

Video Otoscopes

An Overview of the Market and Technology

March 30, 2011

A Webinar from the Telehealth Technology Assessment Center

Welcome

- Slides and recorded presentation will be posted to the website – www.telehealthtac.org
- Funding for this presentation comes from the Health Resources and Services Administration, the Office for the Advancement of Telehealth, and Indian Health Services
- Presented in partnership with the Regional Telehealth Resource Centers – www.telehealthresourcecenters.org

Welcome – Overview of Today’s Talk

- Definition of Terms
- Technology Overview
- Making Them Work – VTC and Store-and-Forward
- A Look at the Market
- Thoughts on Imaging
- Image Comparisons
- Summary
- The Toolkit
- Q&A

Definition of Terms

A look at the terminology associated with video otoscopes

Definitions – The Categories

- Otoscopes with Video Output
 - Multiple video connector options
 - S-Video
 - Composite
 - HDMI
 - DVI
 - Multiple interface options
 - Stand-alone monitors
 - VTC Endpoints
 - “Framegrabber” video cards
 - Video-USB adapters

Definitions – The Categories

- Otoscopes with USB Output
 - Requires a computer to view video
 - Multiple interface options
 - Live VTC software
 - Store-and-forward software applications

Definitions – Resolution

- Standard Definition
 - 640x480 pixels (NTSC)
 - ~300,000 pixels, or $< 1/3$ megapixel
 - Uses S-Video or Composite cables / connectors
 - 4:3 aspect ratio
- High Definition
 - 1280x720 vs 1920x1080
 - ~1 megapixel vs ~2 megapixels
 - Uses HDMI, DVI or Component cables / connectors
 - May have 16:9 aspect ratio

Technology Overview

A look at how the devices work, and common features, functions, and issues surrounding this technology

The Parts



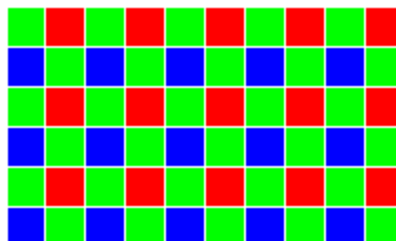
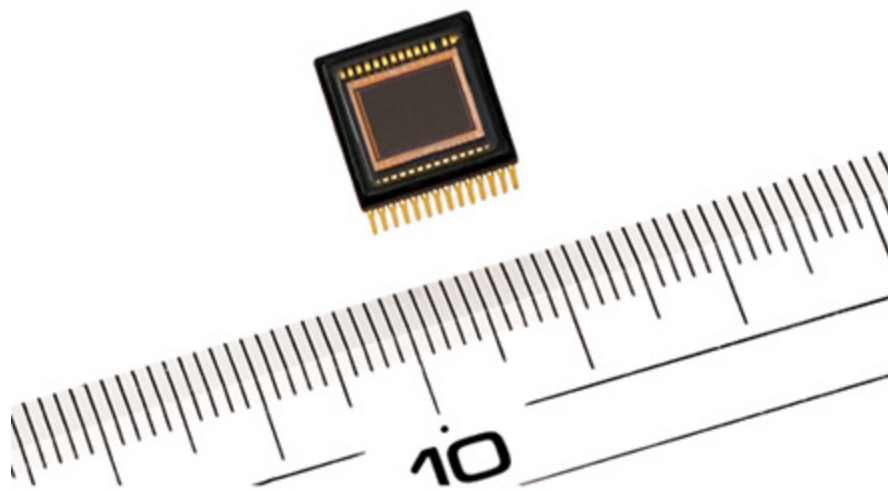
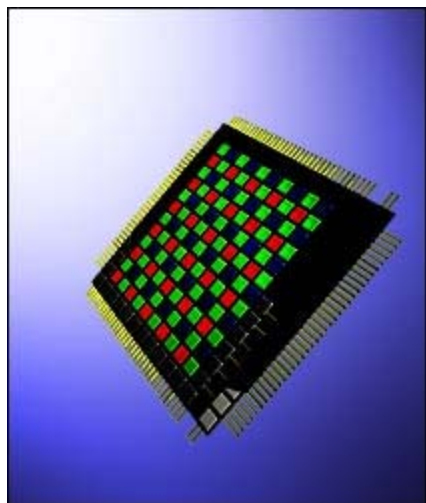
The Parts – Specula



The Parts – Probe



The Parts – Imaging Sensor



The Parts – Focus Ring



The Parts – Light Source

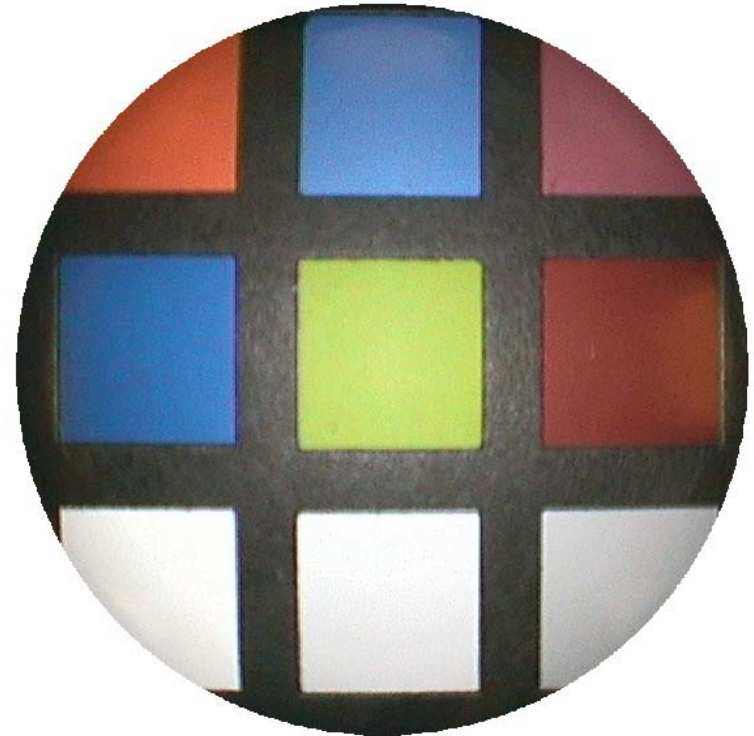


The Parts – Cables

- Fiber Optics
- Power – to Probe
- Power – to Light Box
- Video Output – to Light Box
- Video Output – to Auxiliary Device
- USB

White Balancing

- Automatic
 - Slight adjustments may change color
 - Performance varies
- Manual
 - Reset the sensor to “white” before use



Light Intensity

- Manual controls for increasing or decreasing the brightness of the lights
- Lower light levels may reduce “blooming” in images
- Not all devices support this



Sensor Sensitivity

- “Gain Control”
- Automatic
 - Easier to use
 - Can result in variations in color or brightness with minor movements
- Manual
 - Easier to control
 - May require frequent adjustments to get the best image



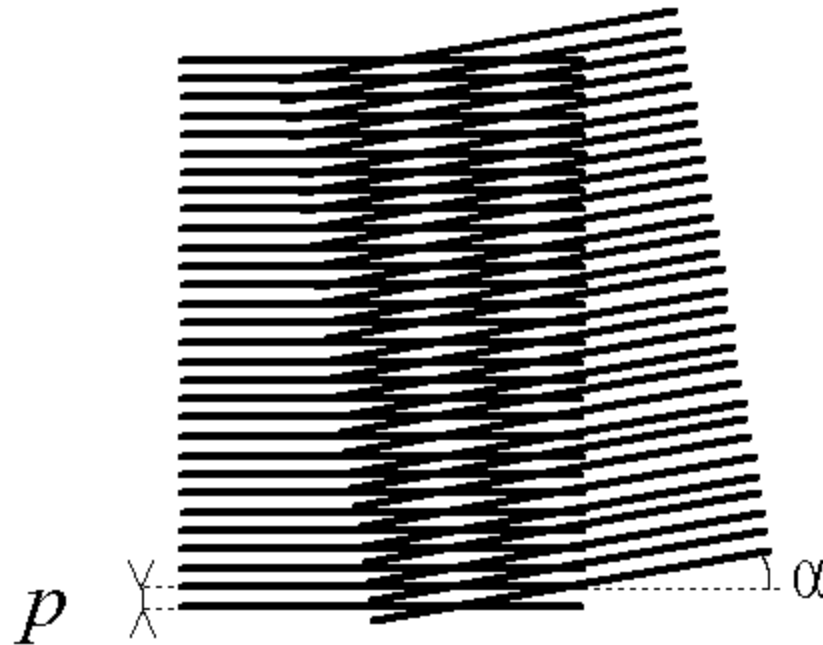
Insufflation

- Can clear humidity in the ear and “clouding” of the lens
- Not all devices support this
- Not all insufflation bulbs work on all probes



Anti-Moiré

- Moiré is an imaging artifact that results in the appearance of a regular pattern in the final image
- Important to suppress when supporting flexible scopes



Capture Image

- Internal memory
 - Images are stored to the device
 - Images may or may not be deleted on power down
 - Images can be retrieved through USB or media readers
- External software
 - Devices may communicate with proprietary software

Software

- Store patient information
- Capture images
- Case / encounter management
- May have limits on how many images can be added in one encounter
- Sometimes have background processes that use CPU

Focusing

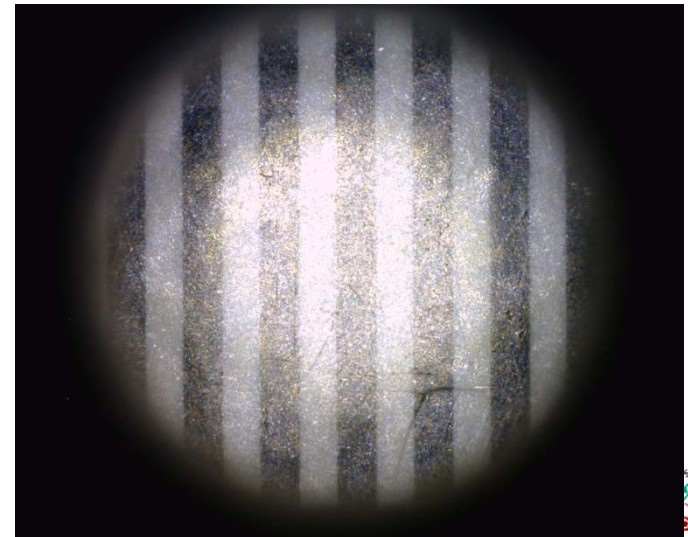
- Fixed Focus
 - Typically only on devices with large focal length
 - Usually does not allow for “wide” shots
- Manual Focus
 - Requires user to focus the camera
 - May be prone to accidental adjustments
- Useful to be able to focus before inserting into ear canal

Depth of Field

- Also referred to as “focal length”
- Refers to the range of distances that an object can be in focus
- Very important when imaging with an otoscope
 - A greater depth of field is very useful

Field of View

- How much of the world can be captured by the sensor
- Wide field of view is important
- Extremely wide FOV can lead to distortion or “fish-eye”



Making Them Work With VTC

Getting video otoscopes to work with videoconferencing systems.

VTC Overview – Inputs

- Videoconferencing systems often support auxiliary inputs
 - VCR, DVD player, etc
 - Older Tandberg units supports Composite inputs
 - Tandberg C* series codecs may support HDMI, Component, Composite and DVI
 - Polycom supports S-Video inputs
 - Vidyo does not support auxiliary inputs
 - Recommends using a “video scaler” device
 - Lifesize supports HDMI, Component, Composite, S-Video, and DVI inputs

Connections and Conversions

- Connecting to Standard Definition
 - S-Video and Composite connectors
 - Non-USB video otoscopes should support this
 - High-definition converters
 - Requires down-conversion from HDMI or Component to SD
 - Aspect ratio becomes a problem

Connections and Conversions

- Connecting to High Definition
 - HDMI and DVI
 - This is not yet a common feature on video otoscopes
 - High-definition converters
 - Requires up-conversion from S-Video or Composite to HDMI or Component
 - Will not gain resolution in conversion
 - Aspect ratio becomes a problem

Desktop Videoconferencing

- USB-based converters
 - S-Video and Composite video can be attached to USB “dongles” that make the camera input appear as a webcam to desktop videoconferencing applications
 - Success may depend on software and USB converter
 - Would require switching the video source from the normal USB webcam to the converter

Making Them Work With S&F

Getting video otoscopes to work with frame grabbers and store-and-forward systems.

Frame Grabbers

- Capture standard-definition video or high-definition video to a PC through a special card
 - Usually integrated with a store-and-forward software application
 - Same requirements as VTC systems
 - Converters, connectors, etc

Full-Resolution Captured Content

- USB video otoscopes may support capturing images to internal memory or removable media
- Proprietary software may support capturing still images
- Requires USB connection or memory card reader
- Allows saved files to be transmitted

Product Overview

A look at the manufacturers and their devices

The Products

- Advanced Monitors VO – USB
- Advanced Monitors VO – Video
- AMD 300 (discontinued)
- AMD 500
- Aurical OTOCam 300
- Jedmed Combo 24
- Jedmed Digicam
- Lightning Enterprises M-100
- MedRx
- MGE DinoLite Pro – USB
- MGE DinoLite Pro – Video
- RF Co. ME-16 Morse TypeS – Video
- RF Co. ME-16 Morse TypeS – USB
- SecondOpinion DrCamscope – Standard Definition
- SecondOpinion DrCamscope – High Definition (discontinued)
- WelchAllyn Macroview

Video Otoscopes



Advanced Monitors – Video and USB

Video Otoscopes



AMD 500

Video Otoscopes



Aurical OTOCam 300

Video Otoscopes



JEDMED Combo 24

Video Otoscopes



JEDMED Digicam – G3 and MightBrite

Video Otoscopes



MEDIT M-100

Video Otoscopes



MedRx

Video Otoscopes



DinoLite Pro – USB and Video

Video Otoscopes



RF Co. ME-16 – USB and Video

Video Otoscopes



Video Otoscopes



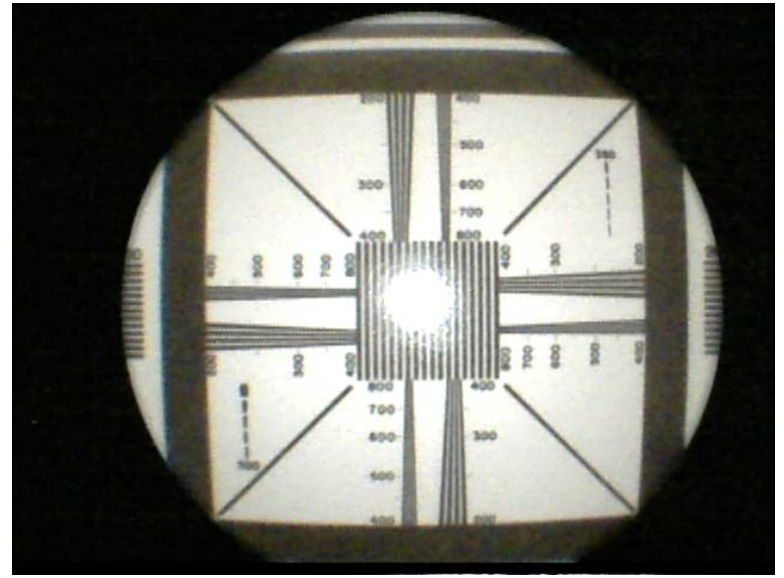
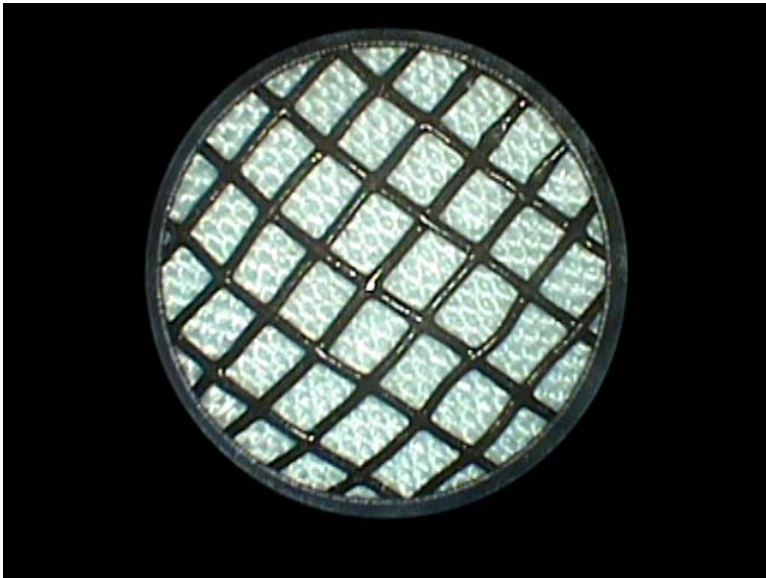
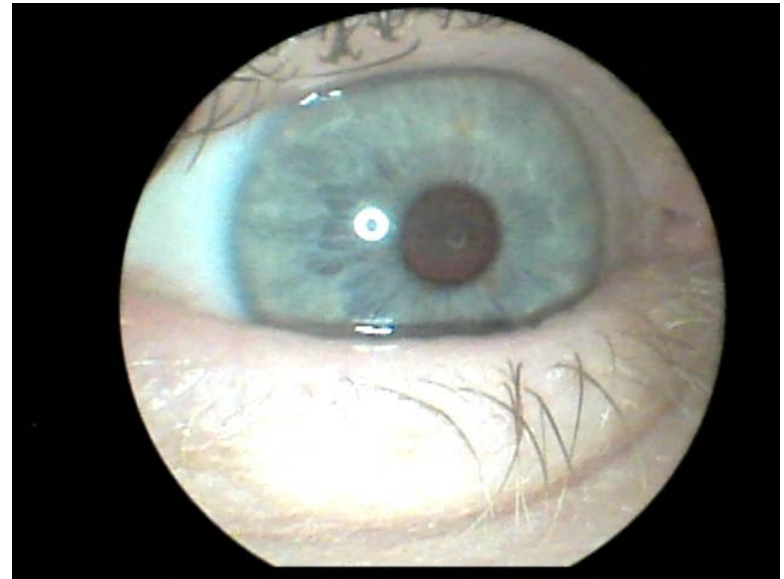
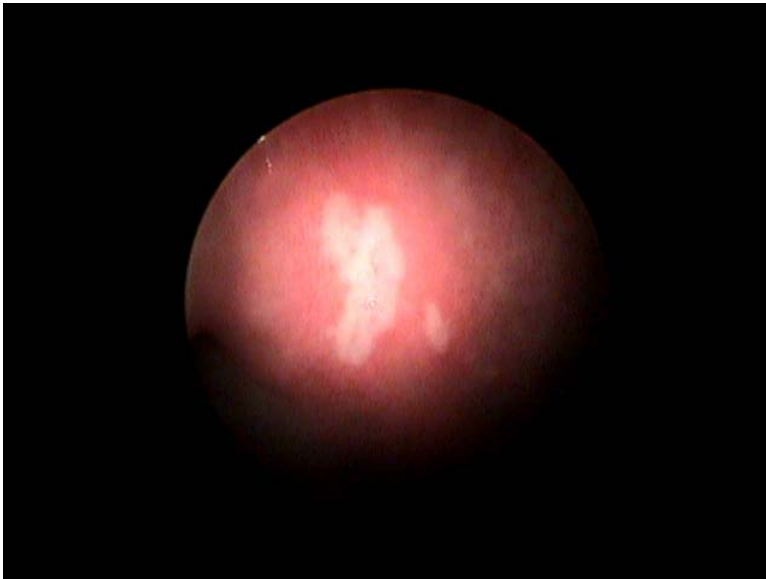
Welch Allyn - Digital MacroView

Thoughts on Imaging

General feedback on issues that were experienced with devices when used to capture images

What Are Useful Images?

- Clinical Images
 - Most familiar to providers performing reviews
 - Challenging to control completely
 - Changes in humidity and temperature
 - Movements of subject and operator will be captured
- “Technical” Images
 - Allow for additional analysis of performance
 - May not reflect realistic use cases
 - May cause devices to look worse in review

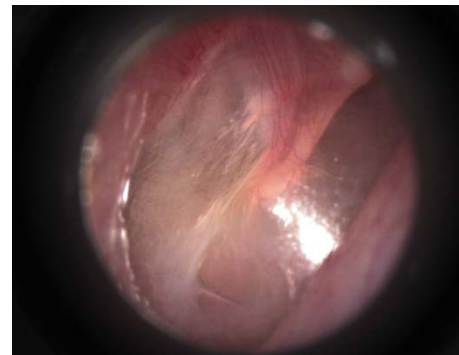
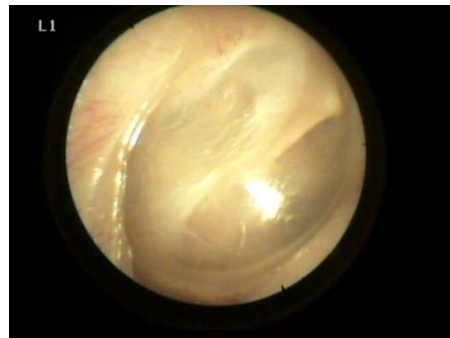
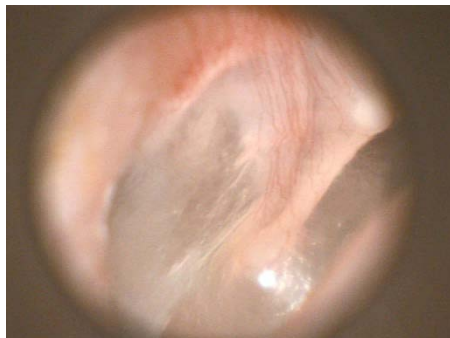
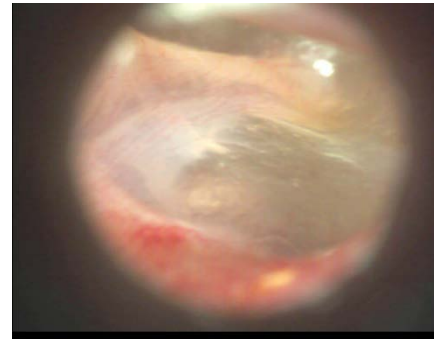
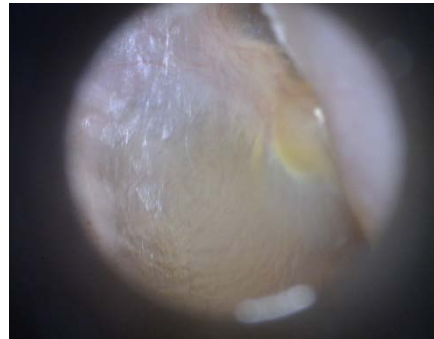
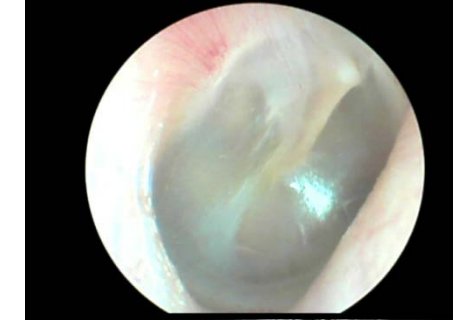
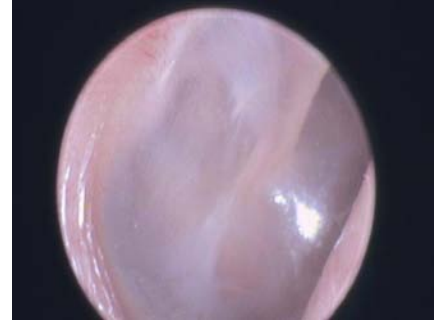
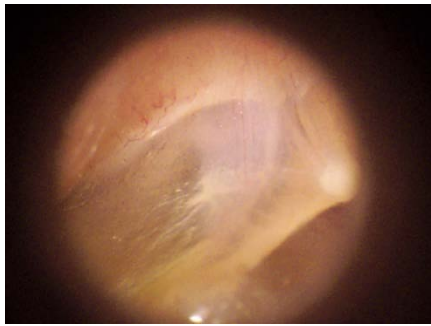


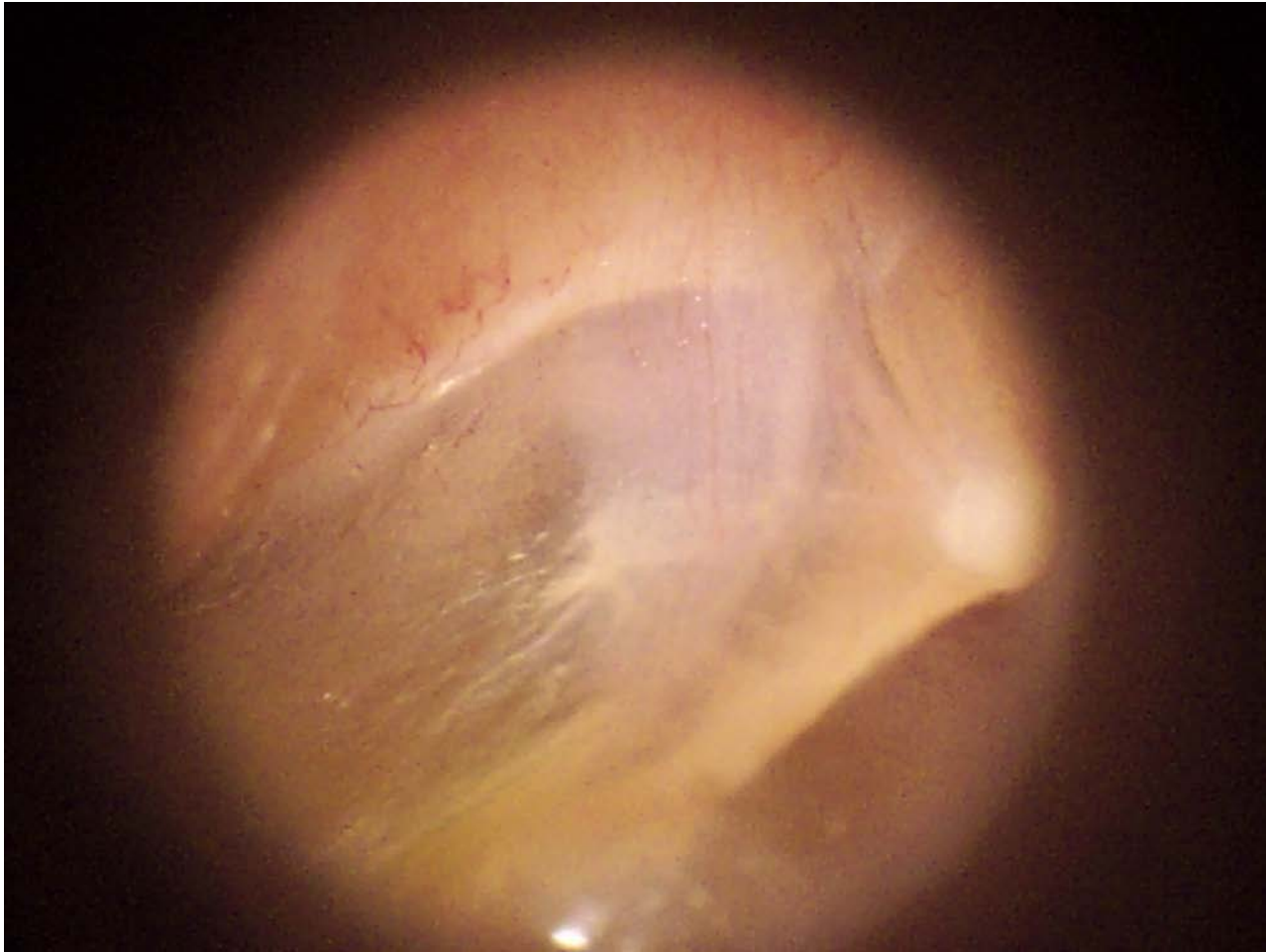
When Capturing Images ...

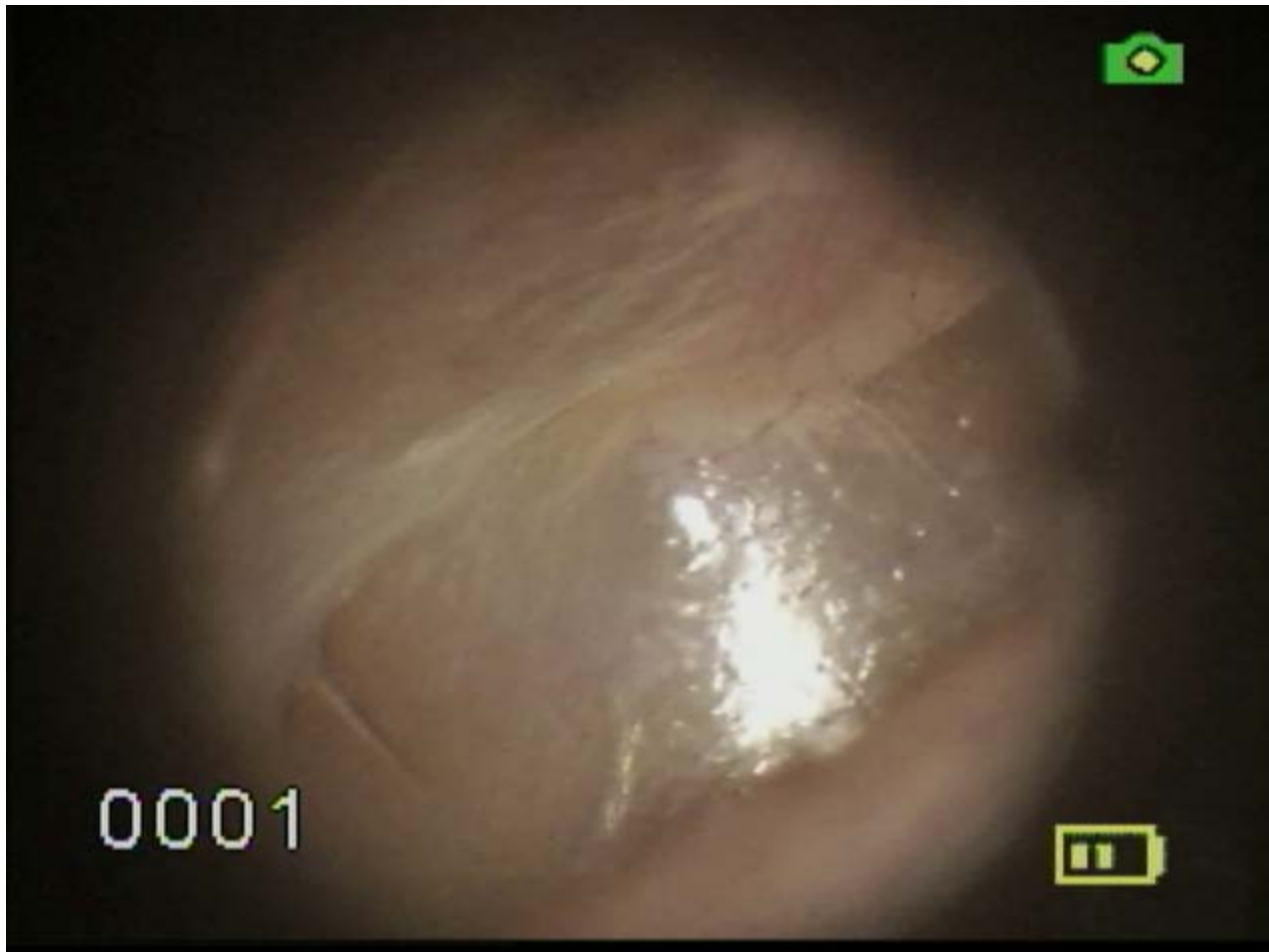
- Learn before you start shooting
 - See if there are tests that don't fare well on all devices
 - Get a feel for how to use the devices
- Stay consistent
 - Fixed distance or consistent framing?
 - Speculum on or off?
 - Image labels

Image Comparisons

A review of images from various devices.









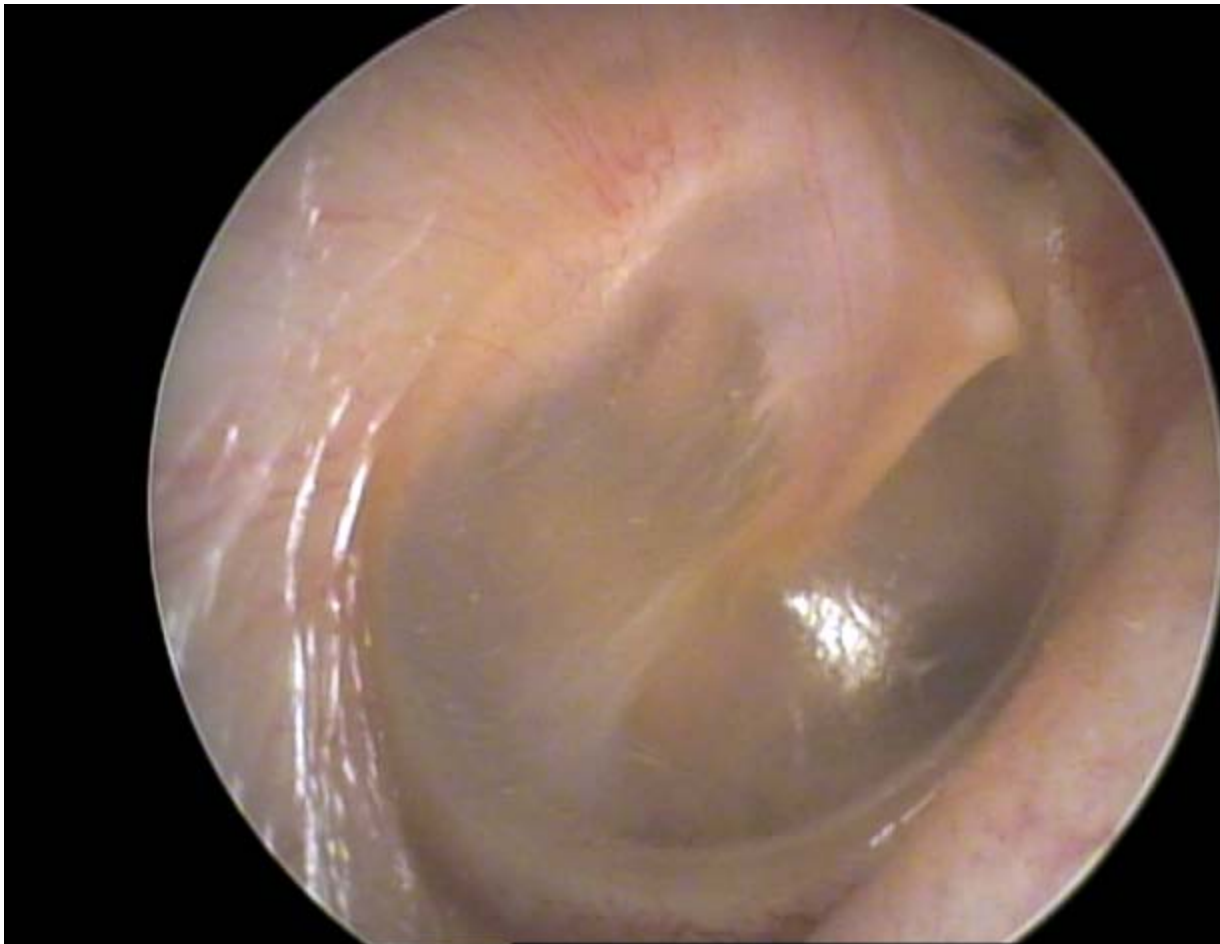




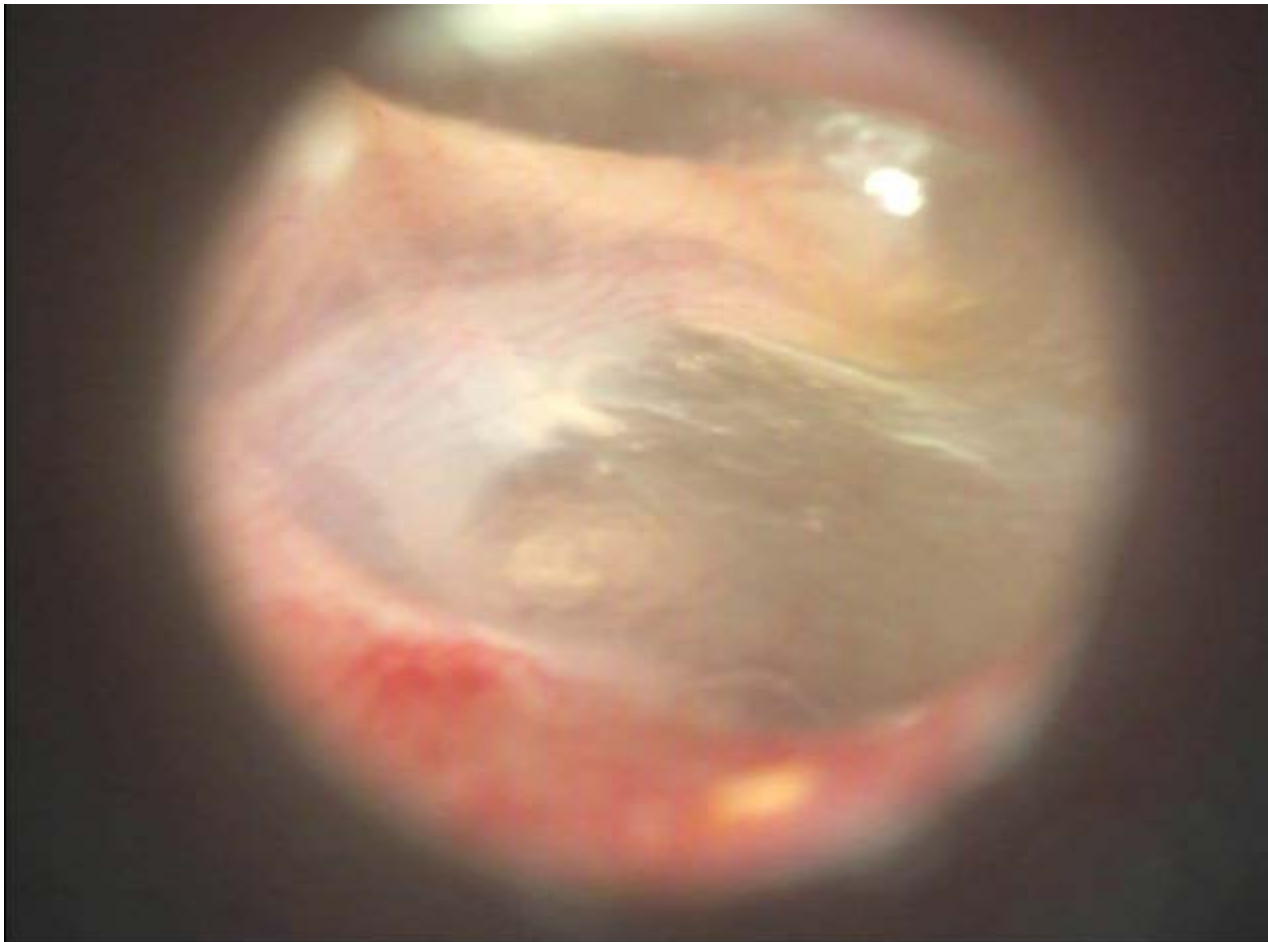




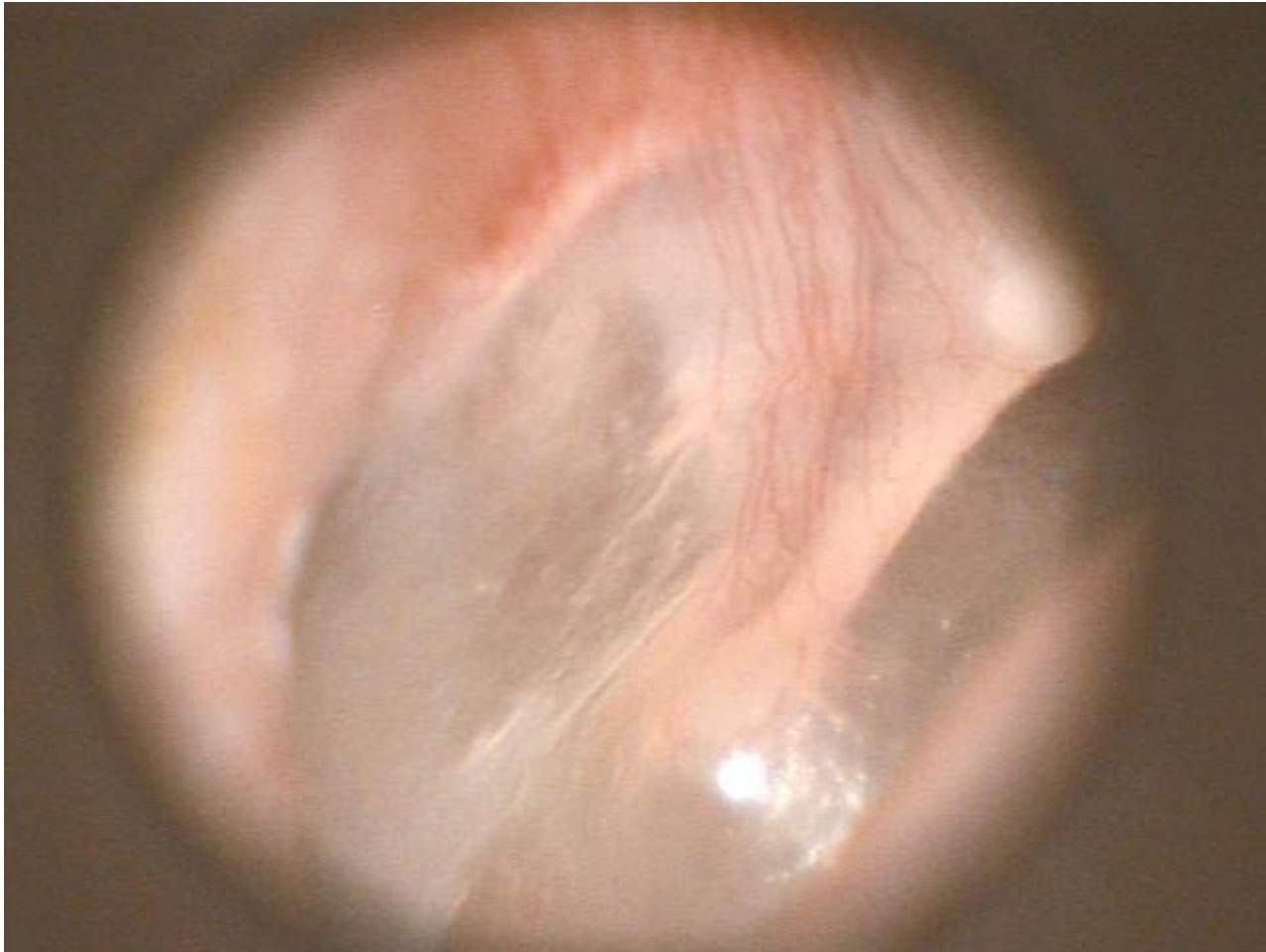






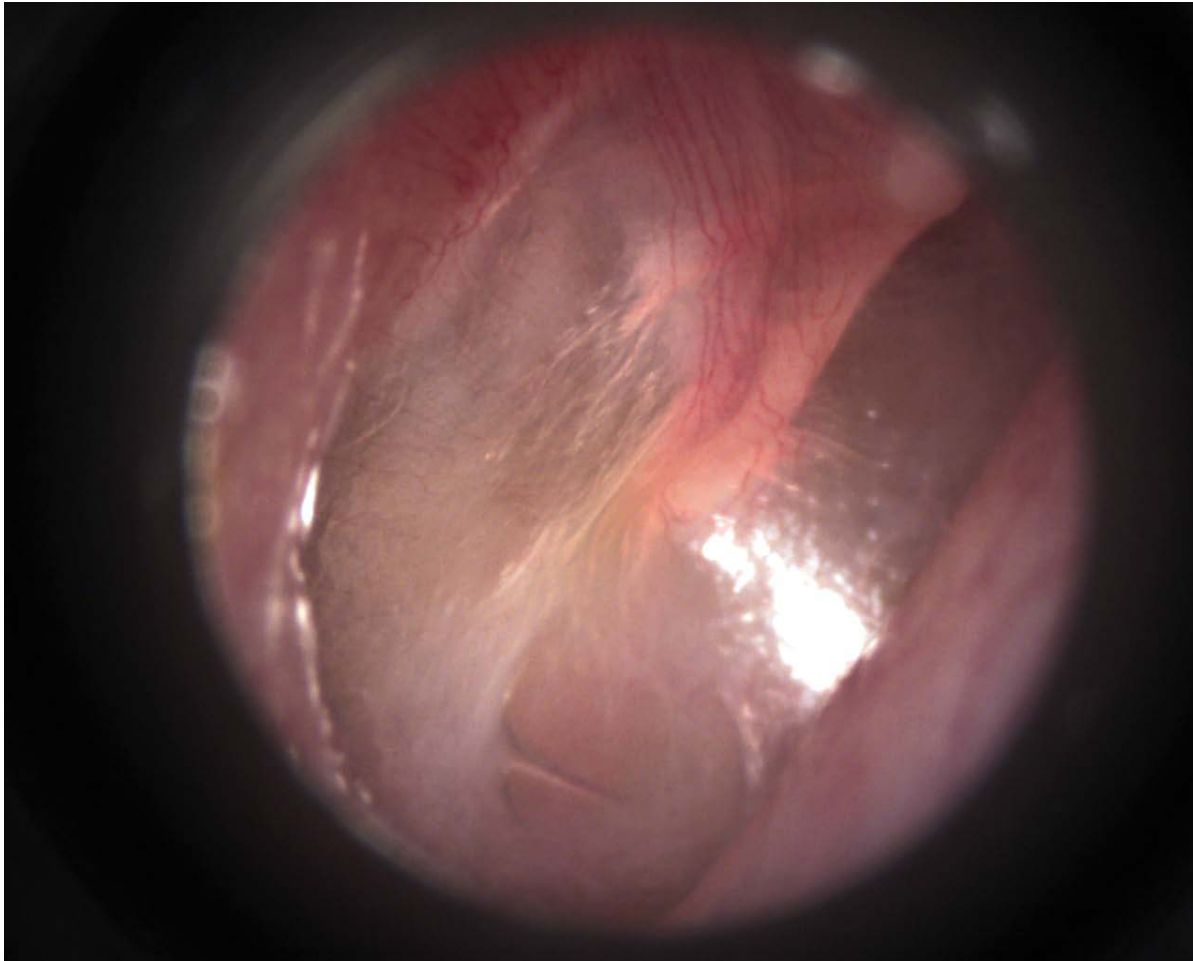






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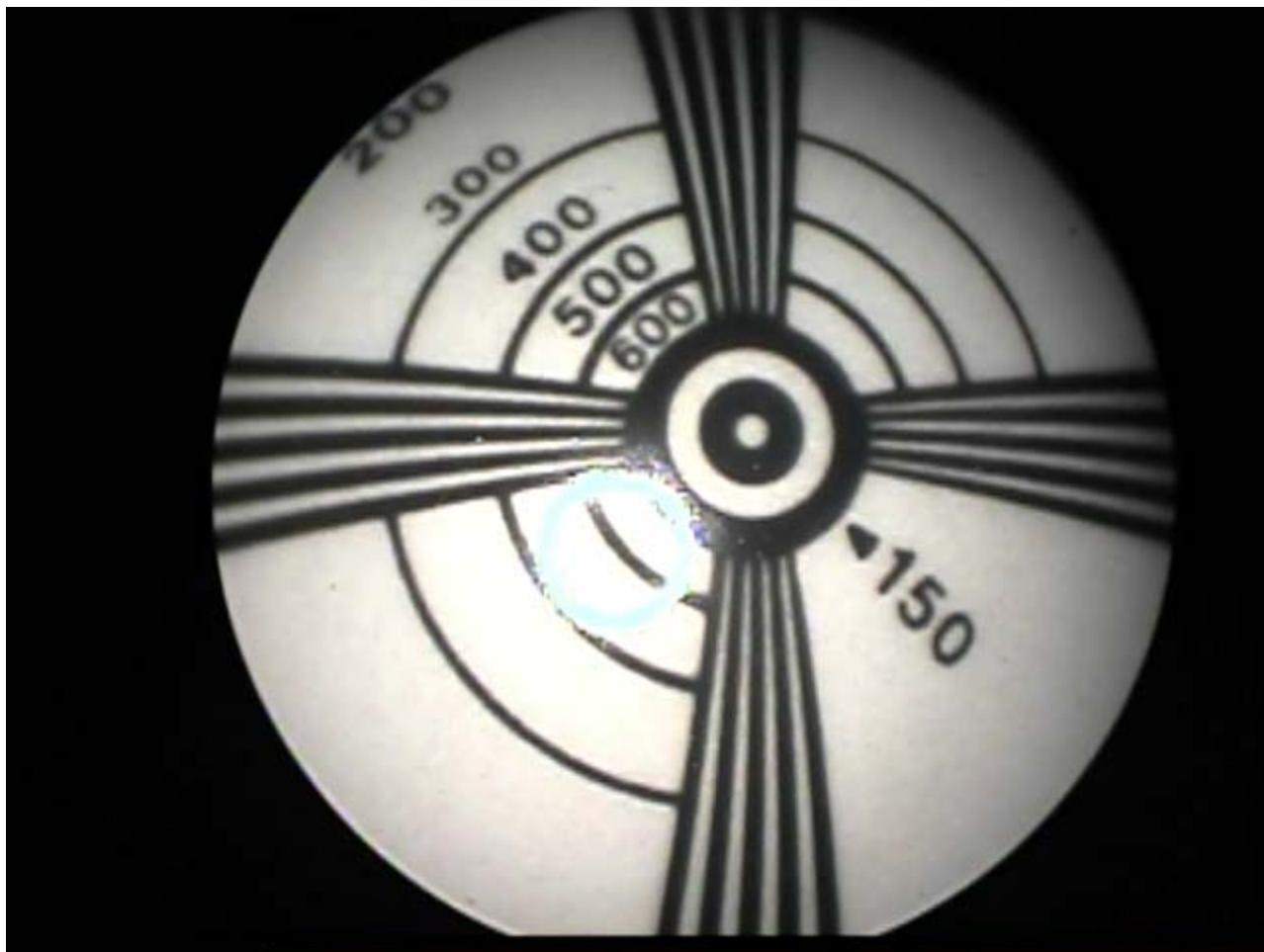




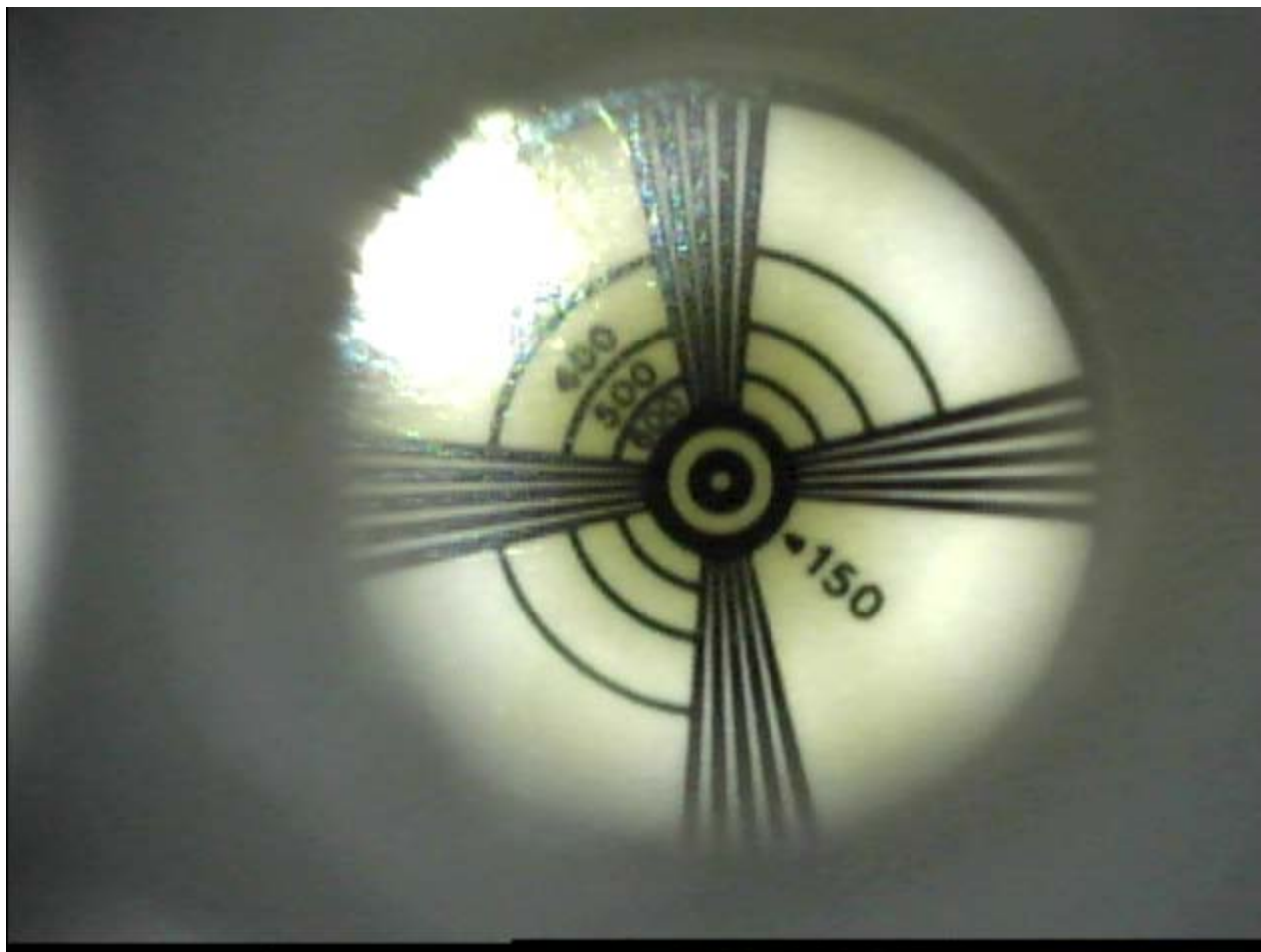
Resolution – USB



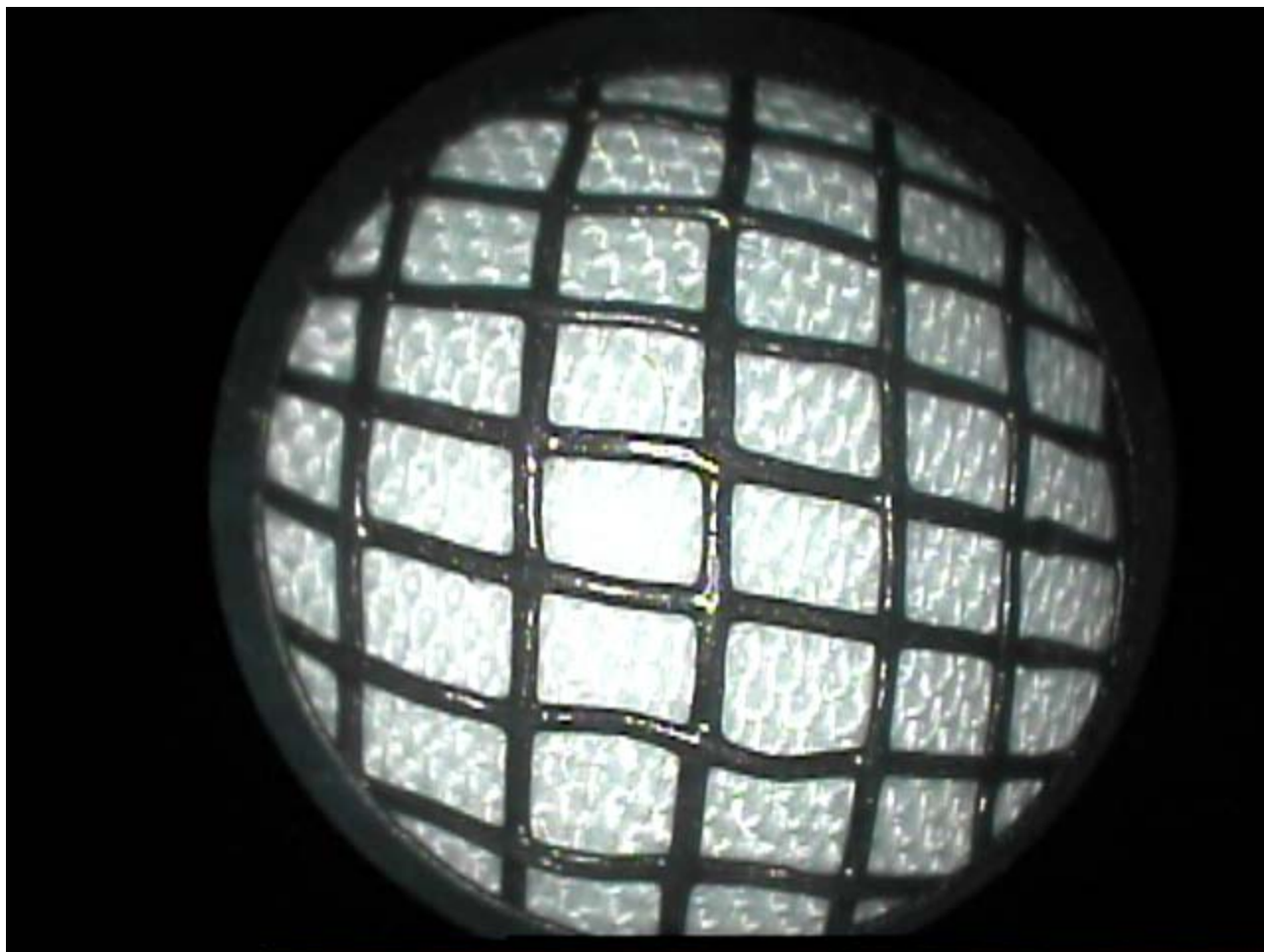
“Technical” Imaging



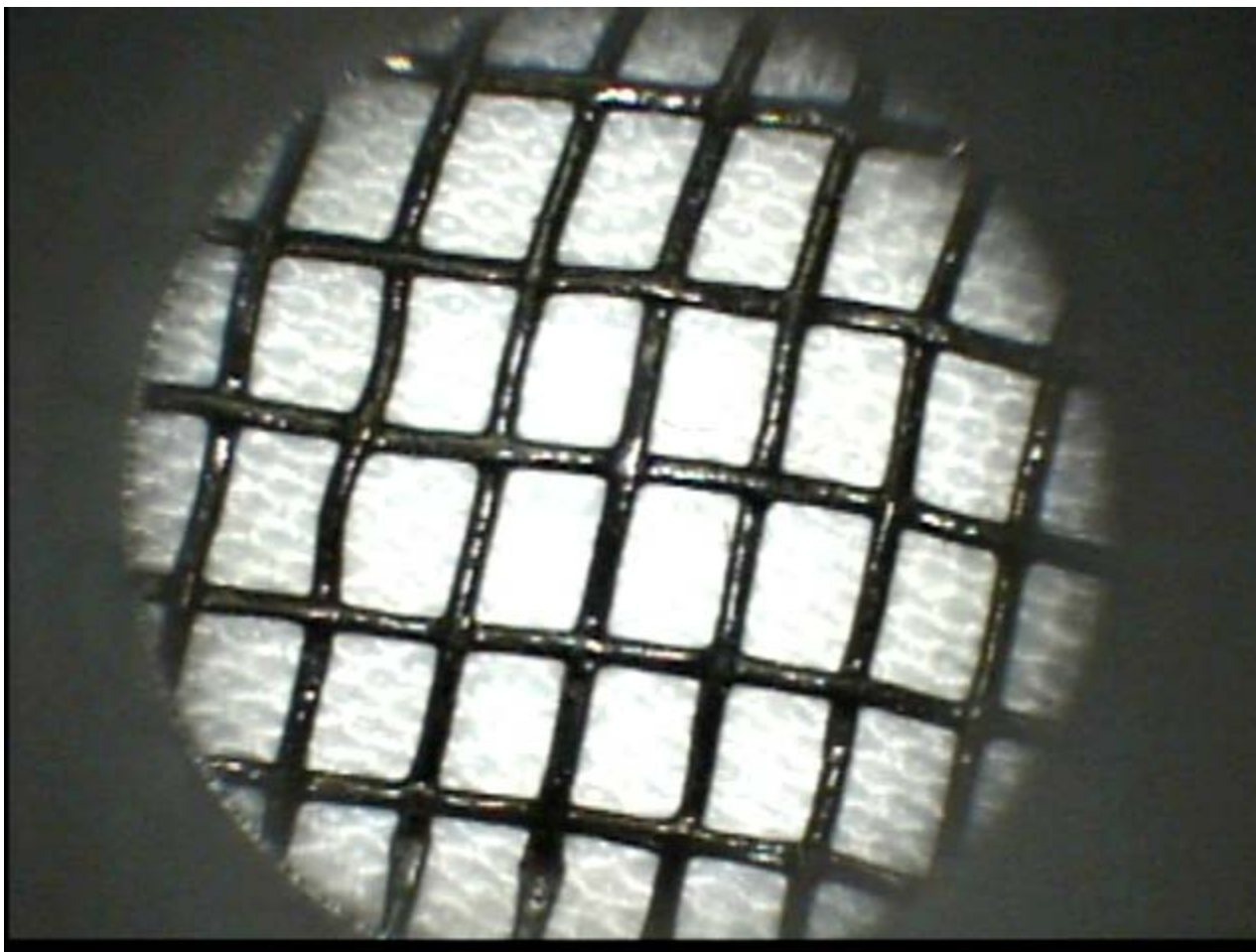
“Technical” Imaging



“Technical” Imaging



“Technical” Imaging



Shooting “Wide” Images



Shooting “Wide” Images



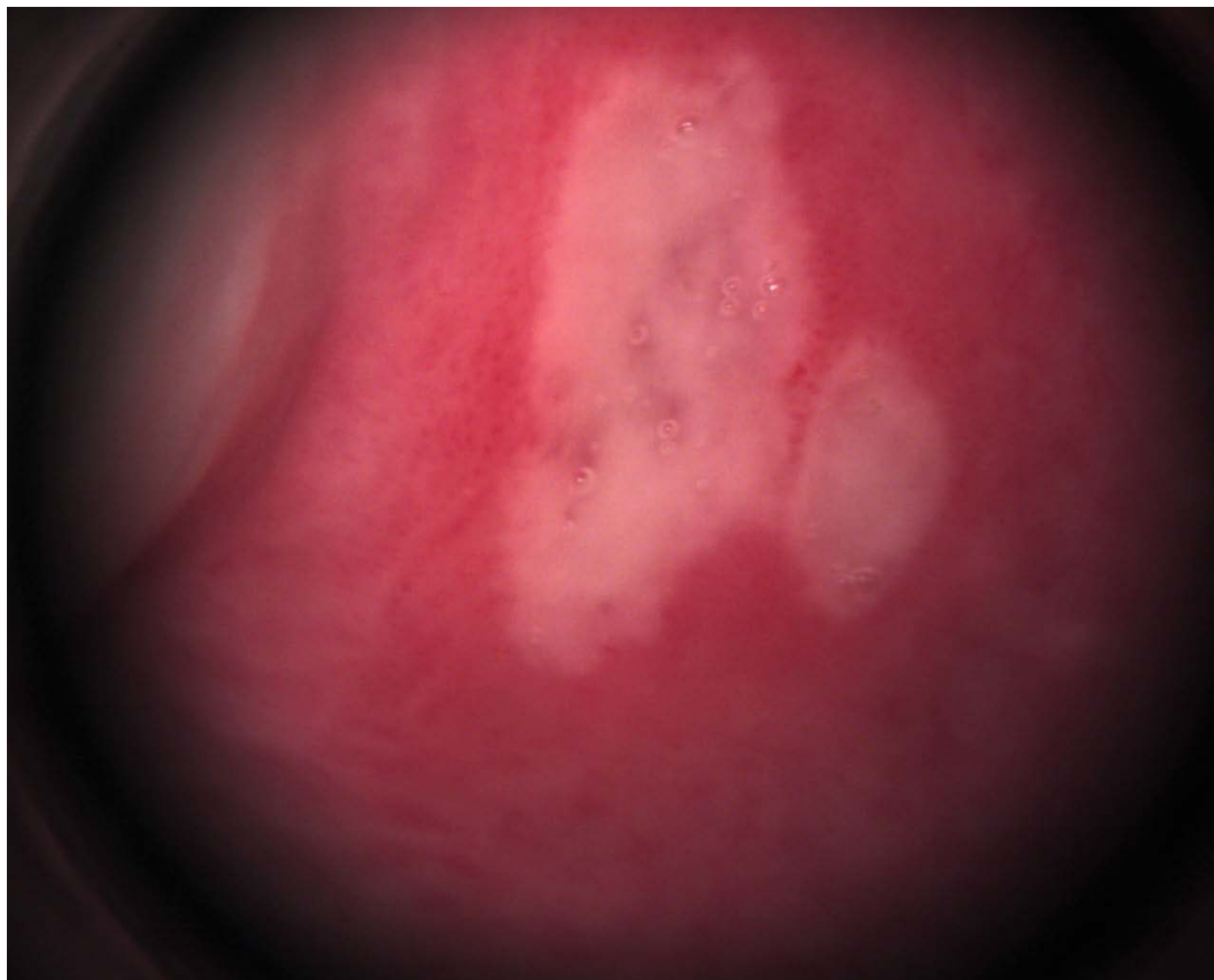
Color Accuracy and Wide Images



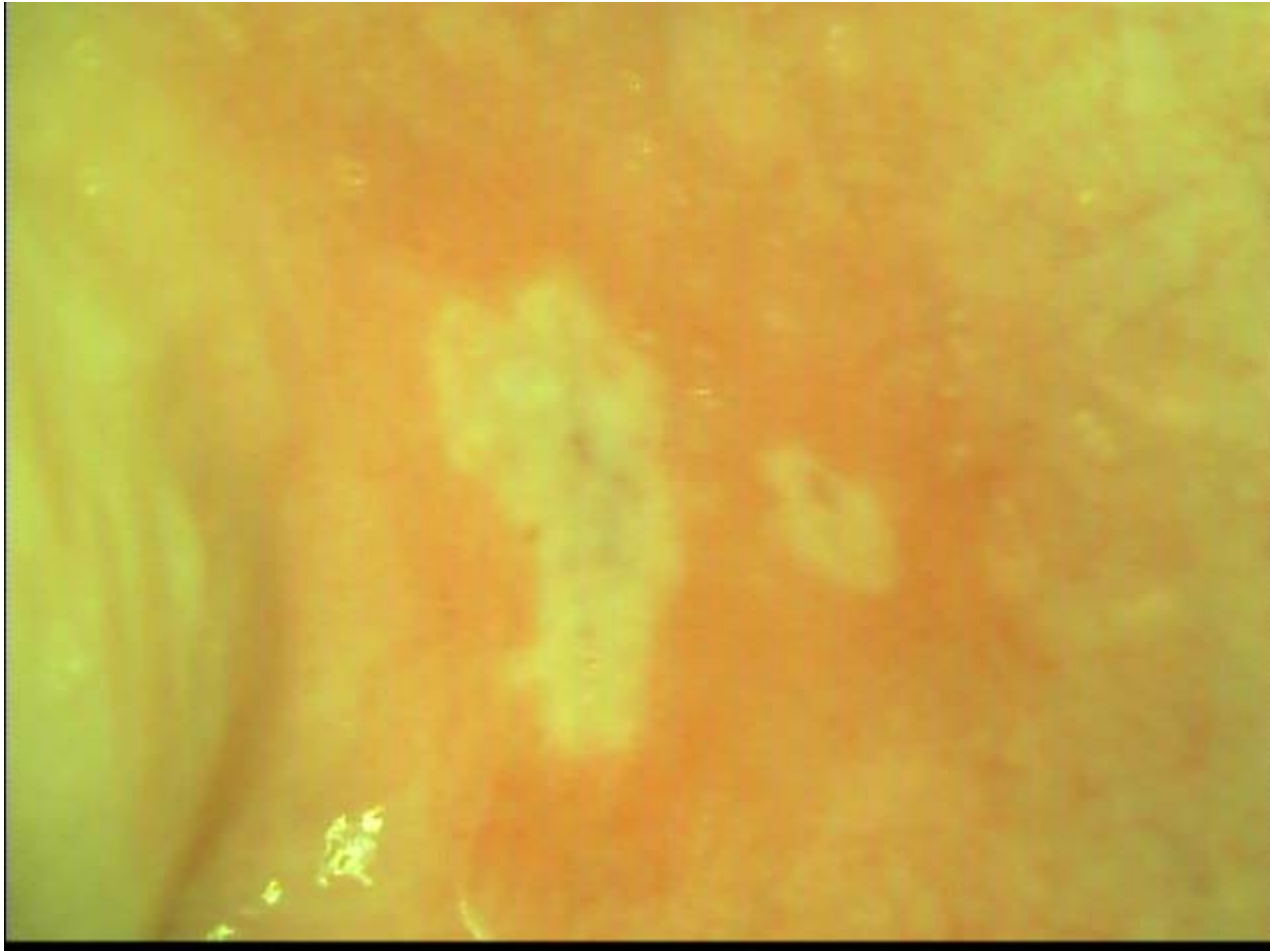
Color Accuracy and Wide Images



Color Accuracy



Color Accuracy



Summary

Summary

- Program requirements should drive purchasing decisions
- Video otoscopes vary widely in features, performance, and cost
- Testing these devices can be challenging due to the variations with each manufacturer's product

Toolkit

- A toolkit on video otoscopes will be available at the Telehealth Technology Assessment Center's website – www.telehealthtac.org
- Includes more information, additional comparison data, and will have labeled sample images available for review

Webinars

- Next webinar is April 27, 2011
- Looking for webinar ideas – either requests for information or offers to give a presentation
- Adding podcasts to our lineup of content

Questions

- info@telehealthtac.org
- Garret Spargo
- (907) 729-4703
- gspargo@anthc.org
- Jenevra Foisy
- (907) 729-4721
- jmfoisy@anthc.org