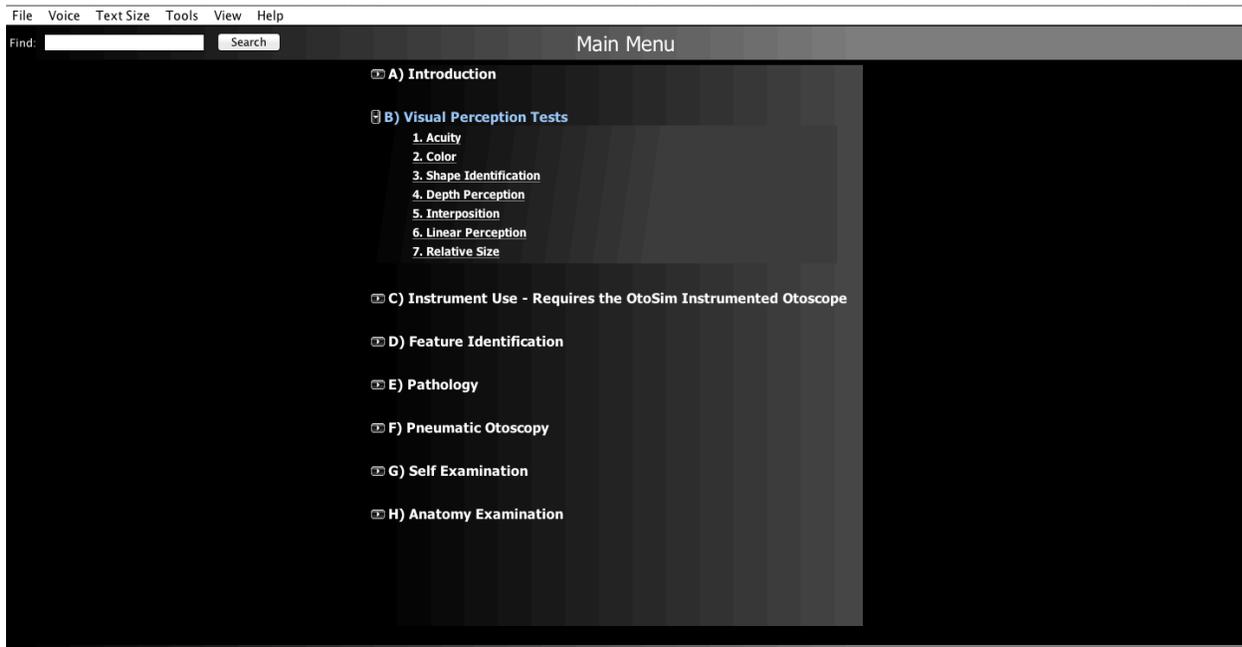
10.5.1 Visual Acuity

The first page is to test visual acuity. If the trainee cannot read the first 4 or 5 lines, they will not be able to diagnose effectively until their vision is corrected. Any vision correction should be prescribed by a licensed professional only.

File   Voice   Text Size   Tools   View   Help

Visual Perception Test - Acuity

Main Screen: Turn OFF

In order to satisfactorily examine the ear, the trainee must possess excellent visual acuity, the ability to distinguish shapes, colors and monocular "depth perception". The examples below provide an assessment of the minimally required visual skills.

Trainees should be able to read the first 5 lines to satisfactorily examine the ear.

10.5.2 Colour Blindness

A red/green colour blindness image will be displayed. The trainee should see the number 74.

10.5.3 Shape Recognition

There are 6 shapes. By clicking on one, you can display it on the OtoSim™ Base Unit and get the trainee to confirm that they can see it, and whether it is a representation of a 2D or 3D object.

To return to the panel of shapes, press the "Back" button.
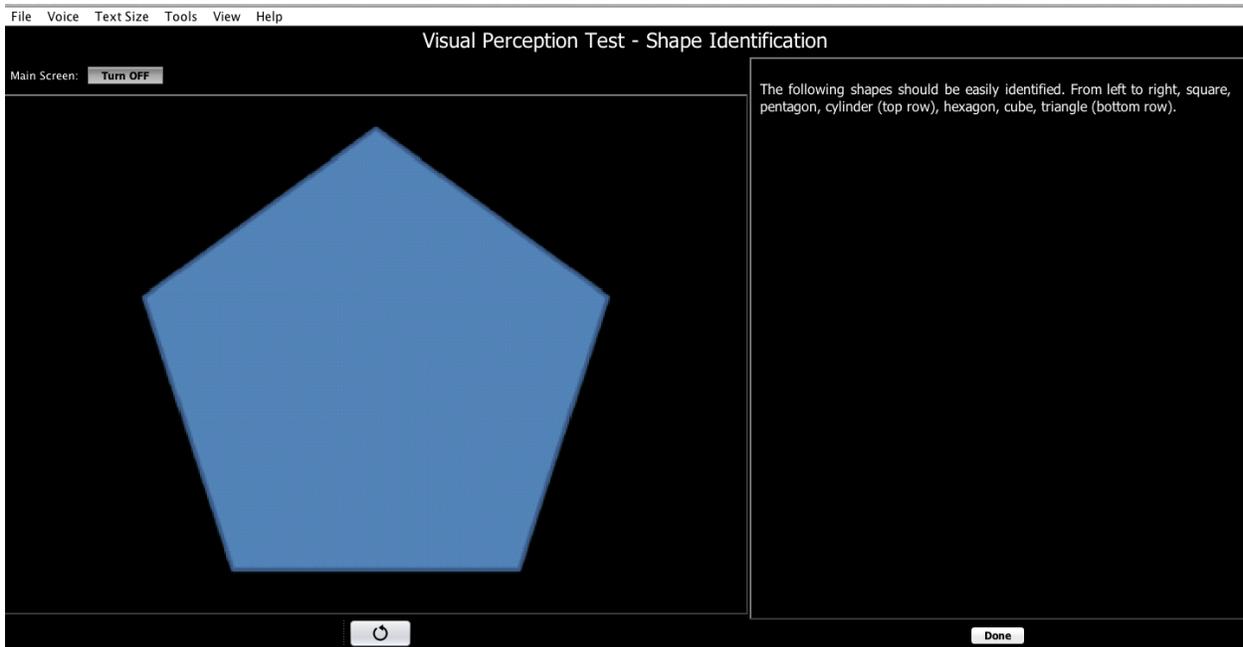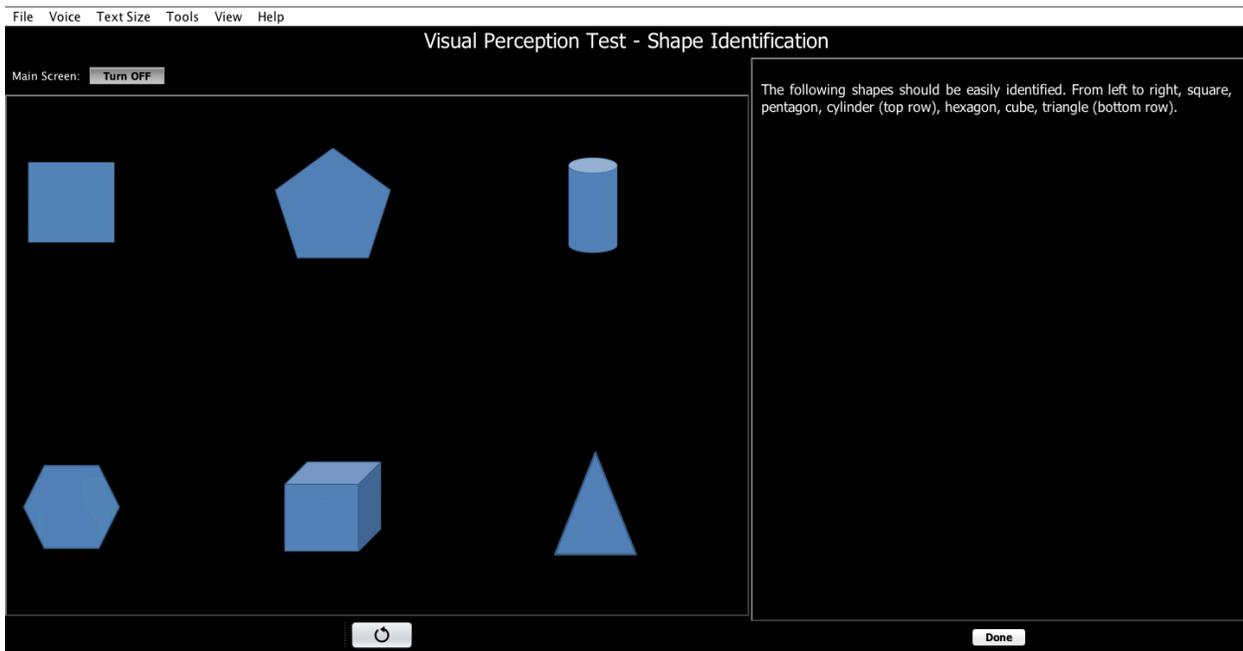
10.5.4 Depth Perception

While the images are 2-dimensional, with shading, trainees should perceive the images to be 3-dimensional (concave or convex bumps). This image tests if they can extrapolate to 3D based on shading. The bumps on the left should be perceived as coming out, while the bumps on the right as going in.
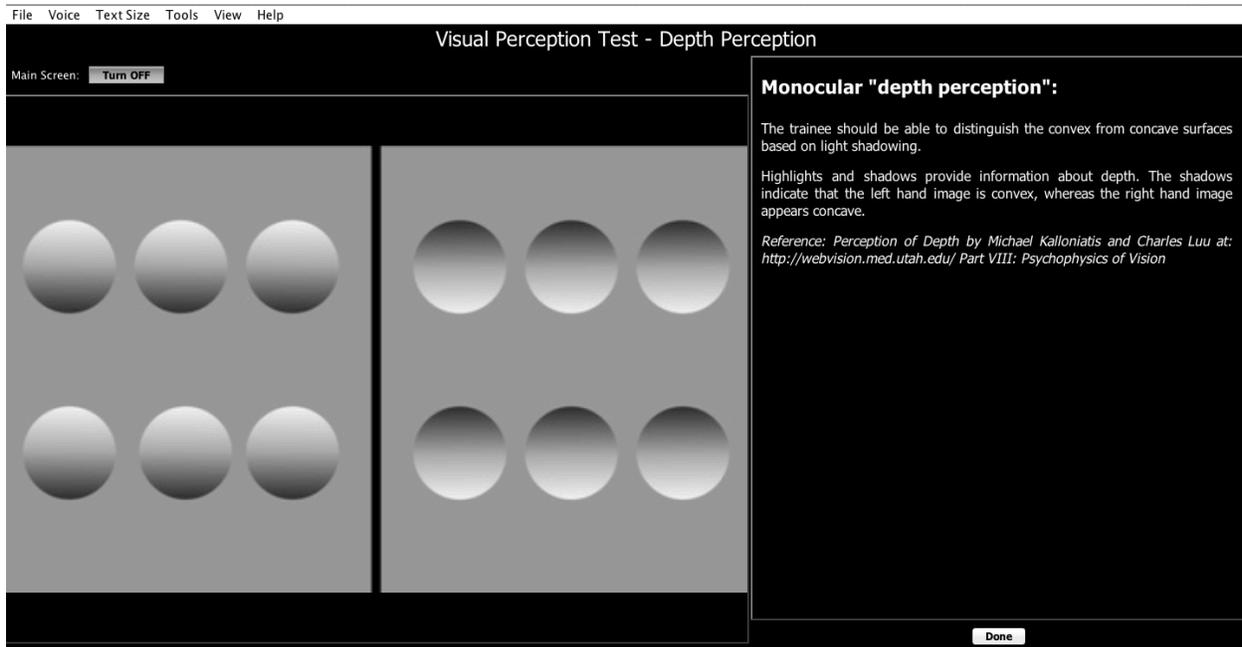
10.5.5 Interposition

The blue circle should be perceived as being in front of the red one.

Visual Perception Test - Interposition

Main Screen: Turn OFF

Interposition:

The blue circle appears to be closer because it overlaps the red circle.

Reference: Perception of Depth by Michael Kalloniatis and Charles Luu at: http://webvision.med.utah.edu/ Part VIII: Psychophysics of Vision

Done
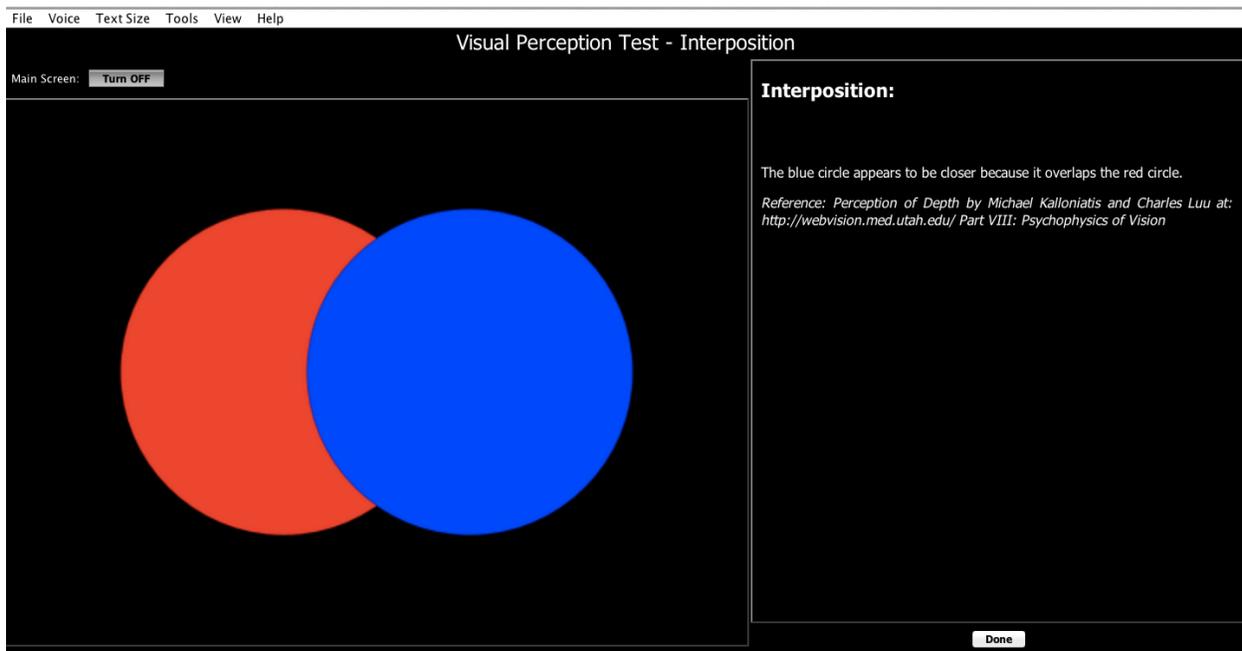
10.6 Instrument Use

This module contains tests designed to familiarize trainees with using the Instrumented Otoscope with the OtoSim™ Base Unit. Each test will consist of a series of targets that trainees must find. They must then stay within each target for several seconds. The timer starts once the trainee has completed the first target.

As the difficulty of each test increases, targets will decrease in size and their locations will vary. Each test will be timed. The lower the time, the better. To achieve proficiency, a trainee should practice regularly and aim to complete each test as quickly and efficiently as possible.

Each test is only considered complete once every target has been viewed. It will then turn red in the main menu. However, each test can be taken multiple times to improve your score.

This section requires using the OtoSim 2™ Instrumented Otoscope. Remember to calibrate the OtoSim 2™ Instrumented Otoscope as in *Section*

10.3 and to hold the scope near vertical during use as described in *Section 10.4.5*.
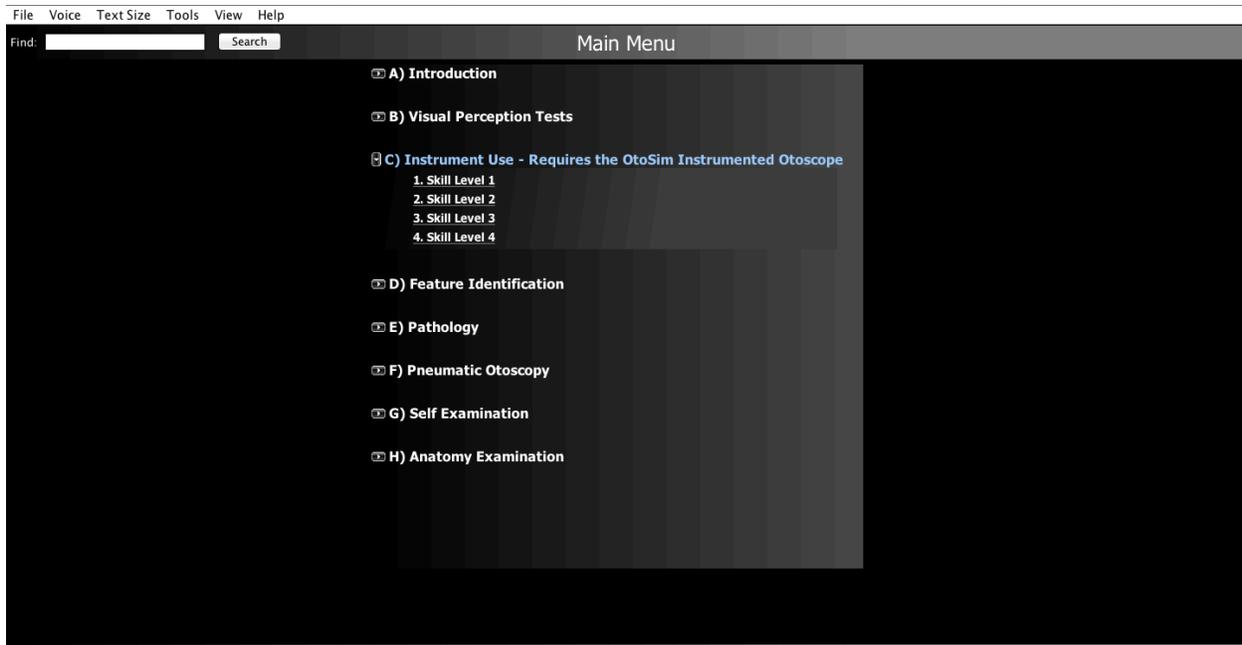
While viewing in the OtoSim™ Base Unit, follow the red broken line to the circular target. The circle border will turn red while within the target. Stay within the target until the countdown within the target reaches zero. The target will stay green in color and a new broken red line will guide you to the next target. Continue until all targets have been hit. The timer will stop and record your time to completion of the level. Practice to improve your time and accuracy and attempt all levels.
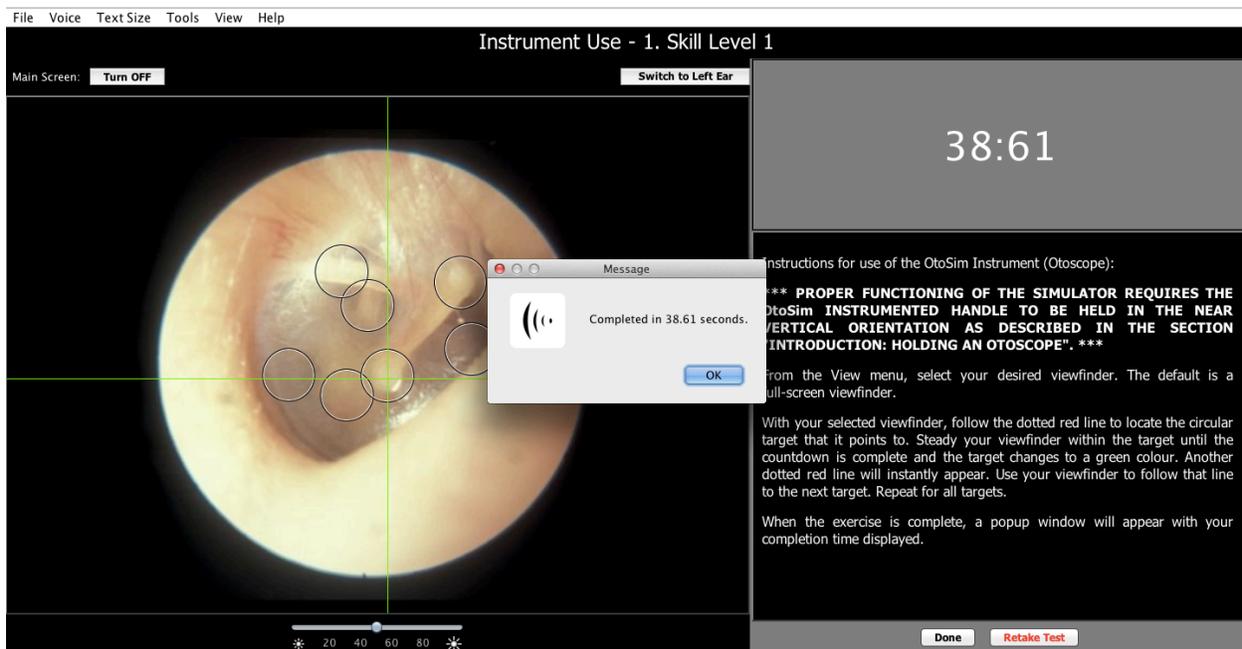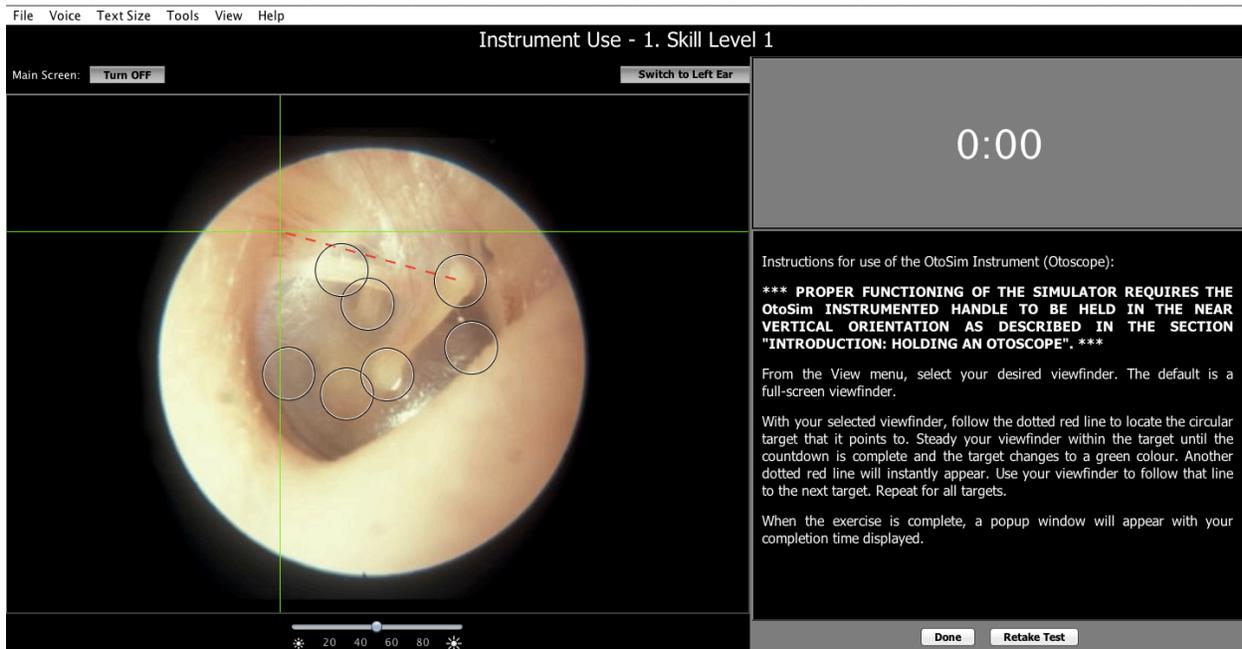
10.7 Feature Identification

This module contains tests designed to help trainees identify major landmarks in the ear. The list on the side allows the user to choose between the various landmarks, which are reflected in the OtoSim™ Base Unit.

Each section is only considered complete once every landmark has been viewed. It will then turn red in the main menu. However, each section can still be revisited.
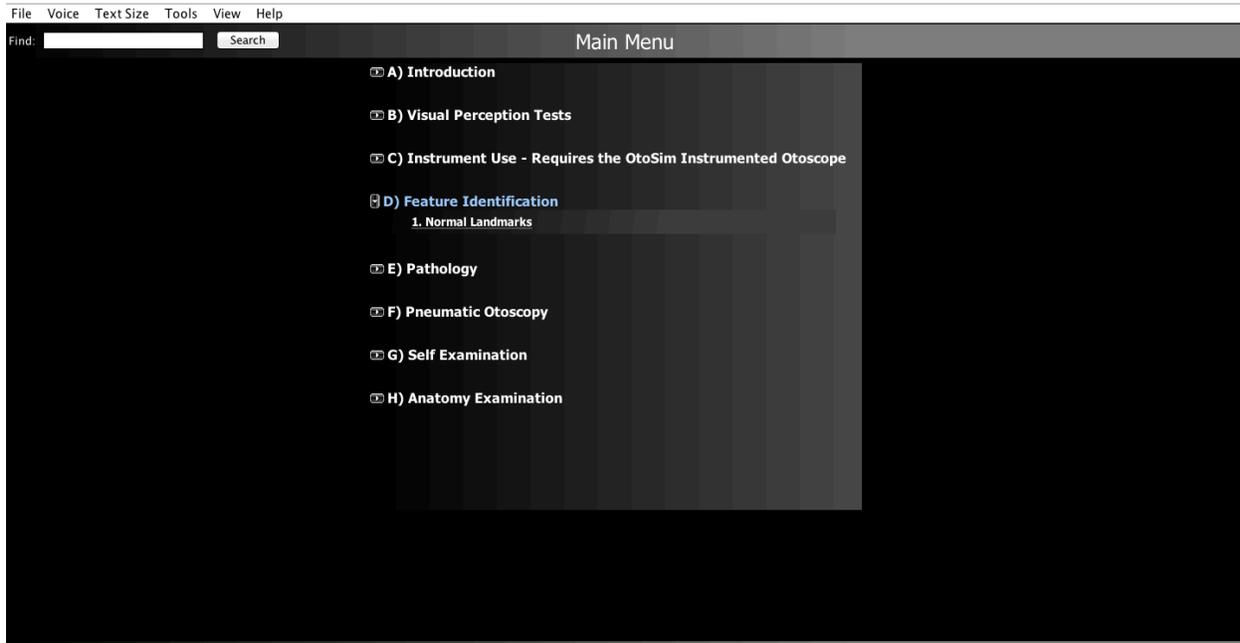
Open the Normal Landmarks section.

While viewing in the OtoSim™ Base Unit, target the structure highlighted in the chart with your Instrumented Otoscope. In this example the Primary Light Reflex is the selected target. It is visible on the main screen as a "hint", but not when viewed on the Base Unit. Remember the main screen can also be hidden totally by a mouse click on the "Main Screen: Turn OFF" button. When accurately identified, the tympanic membrane will be removed to view the middle ear structures while continuing to annotate the position of the landmark selected. The remaining lateral temporal bone will then also be removed in a time-based manner. If you do not have the OtoSim 2™ Instrumented Otoscope, or wish to view activity on the main screen, simply use the computer mouse-click to target the anatomical structures listed in the chart. Remember to practice your skills on both right and left ears!

File   Voice   Text Size   Tools   View   Help

Feature Identification - 1. Normal Landmarks

Main Screen: Turn OFF

Switch to Left Ear

Primary Light Reflex
Umbo
Short Process of the Malleus
Vascular Strip
Posterior Tympanic Annulus
Anterior Tympanic Annulus
Inferior Tympanic Annulus
Long Process of the Incus
Stapedius Tendon
Chorda Tympani
Promontory
Round Window Niche
Eustachian Tube
Pars Flaccida of the Tympanic Membrane
Pars Tensa of the Tympanic Membrane

If you have a OtoSim instrumented otoscope, use it to find the landmarks in the simulator. Hold the crosshairs on the landmark for 3 seconds to reveal the anatomy of that landmark. The currently selected landmark is highlighted for you on the main screen. If you do not have an instrumented scope, you may click on the landmark on the main screen with your mouse to continue.

The **primary light reflex** is an indication of a conically shaped tympanic membrane in the normal anatomical position. It is sometimes referred to as the "cone of light" and is produced by the reflection of light from the otoscope back to the eye. Although important, a normal cone of light does not necessarily indicate a normal, healthy tympanic membrane.

Secondary light reflexes may also be visible. They may be present on normal tympanic membranes, but may also be produced by areas of

20   40   60   80

Done   Next Feature

File   Voice   Text Size   Tools   View   Help

Feature Identification - 1. Normal Landmarks

Main Screen: Turn OFF

Switch to Left Ear

Primary Light Reflex
Umbo
Short Process of the Malleus
Vascular Strip
Posterior Tympanic Annulus
Anterior Tympanic Annulus
Inferior Tympanic Annulus
Long Process of the Incus
Stapedius Tendon
Chorda Tympani
Promontory
Round Window Niche
Eustachian Tube
Pars Flaccida of the Tympanic Membrane

Accurately completed structures will appear red in the table. Work through the entire list. Have fun!
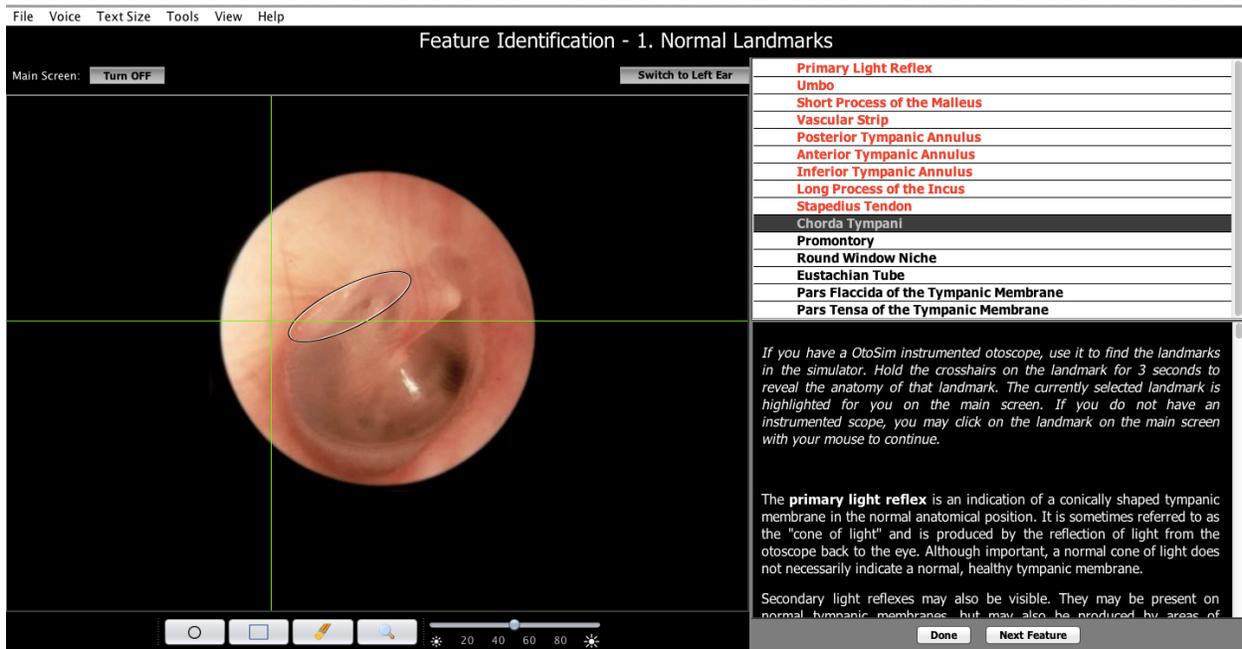
10.8 Pathology

This module contains most of the OtoSim 2™ content, with multiple images for each different condition. This section is divided into various sections and sub-sections, which characterize each condition. The viewable subheadings are underlined and will turn blue when the mouse passes over them.

Once a condition is selected, the trainee is free to examine it freely. However, annotations or other mark-up may be added by the instructor using the tools detailed in *Section 10.2*.

Each section is only considered complete once every image in a section has been viewed. It will then turn red in the main menu. However, each section can still be revisited.

As an example: In the Pathology Module, open the Middle Ear-Acquired Cholesteatoma section.
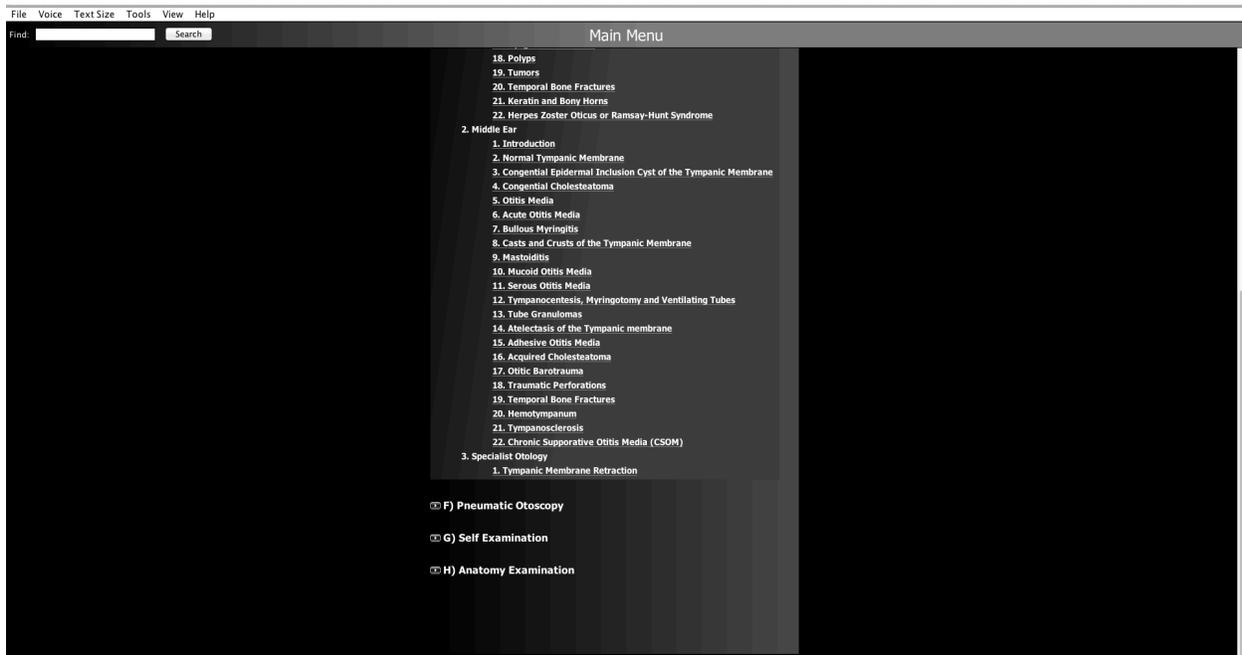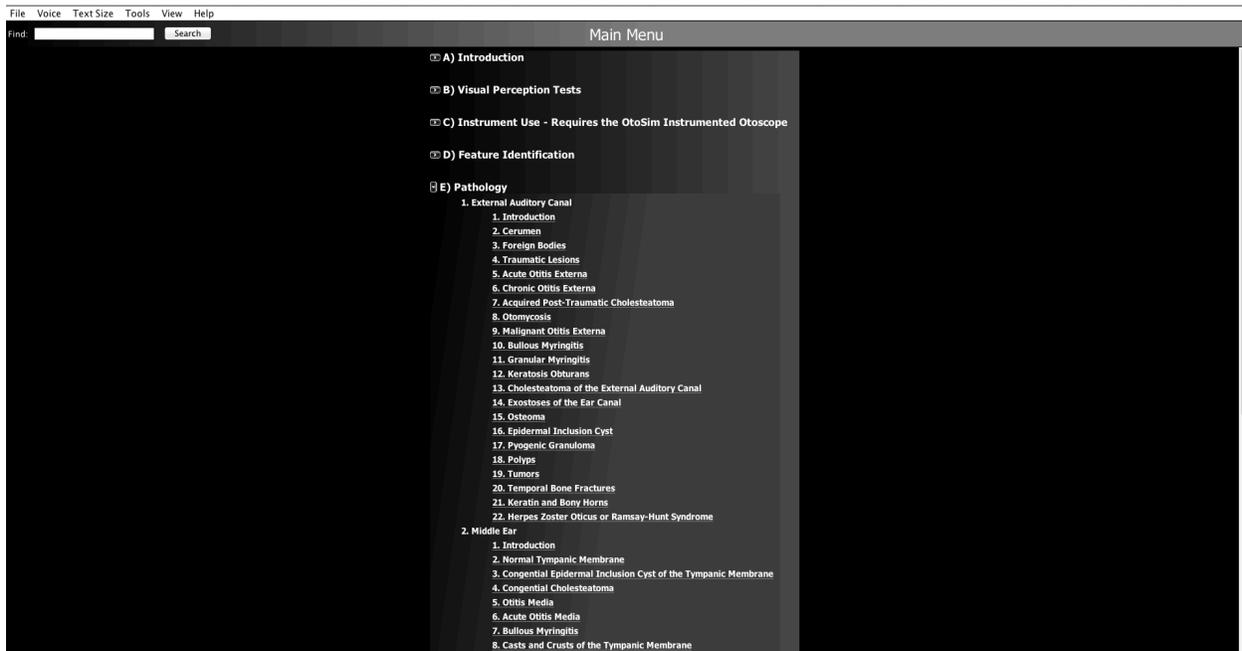
Some images are annotated, and the table of annotations will be below the image description. By turning on the first column (by clicking on its red header), the landmark will be shown on the screen and in the Base Unit.

By turning on the second column, landmarks will be hidden until clicked on with a mouse.

Work through the entire list.

By turning on the third column, the landmark and tracking of the Instrumented Otoscope will be visible on the main screen but will be hidden in the Base Unit until targeted with the Instrumented Otoscope.

Work through all pages of each section until completed denoted by red color. You may revisit any page at anytime.

Note: Calibration of the OtoSim 2™ Instrumented Otoscope and proper holding and use of the scope are essential for complete satisfaction and maximal enjoyment. Remember to calibrate the OtoSim 2™ Instrumented Otoscope as in *Section 10.3* and to hold the scope near vertical during use as described in *Section 10.4.5*. Practice using the scope as described in *Section 10.6 Instrument Use*. Practice, practice, practice!

10.9 Pneumatic Otoscopy

This module specializes in demonstrating Pneumatic Otoscopy. This section is divided into two sections, one of which contains videos and the other allows for students and instructors to directly interact with each simulated pathology. For full functionality, additional hardware – PneumatoSim™ Upgrade Kit is required available through www.OtoSim.com.

View videos of pneumatic otoscopy by selecting from the list. The videos can be projected onto the OtoSim™ Base Unit.
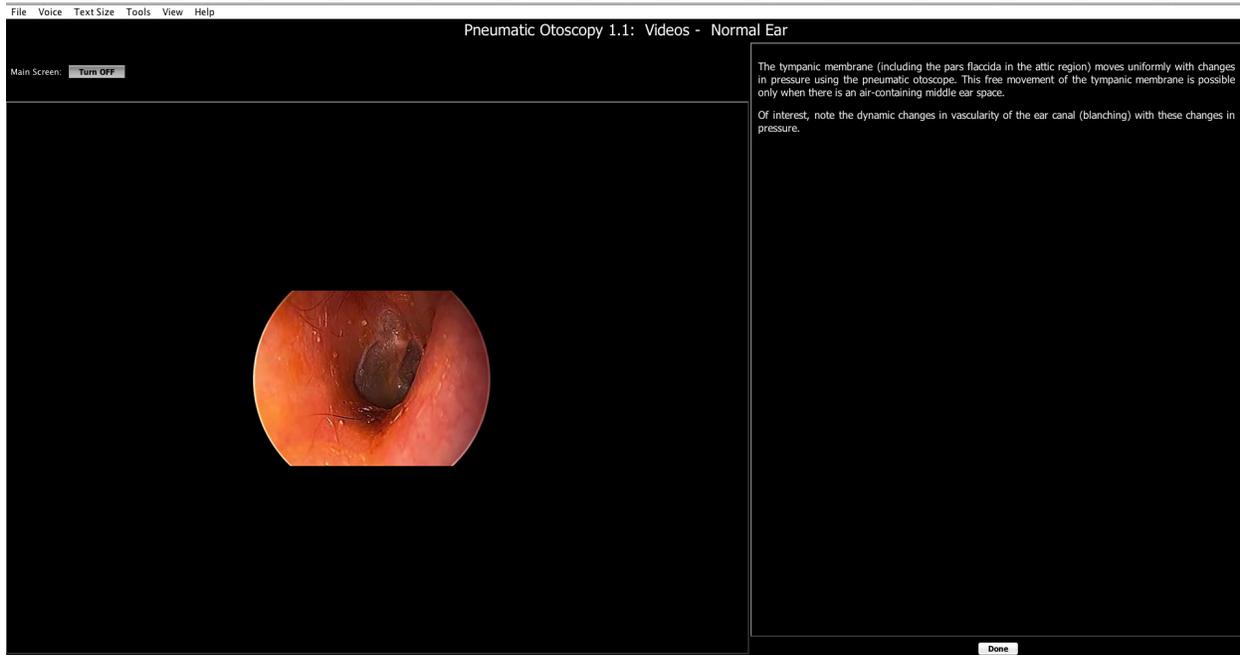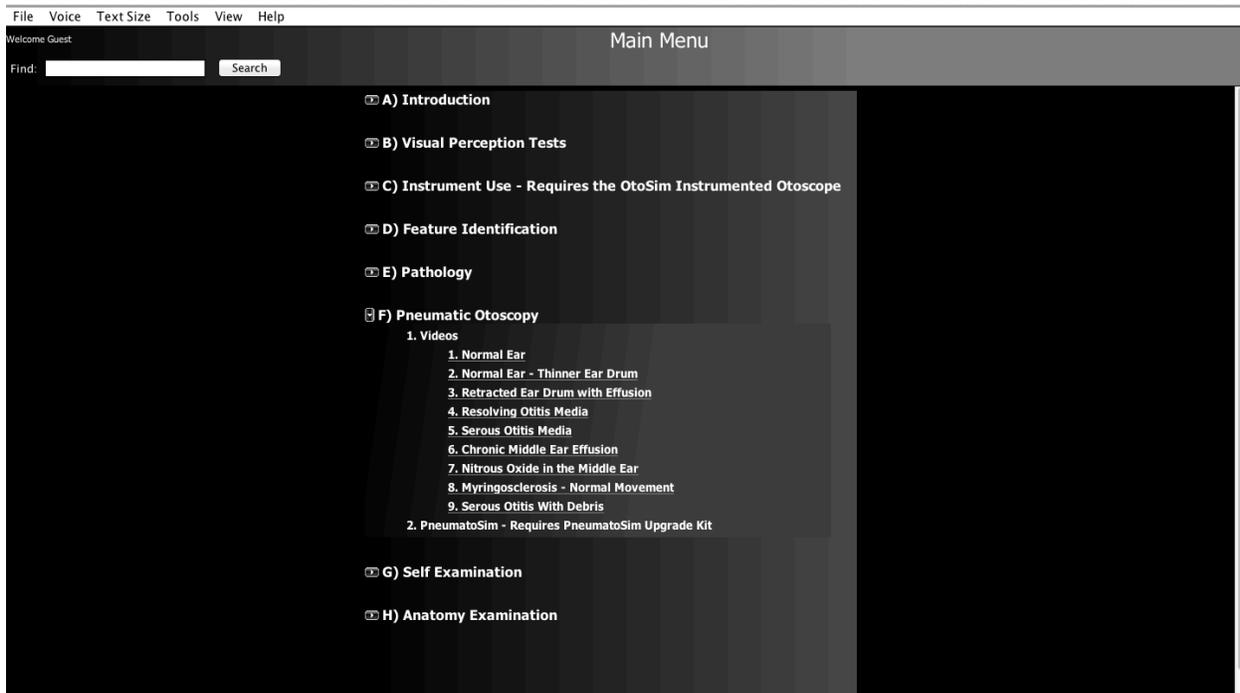
Simulation training for pneumatic otoscopy requires the PneumatoSim™ Upgrade Kit, which is not included with OtoSim 2™ and can be purchased from us.
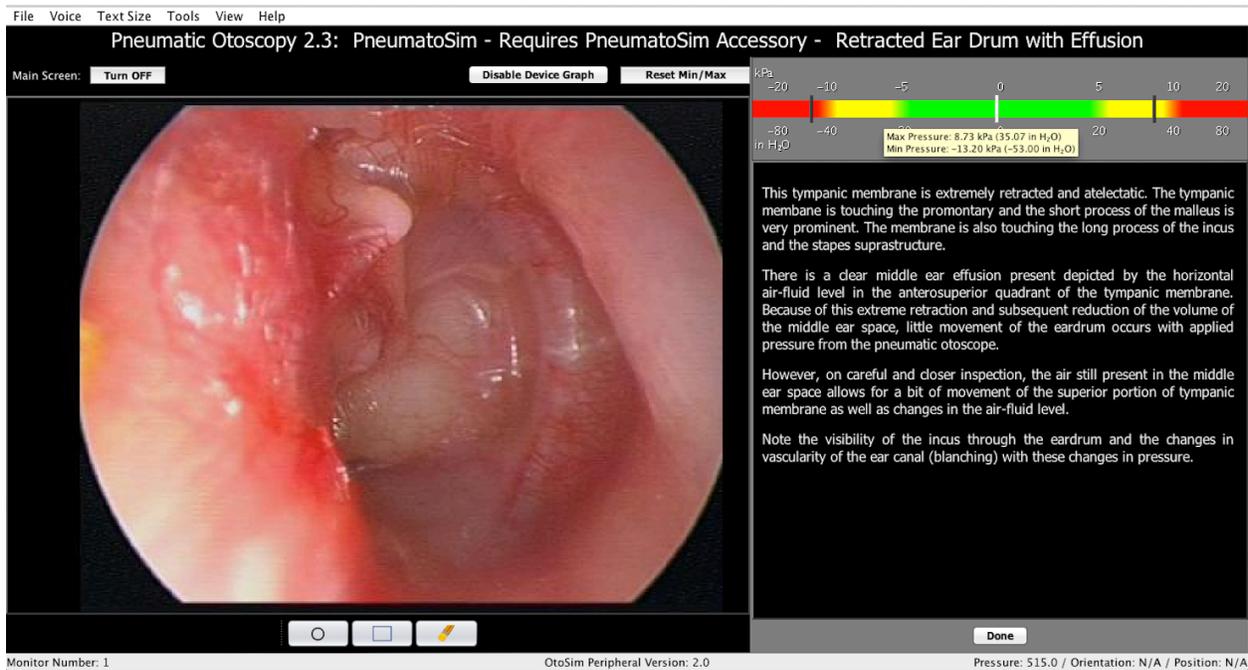
This is a screen shot of PneumatoSim™. Dynamic movement of the tympanic membrane occurs with pressure generated from the Pneumatic Otoscope. Pressure generated is monitored and displayed to the student for maximum feedback and proper safe translation to clinical usage.

Contact us at sales@otosim.com to purchase the PneumatoSim™ Upgrade Kit.

10.10 Self Examination

This module contains a variety of quizzes designed to prepare trainees for the examination. They are timed, but trainees are free to continue after the timer has expired. In addition, they will get as many attempts to answer each question as required. Questions do not have to be answered in order and each quiz is considered complete only once every question has been answered correctly.

The goal of this module is to be a learning aid, not a rigorous examination, so trainees are free to attempt each quiz multiple times and use them to track their progress.

The following screen is shown before a quiz starts:
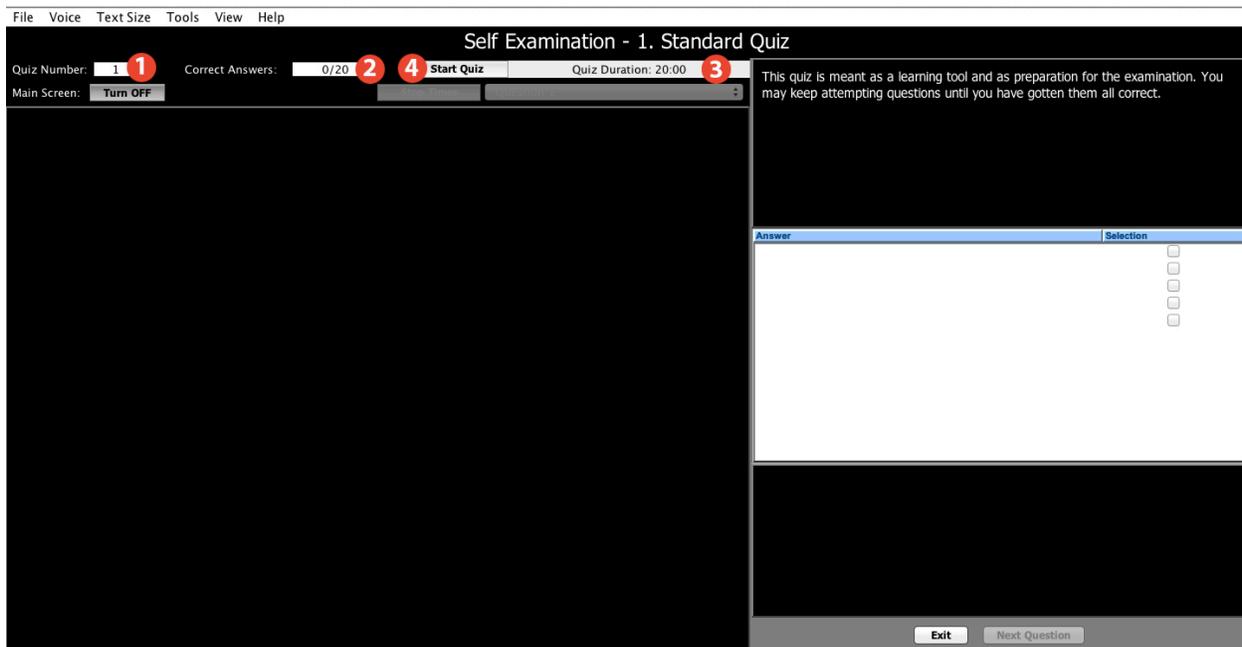
1. This area shows the number of the current quiz.

2. This shows the total number of questions in this quiz and the number of correct answers.

3. This shows the suggested amount of time to complete this quiz.

4. The "Start Quiz" button will start the timer and reveal the first question.

1. The box in the top left displays the amount of time remaining. It will slowly fill up as time passes. When full, an alert will sound, but the trainee can continue answering questions.

2. If required, a trainee can pause the timer to take a break.

3. This dropdown list allows trainees to jump to any other question in the quiz.

4. The question is displayed in the box on the right.

5. The possible answers are displayed in the list on the right. The trainee can choose their response by clicking in the area marked "Selection", where they will get instant feedback telling them if they were correct or not.

6. If a trainee was incorrect, a hint is displayed in this box to help them get the correct answer.

7. The "Next Question" button will take the trainee to the next unanswered or incorrect question.

8. The "Done" button allows the trainee to return to the main menu. If every question is answered correctly, the quiz will be marked red in the main menu. However, the trainee is free to return to the quiz and reattempt it to refresh their knowledge.


10.11 Anatomy Examination

This module contains a variety of anatomical quizzes designed to prepare trainees for the examination. They are timed, but trainees are free to continue after the timer has expired. In addition, they will get as many attempts to answer each question as required. Questions do not have to be answered in order and each quiz is considered complete only once every question has been answered correctly.

The goal of this module is to be an anatomical learning aid, not a rigorous examination, so trainees are free to attempt each quiz multiple times and use them to track their progress.

There are 2 sections; the first requires use of the OtoSim 2™ Instrumented Otoscope and the Base Unit. The second is for use with the computer only and a mouse-pointing device.
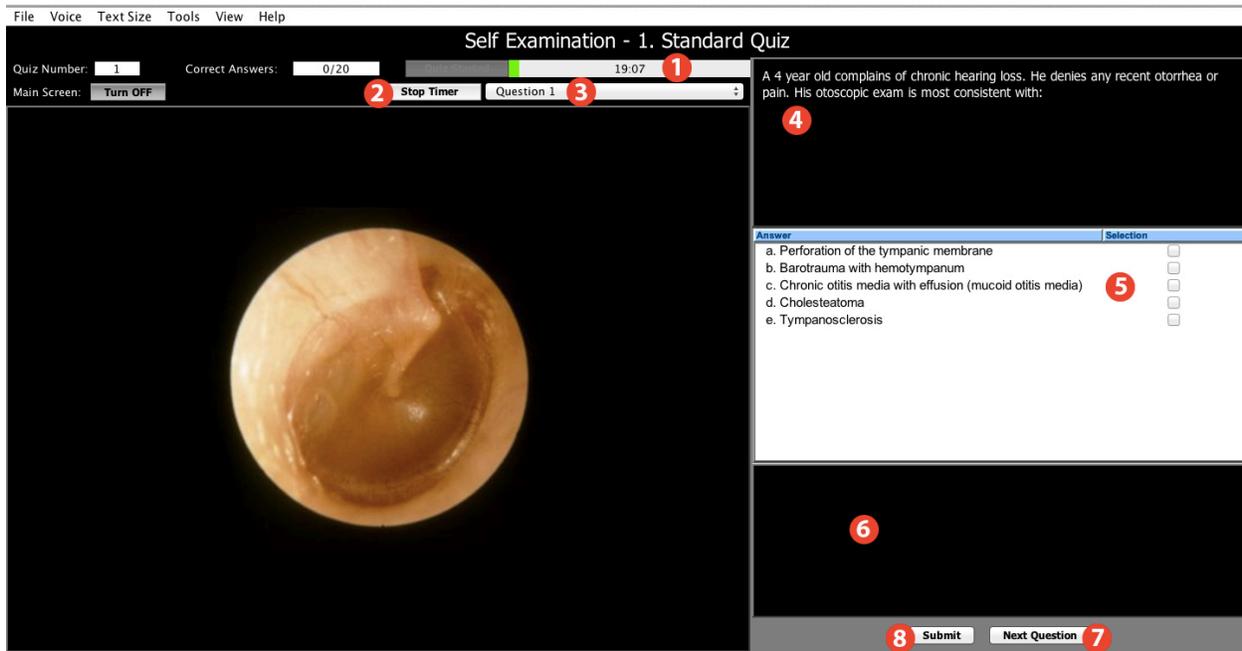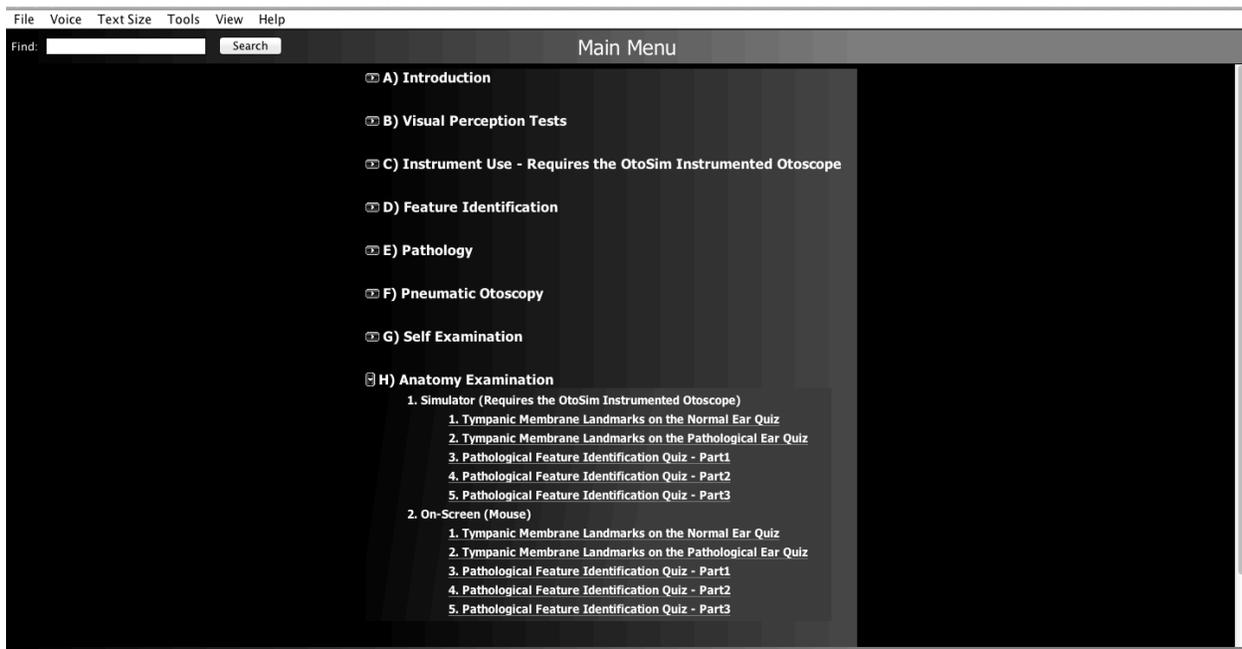
The following screen is shown before a quiz starts:

1. This area shows the number of the current quiz.

2. This shows the total number of questions in this quiz and the number of correct answers.

3. This shows the suggested amount of time to complete this quiz.

4. The "Start Quiz" button will start the timer and reveal the first question.
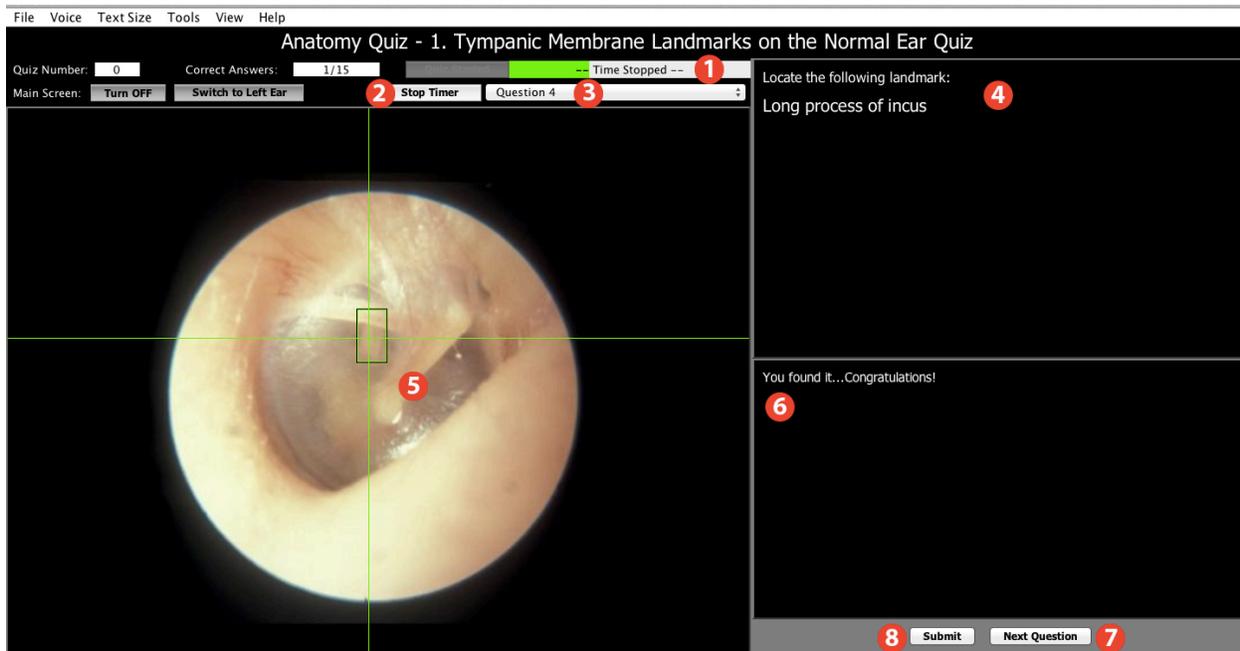
1. The box in the top left displays the amount of time remaining. It will slowly fill up as time passes. When full, an alert will sound, but the trainee can continue answering questions.

2. If required, a trainee can pause the timer to take a break. The trainee can then resume the timer with the same button.

3. This dropdown list allows trainees to jump to any other question in the quiz.

4. The question is displayed in the box on the right.

5. An image of the ear is displayed here, if using the On-Screen version, the trainee will be required to click on the appropriate landmark on the image of the ear.

6. The trainee is informed if they are correct in this box.

7. The "Next Question" button will take the trainee to the next unanswered or incorrect question.

8. The "Submit" button allows the trainee to return to the main menu. If every question is answered correctly, the quiz will be marked red in the main menu. However, the trainee is free to return to the quiz and reattempt it to refresh their knowledge.

The second section is for the On-Screen (Mouse) version.

The computer mouse-pointing device is used to target the anatomical structure and the annotation appears when successfully identified by clicking on it on the main screen.
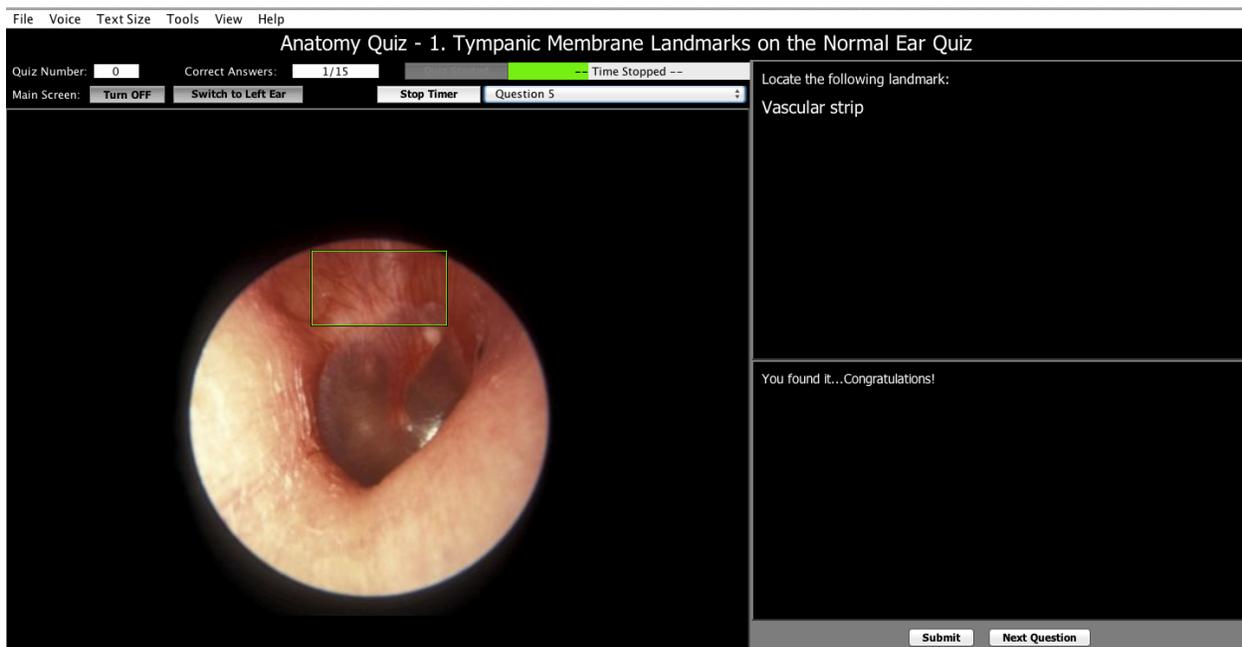
This concludes the Software Use and Navigation for OtoSim 2™ .

11. Troubleshooting

- There is no on/off switch for the OtoSim™ Base Unit. It is fully powered by the USB cable when connected to the computer.

- Make sure the USB hub you choose to use has an external power supply (AC adapter), is rated 480 MBPS, and is classified as USB 2.0.

- Ensure your operating system is fully up-to-date.

- Windows and its various updates may cause complications. Check for any software updates for your operating system and download them if there are any.

- When in doubt, reboot the computer. Repeat *Section 7* for PC; *Section 8* for Mac.

    o Please disconnect all Base Units and USB hubs before you restart your computer.

    o Once the computer reboots, give your computer time to load properly.

- Without any Base Units connected, attach the USB hub first. Make sure the AC adapter for the USB hub is connected to a power source. Please refer to *Section 6* for safe operation procedures.

    o Individually connect each Base Unit one-by-one. After plugging the first unit in, give time for the computer to process the connection. Your screen will flicker on/off, and your computer will emit a "USB-connected" sound. Wait several moments for the computer to process.

    o Insert the next Base Unit into the next port in the USB hub.

- Ensure that the DisplayLink Drivers are fully up to date.

- If your laptop is attached to a docking station, you may encounter some display driver compatibility issues. As such, please disconnect the laptop from the docking station and proceed with normal installation and usage of the OtoSim™ Base Unit, as described in this manual.

- If you are using dual monitors and the computer cannot detect the OtoSim™ Base Unit, make sure that the monitor is placed to the right-side of the main monitor, with the **top edges** aligned (see diagrams in *Sections 7.2* and *7.3* for PC; *Section 8.2* for Mac).

- To uninstall the OtoSim 2™ software, please utilize your computer's standard uninstallation procedure.

If you are still having trouble, or need someone to vent to, feel free to send us an email (info@otosim.com) and set-up an appointment for technical support. We will typically respond within 24 hours, Monday to Friday. Thank you for your continued support for our medical training and simulation products.

OtoSim

BETTER EAR AND EYE TRAINING, BETTER OUTCOMES

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