2012 Webinar Series

Video Otoscopes

An overview of the market and technology

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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-Foward
- 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

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The Parts – Specula

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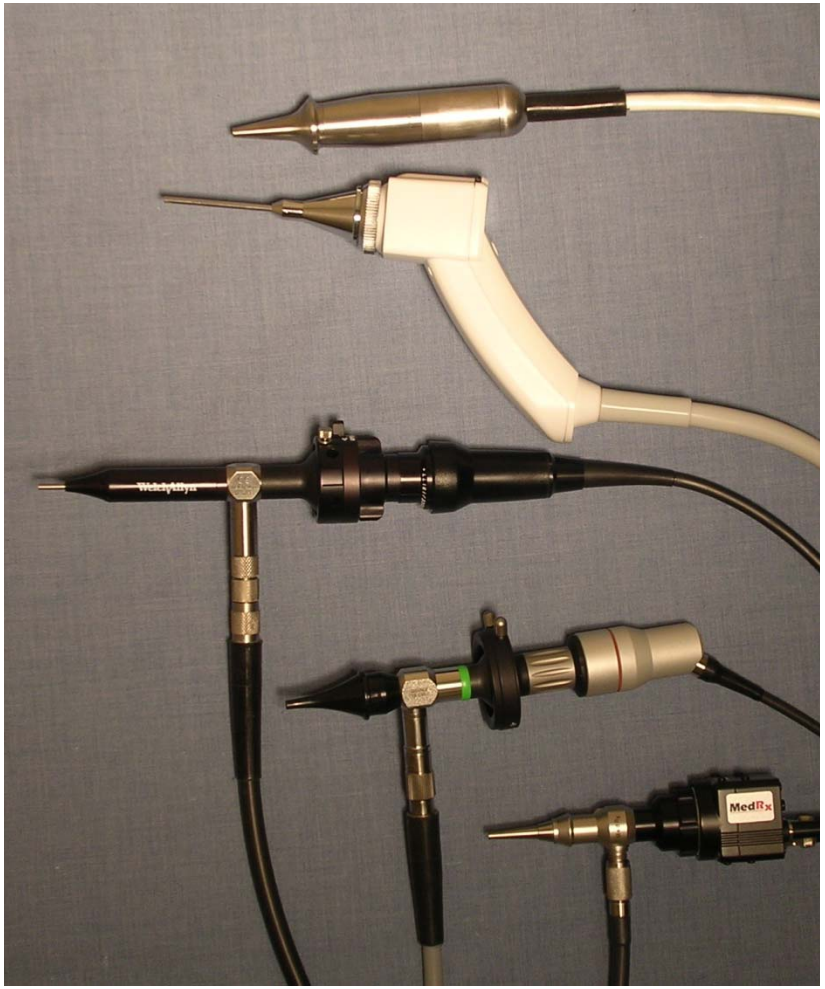
The Parts – Probe



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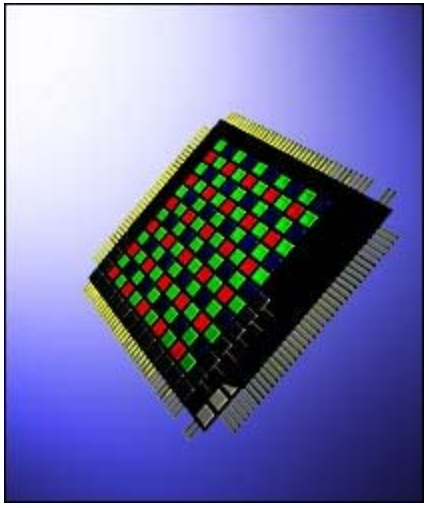
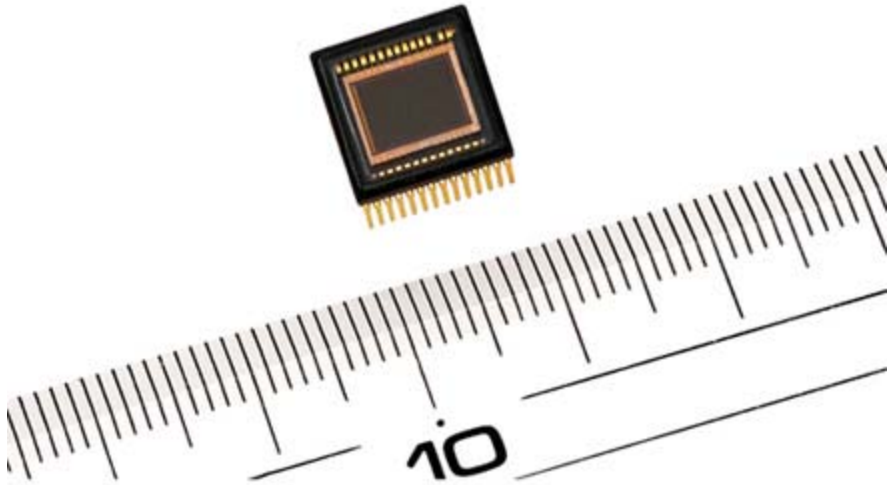
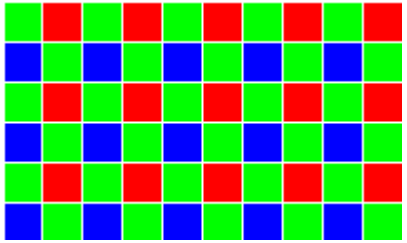
The Parts – Imaging Sensor







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The Parts – Focus Ring

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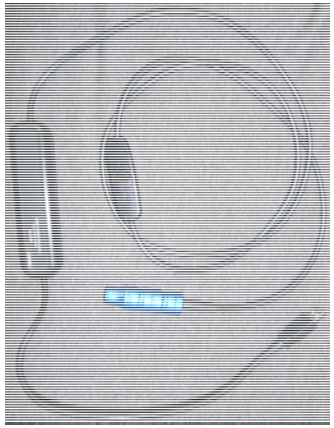
The Parts – Light Source



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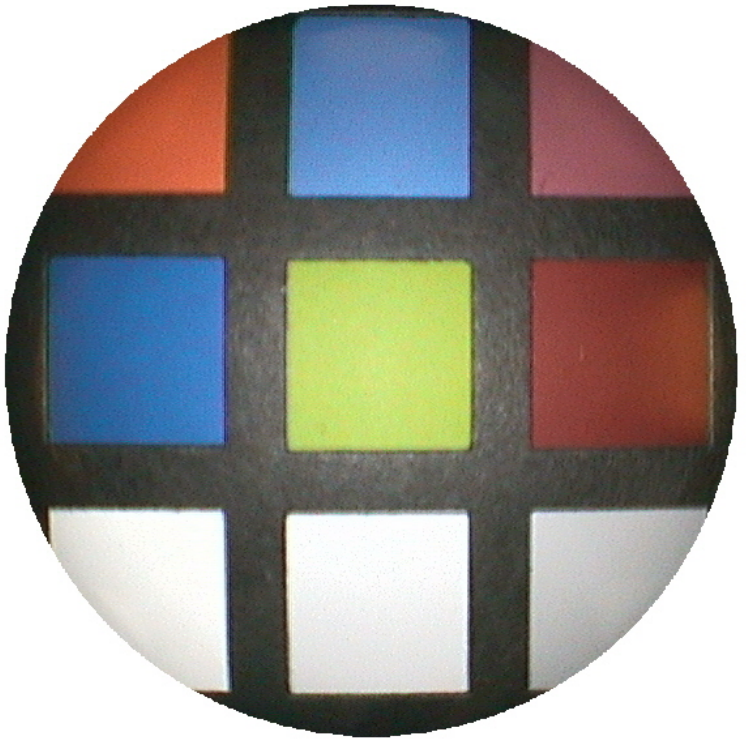
The Parts – Cables

- 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

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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

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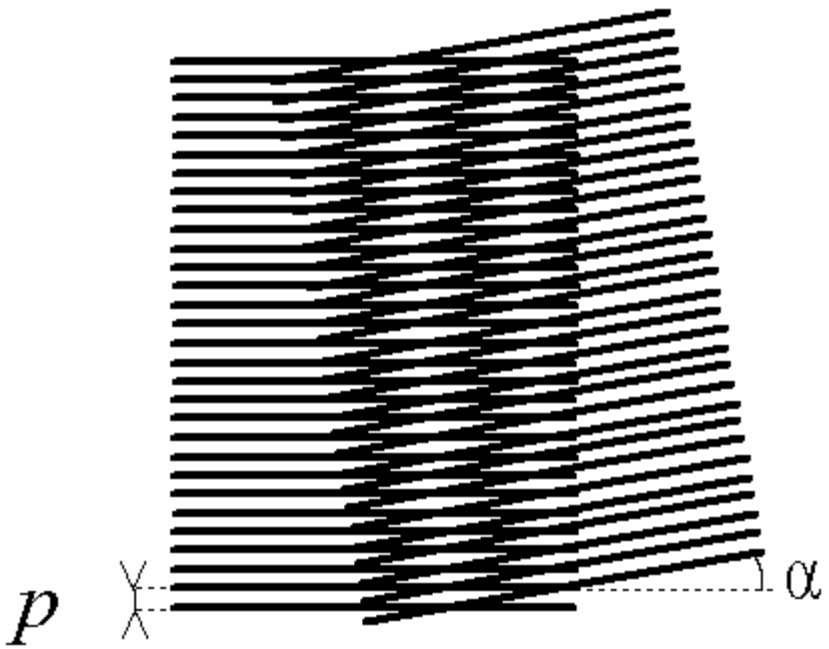
Insufflation

- 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

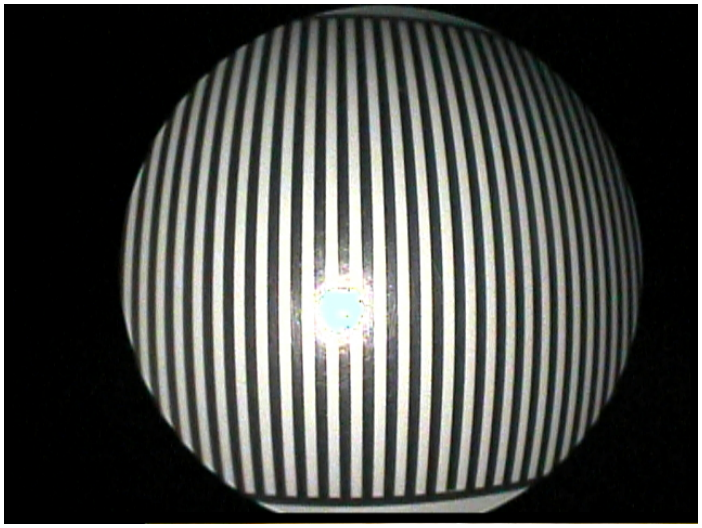
- Useful to be able to focus before inserting into ear canal

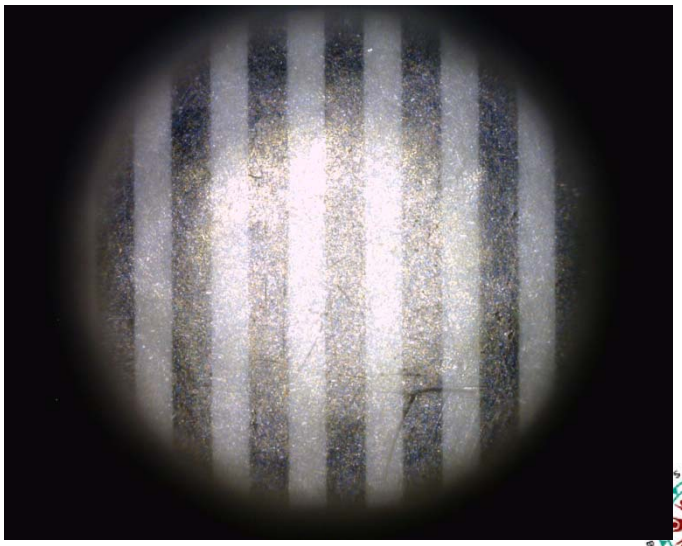
Depth of Field

- 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”





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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

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Video Otoscopes

AMD 500

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Video Otoscopes

Aurical OTOCam 300

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Video Otoscopes

JEDMED Combo 24

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Video Otoscopes

JEDMED Digicam – G3 and MightBrite

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MEDIT M-100

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MedRx

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DinoLite Pro – USB and Video

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RF Co. ME-16 – USB and Video

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Sometech – Dr. Camscope

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Welch Allyn - Digital MacroView

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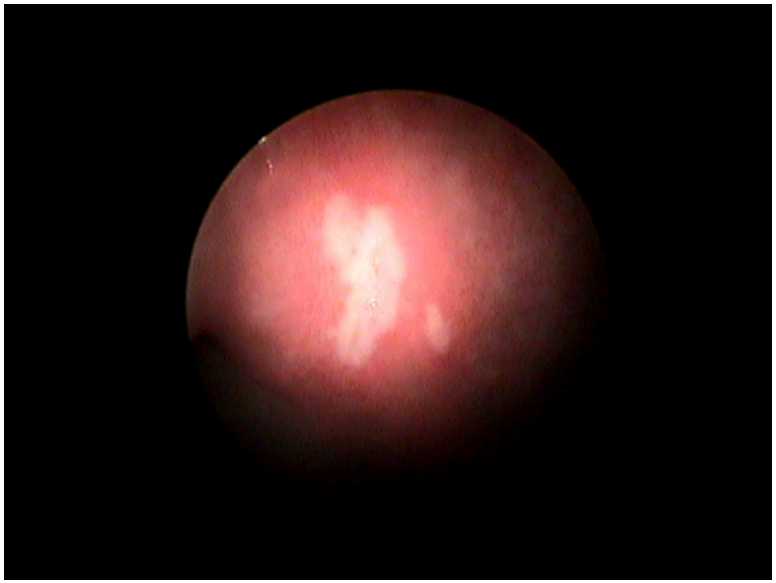
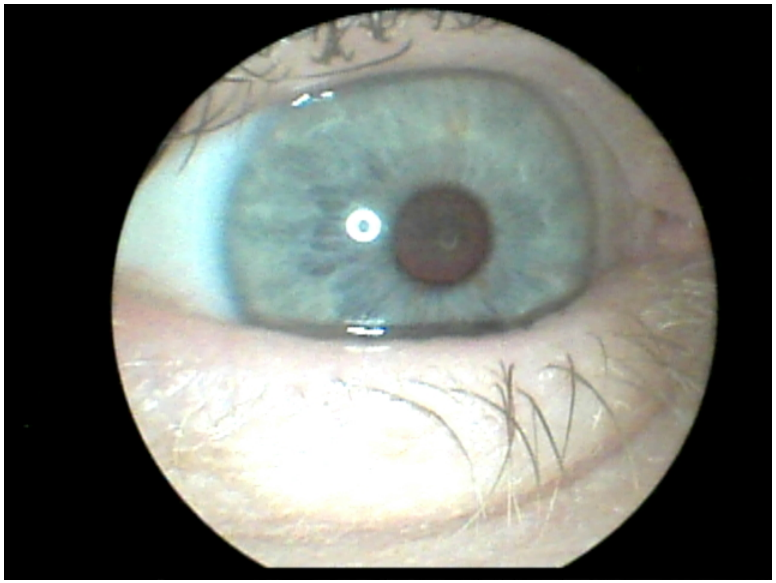
Thoughts on Imaging

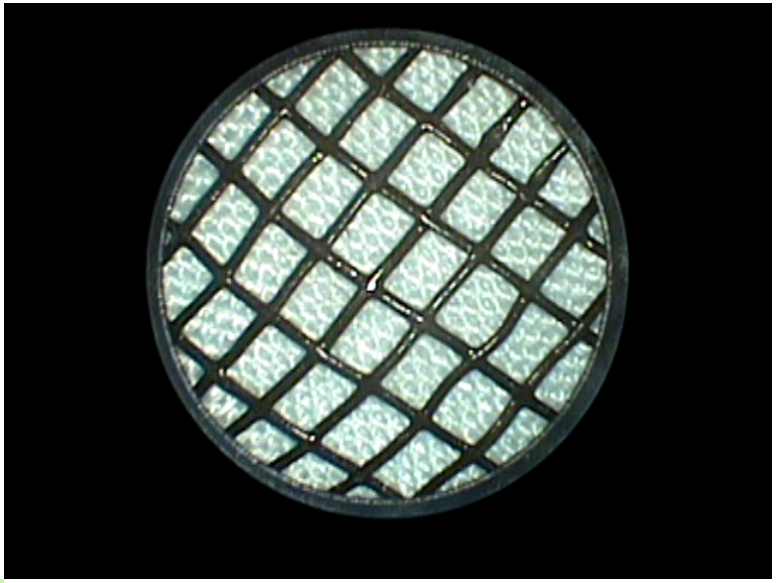
General feedback on issues that were experienced with devices when used to capture images

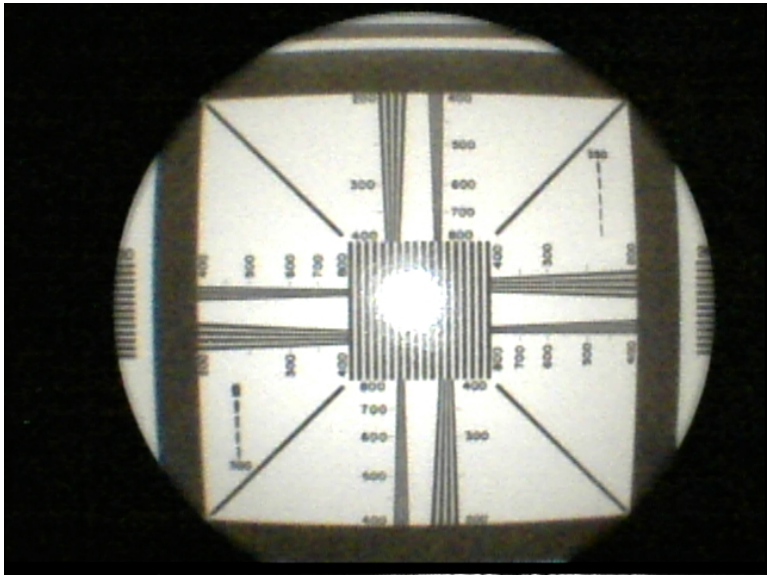
What Are Useful Images?

- 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









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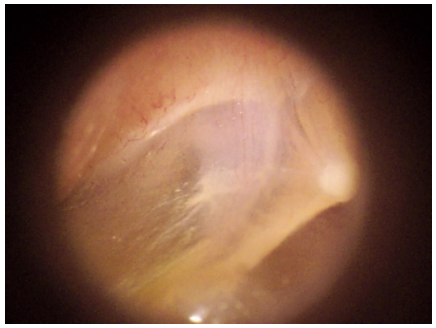
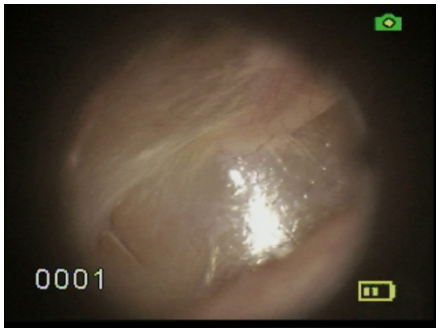
When Capturing Images …

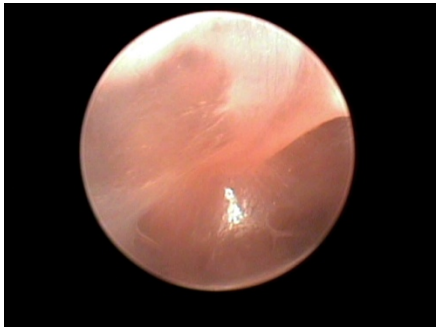
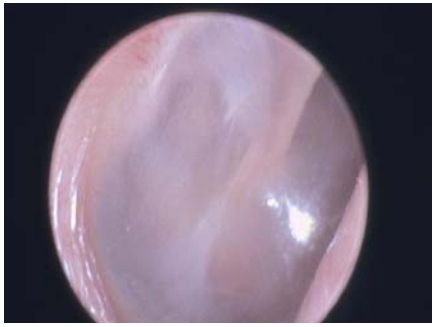
- Learn before you start shooting
  - See if there are tests that don't fare well on all devices
  - Get a feel for how to use the devices
- Stay consistent
  - Fixed distance or consistent framing?
  - Speculum on or off?
  - Image labels

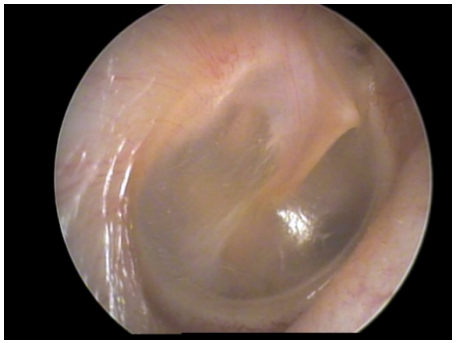
Image Comparisons

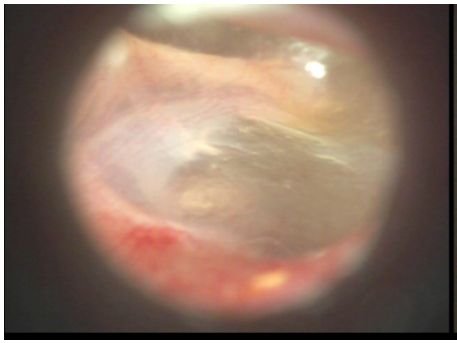
A review of images from various devices.

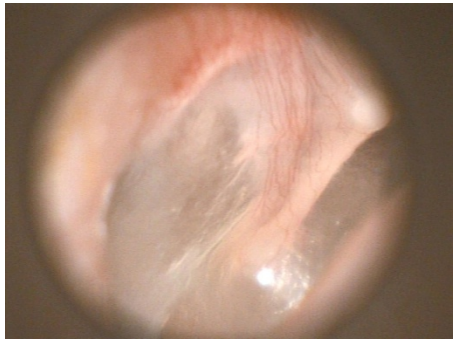
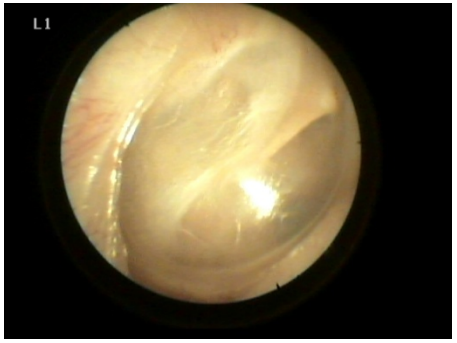



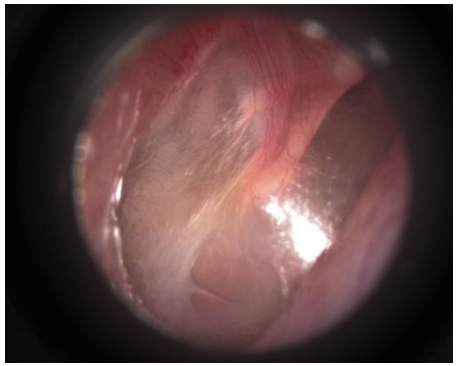








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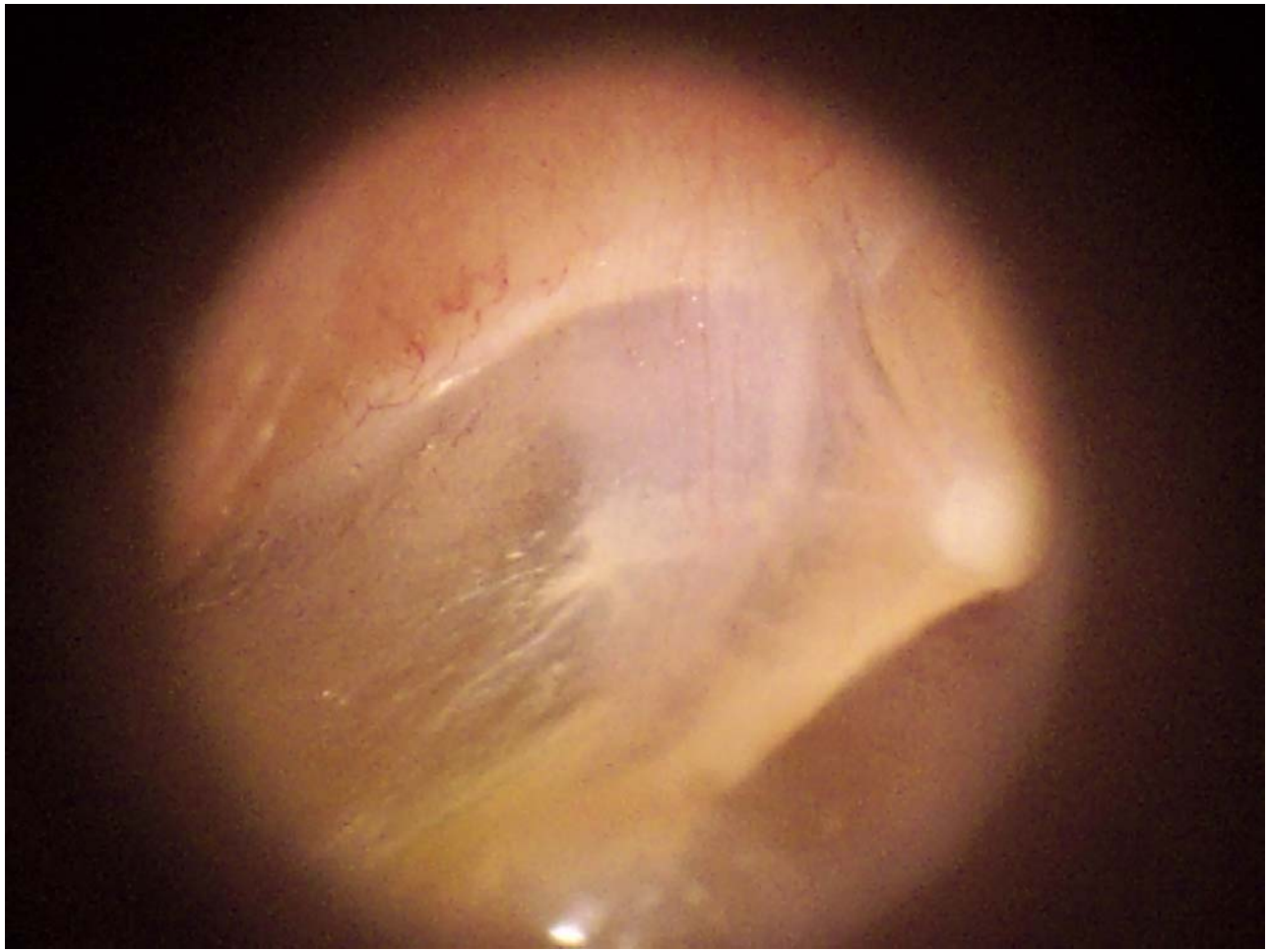

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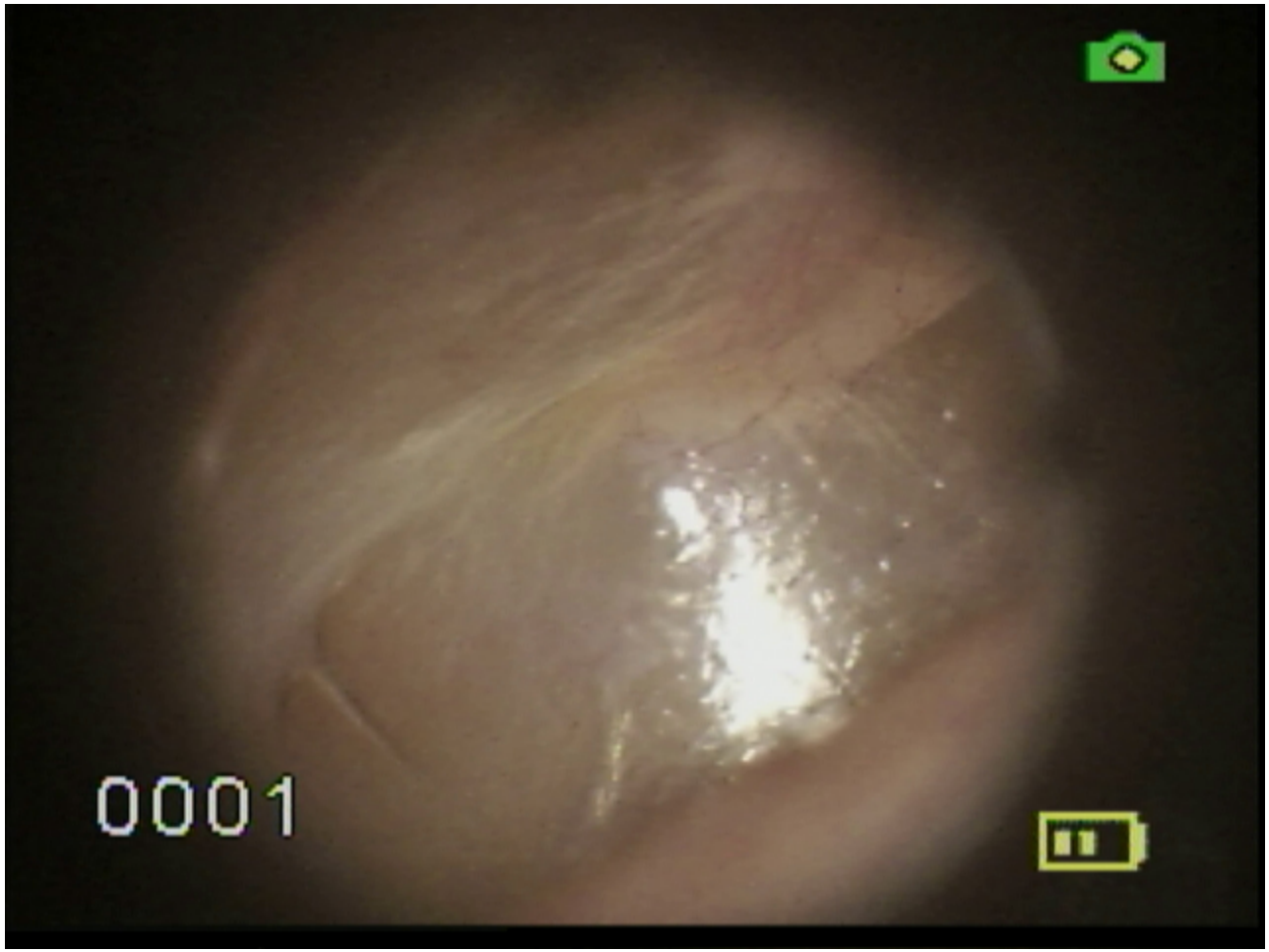

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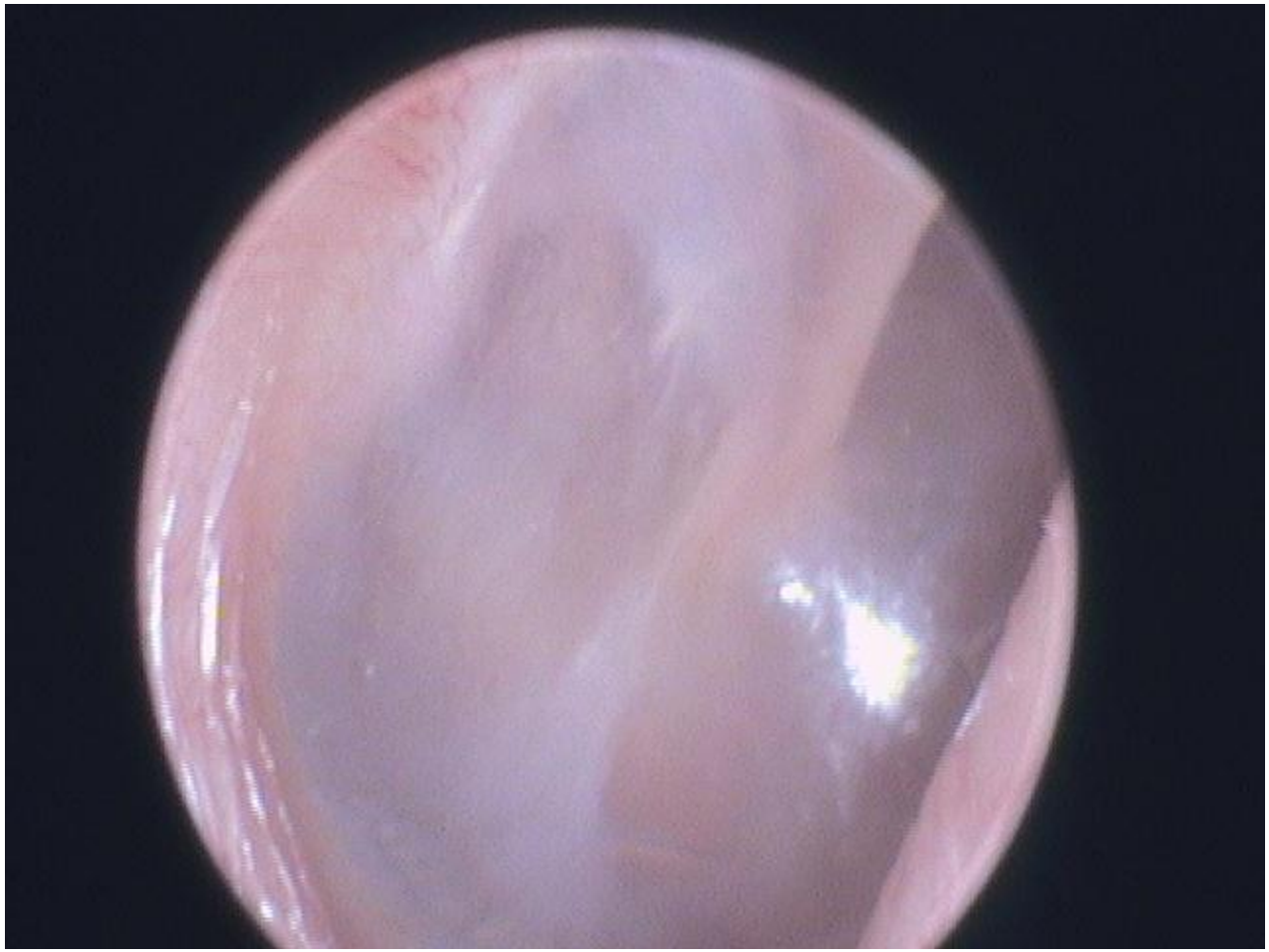

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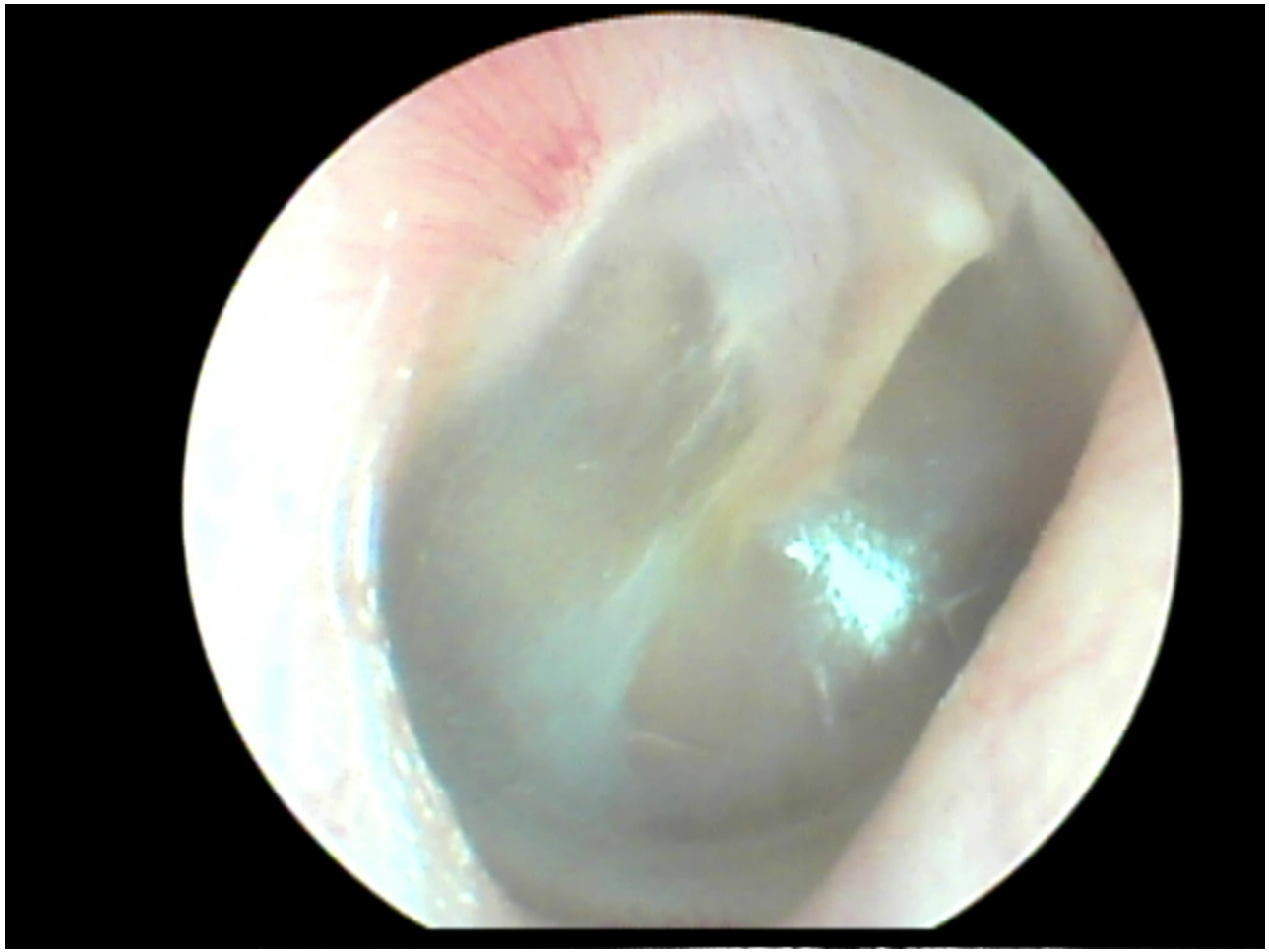

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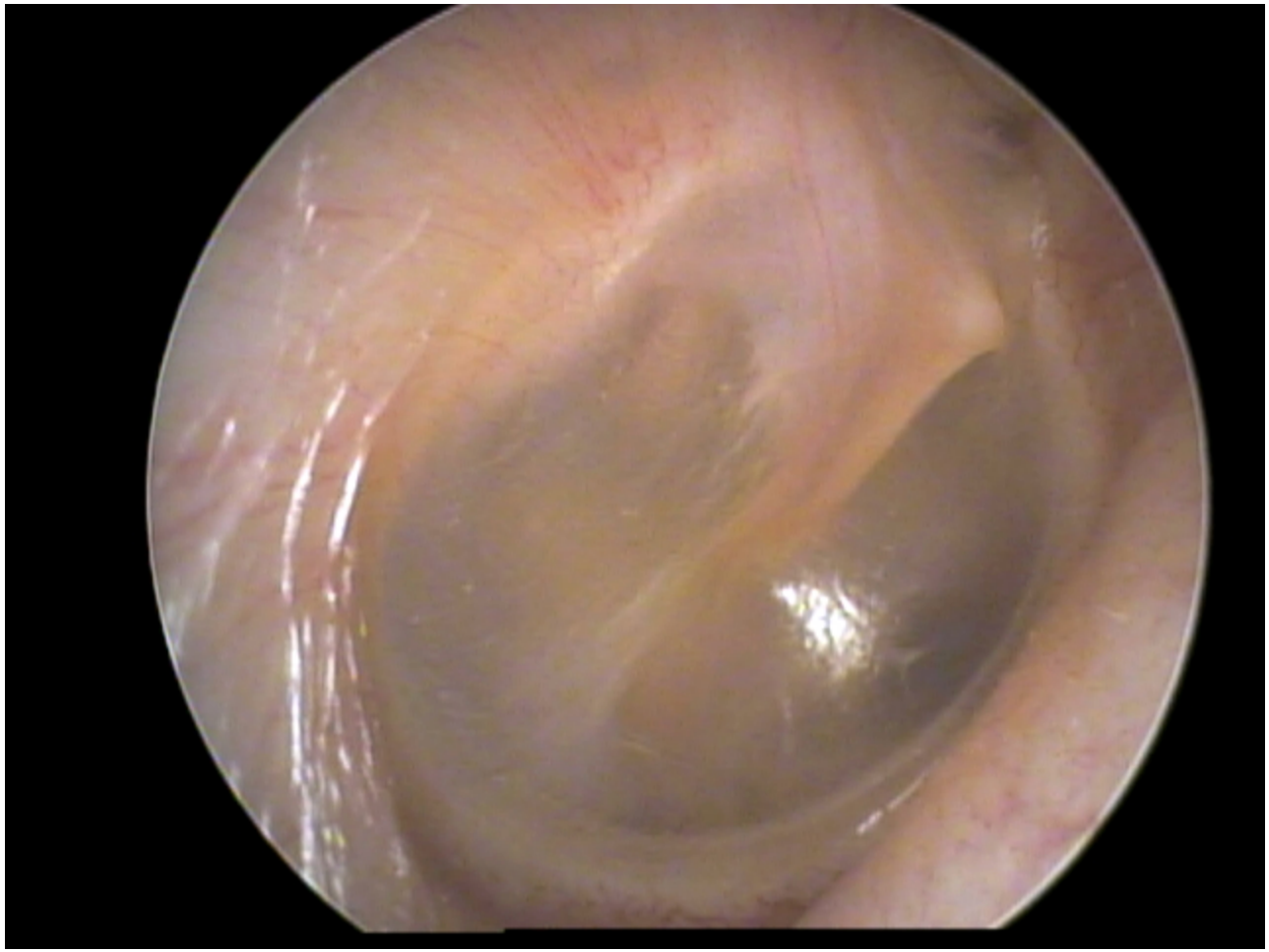

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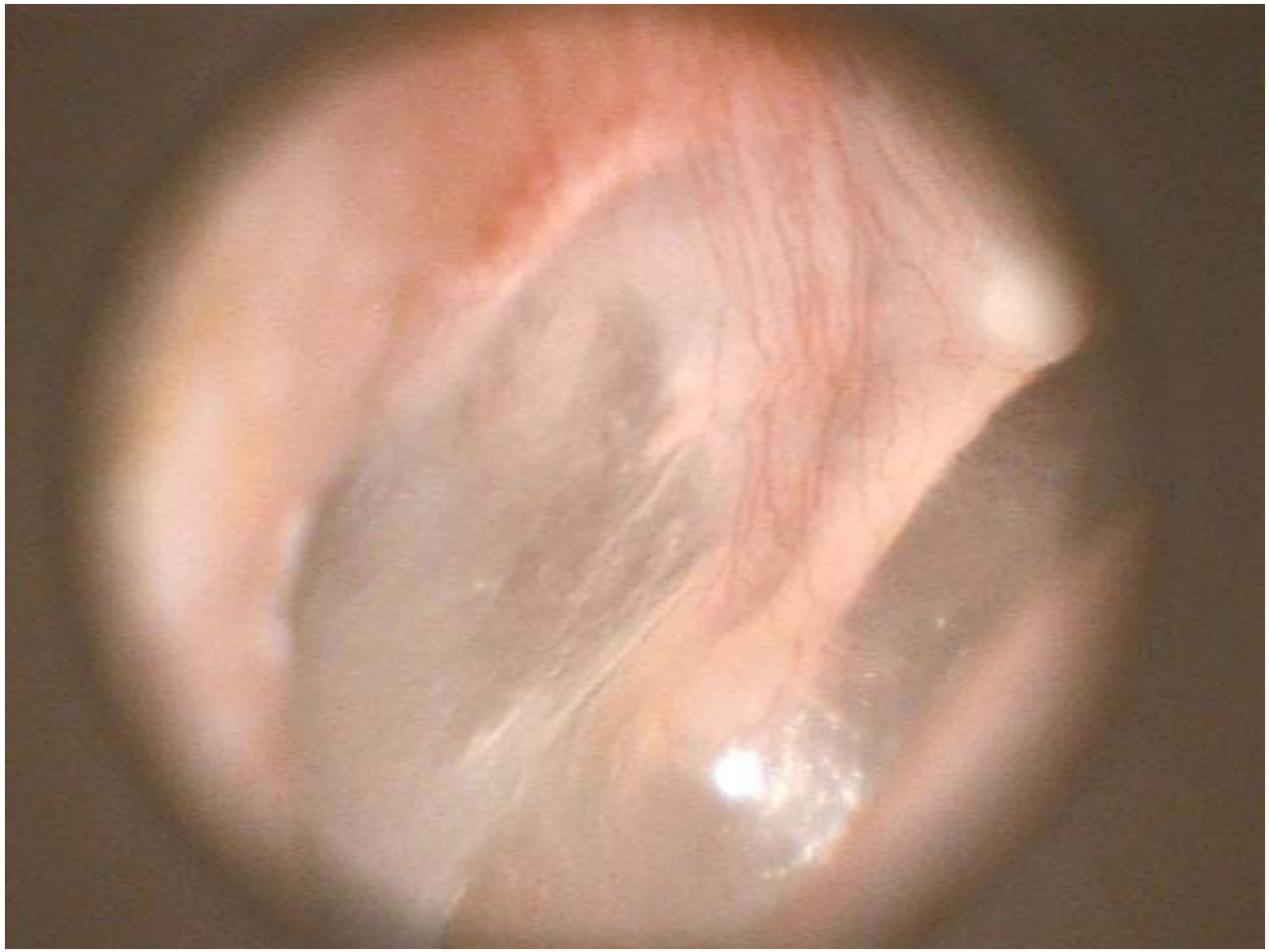

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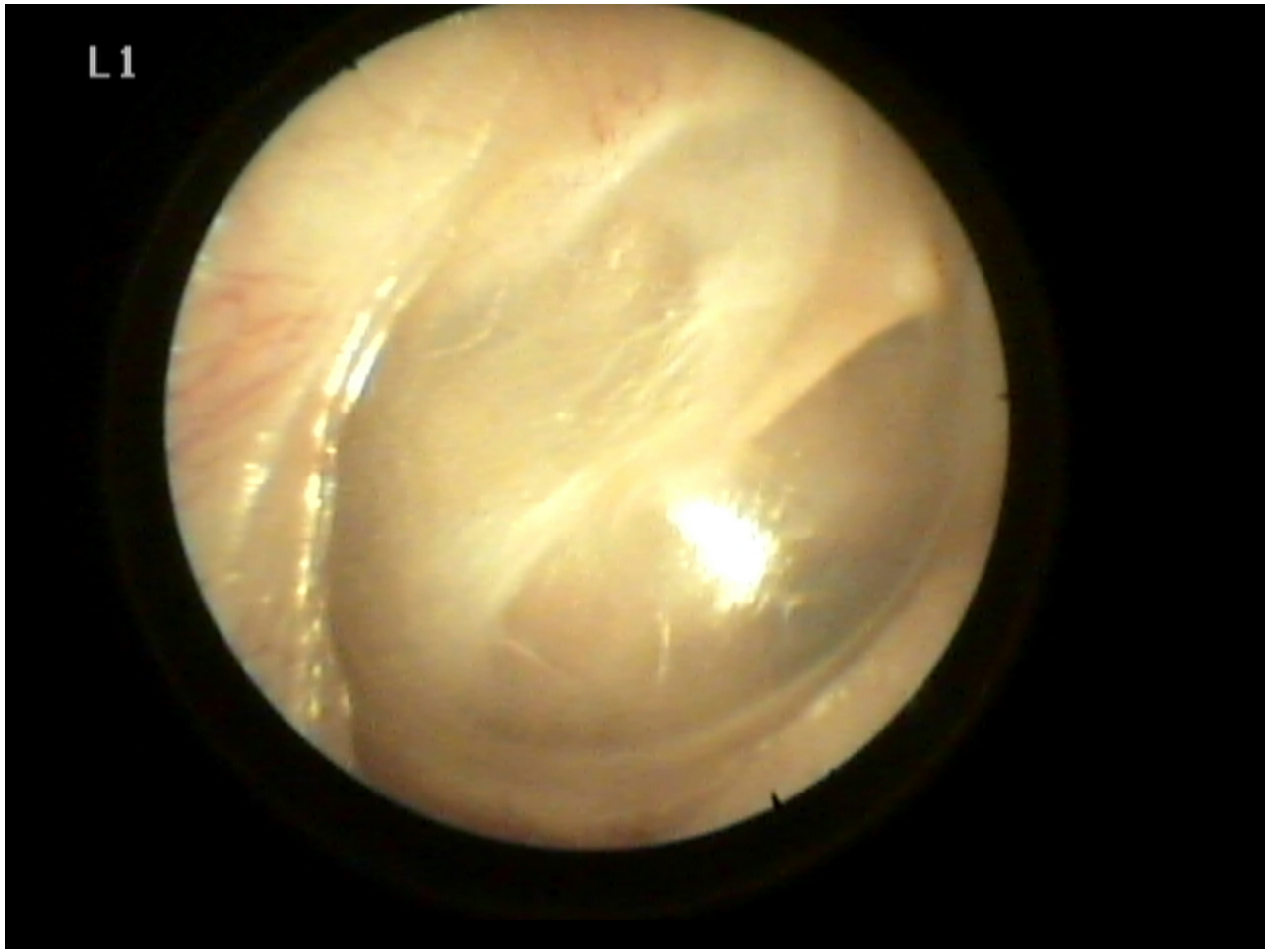

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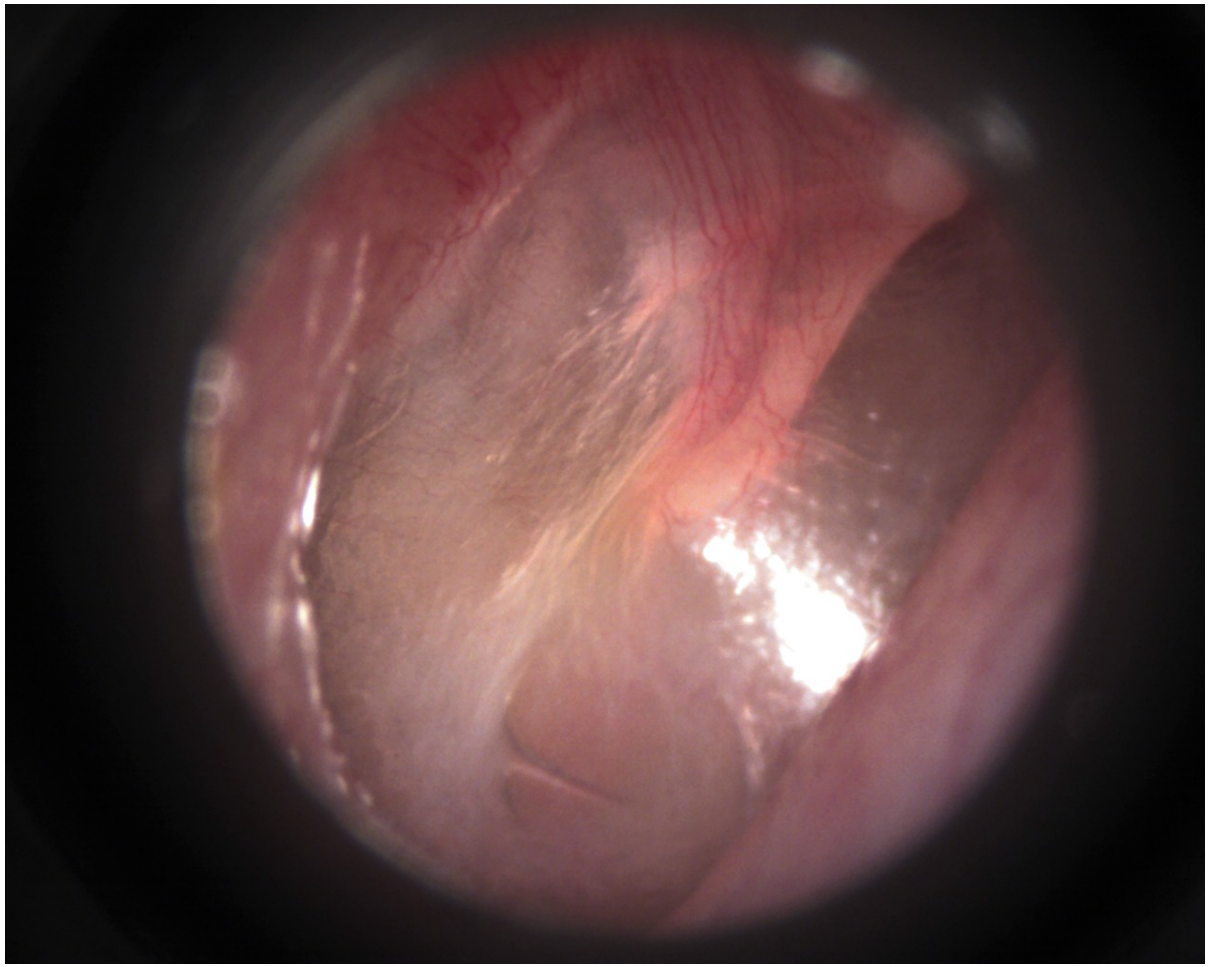

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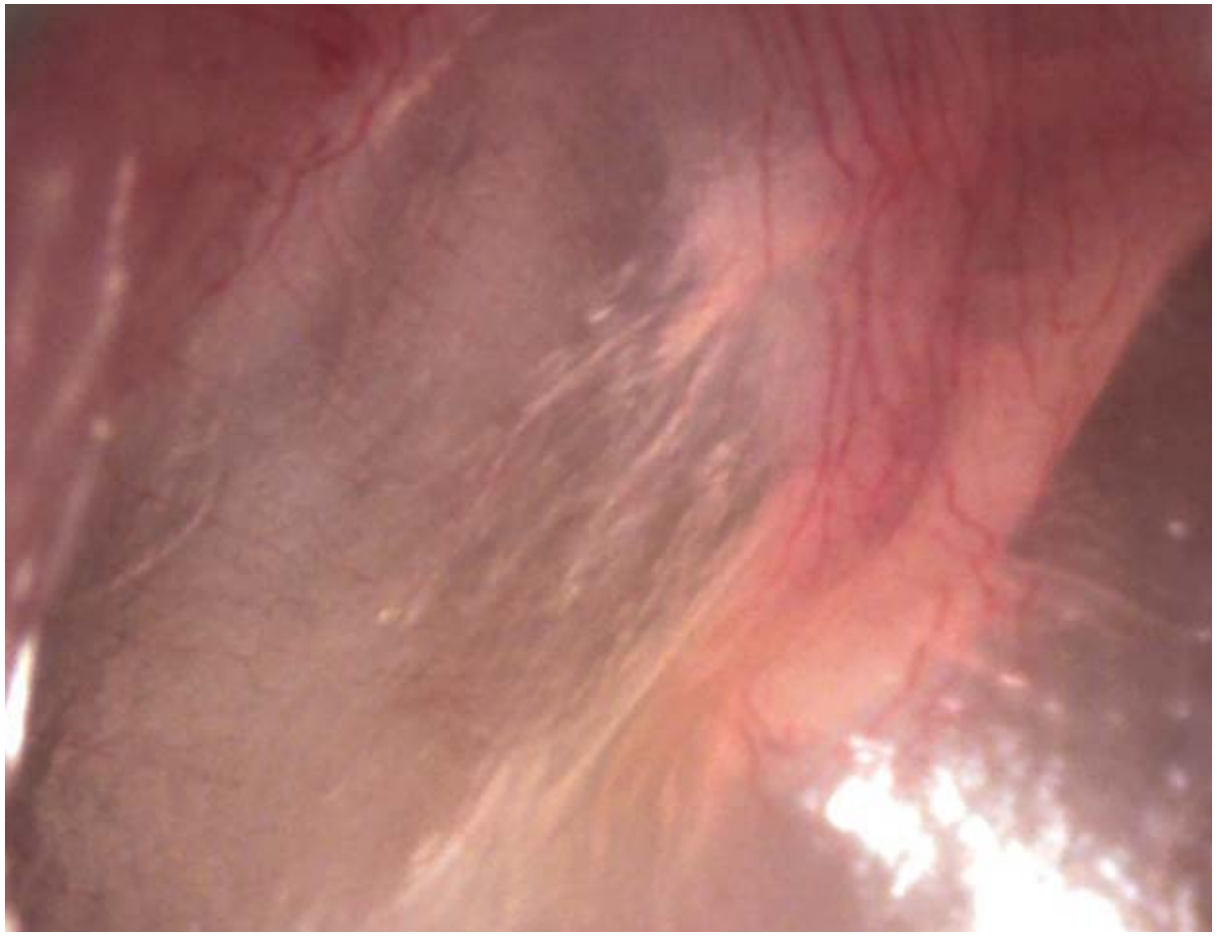
Resolution – USB



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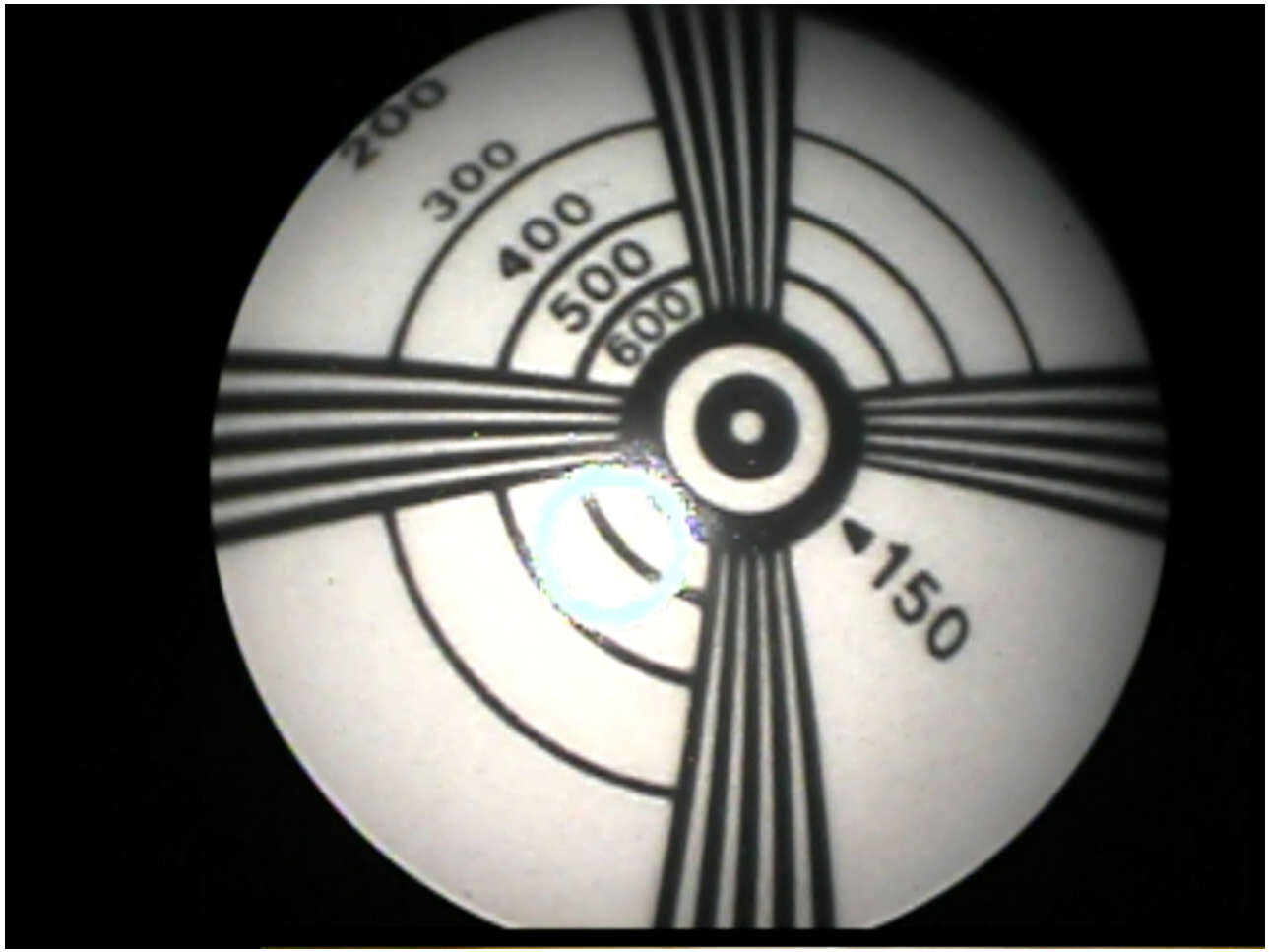
“Technical” Imaging



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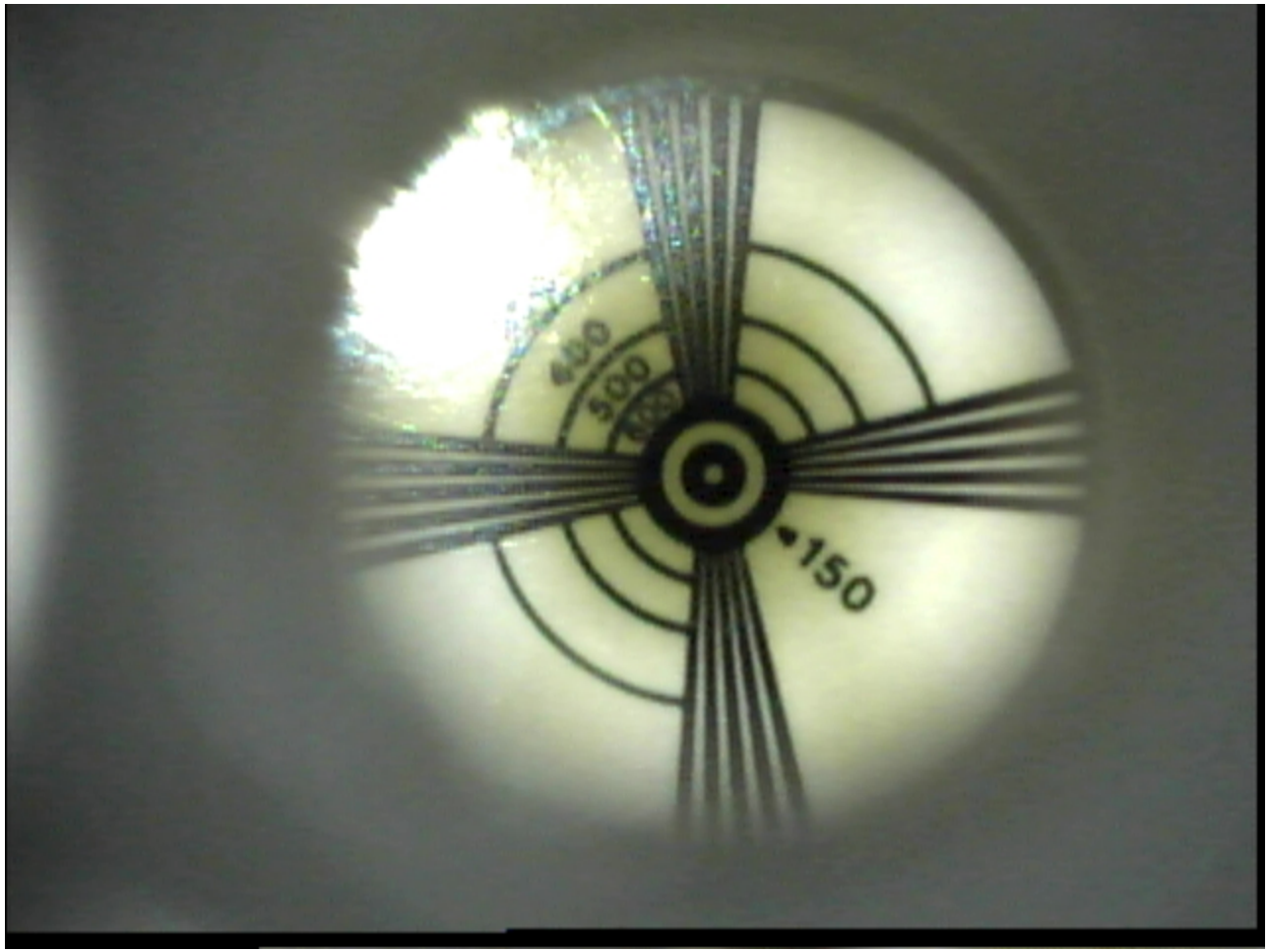

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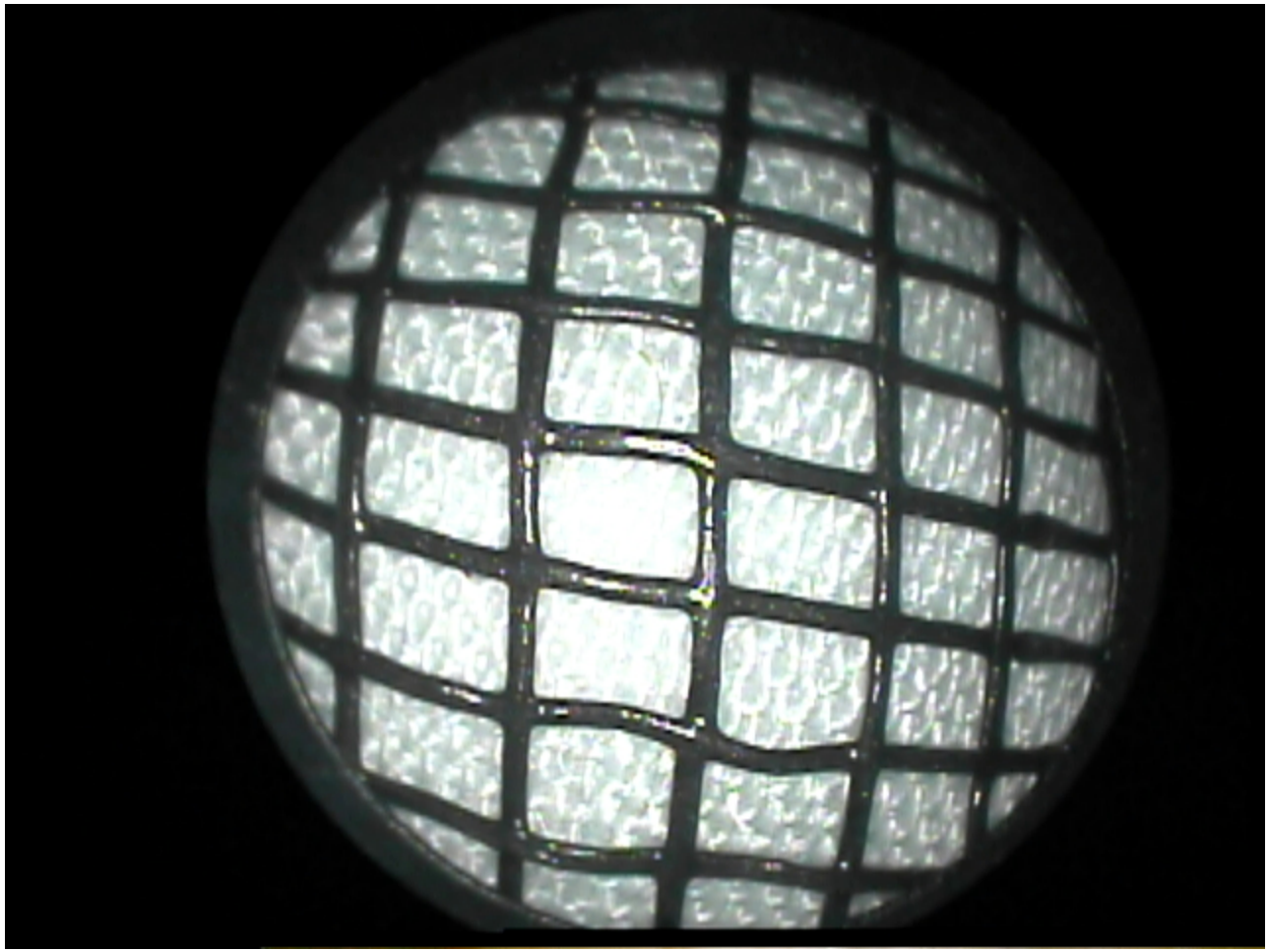

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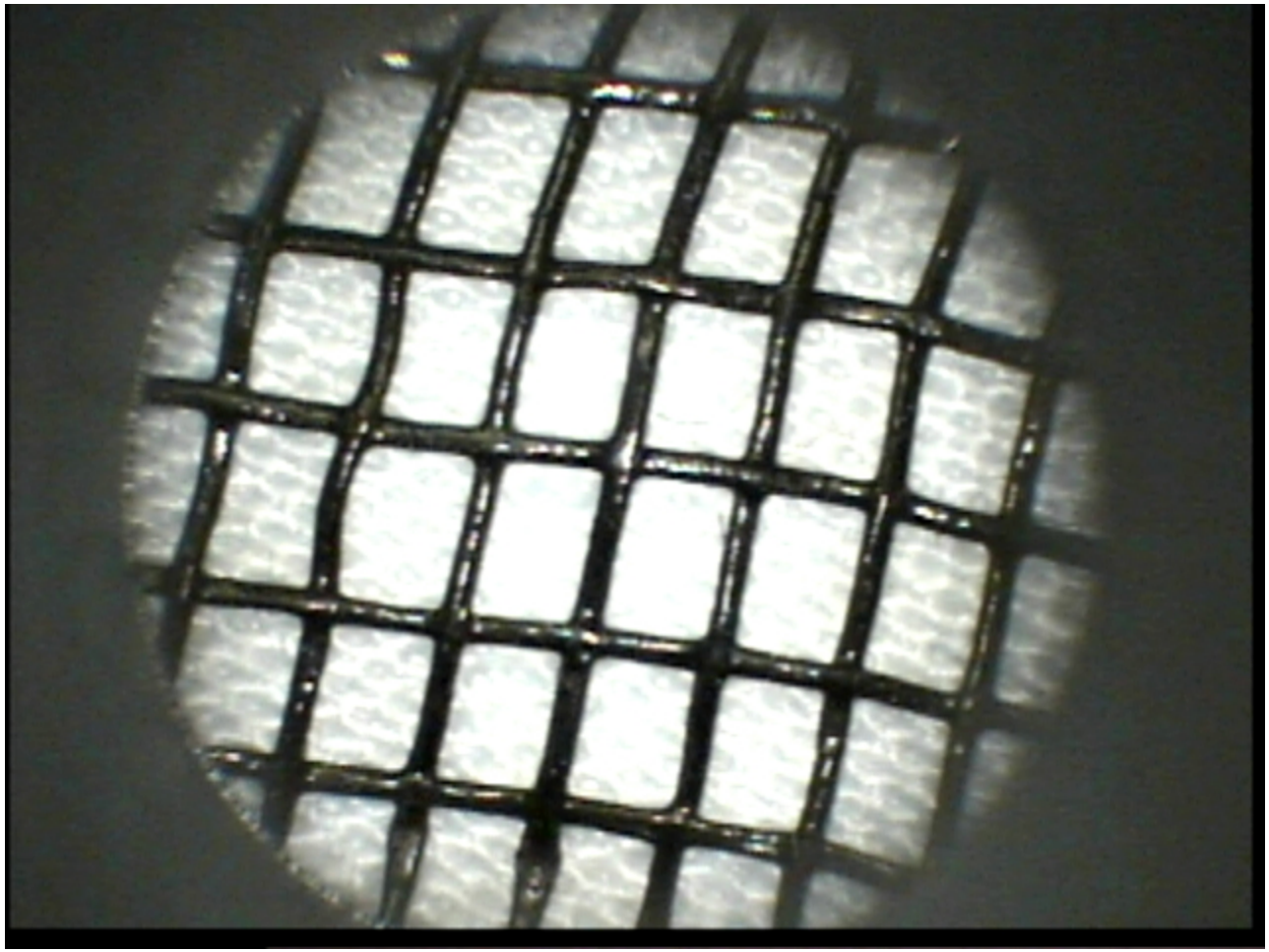

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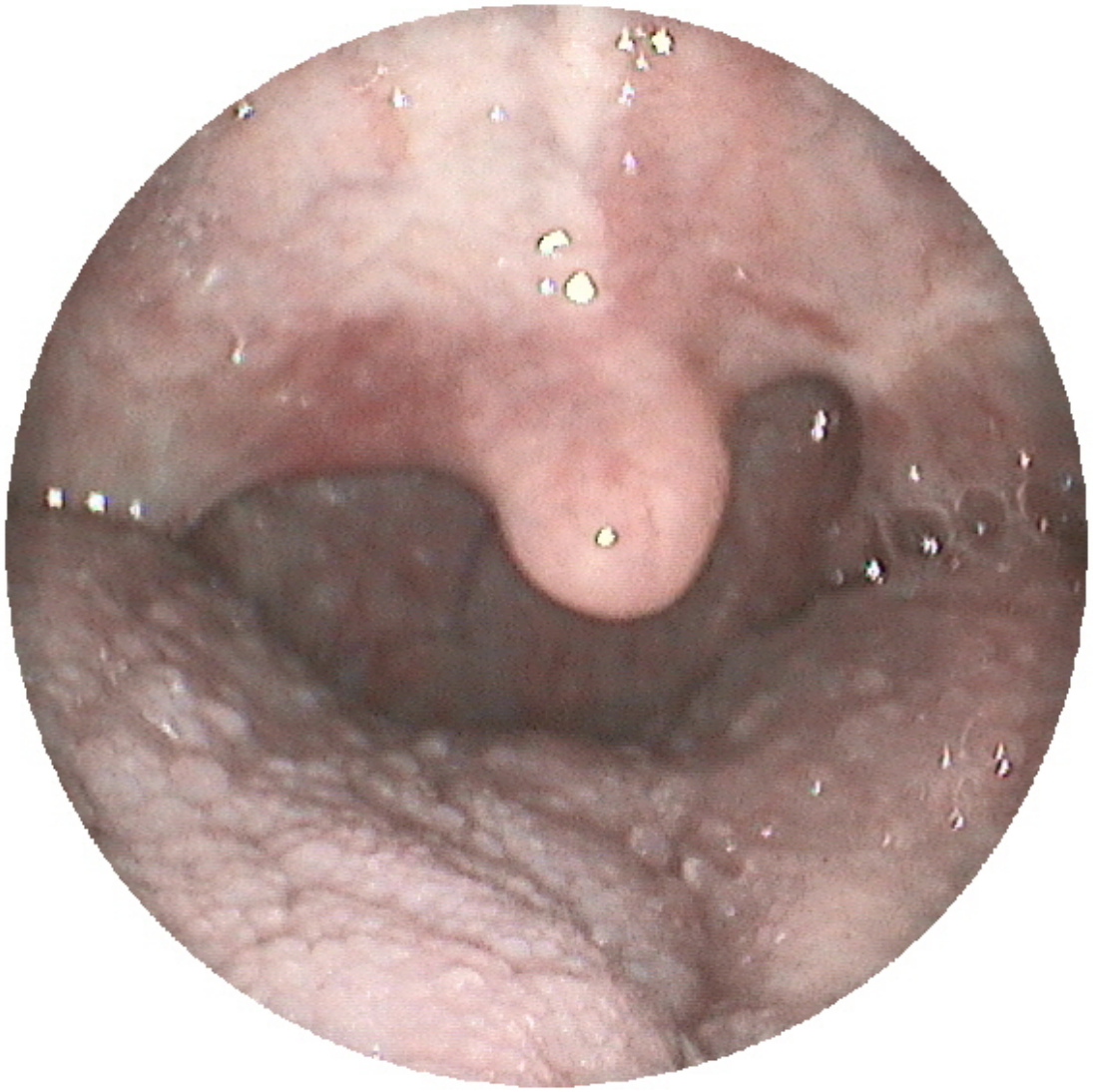
Shooting “Wide” Images



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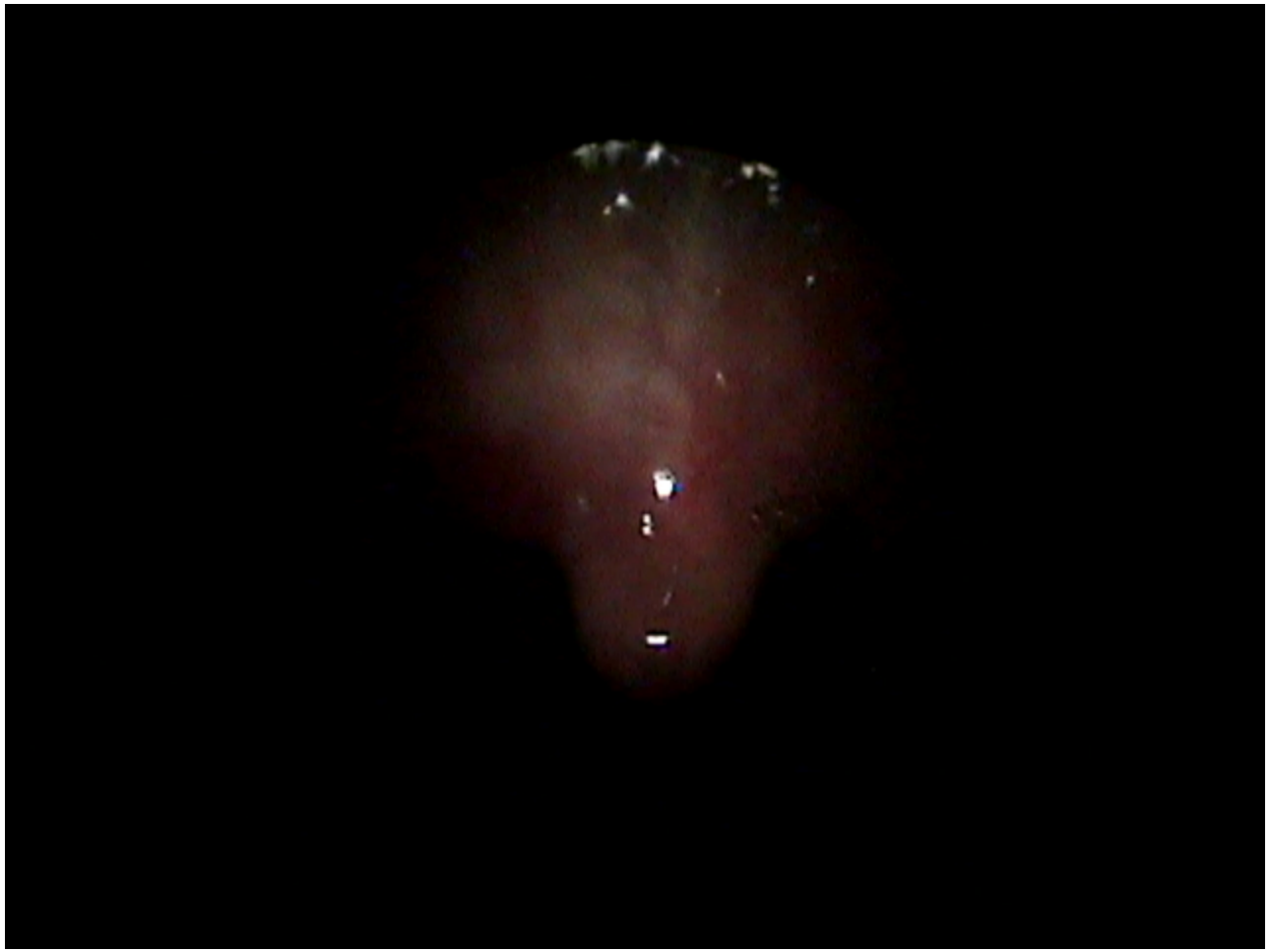

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Color Accuracy and Wide Images

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Color Accuracy and Wide Images

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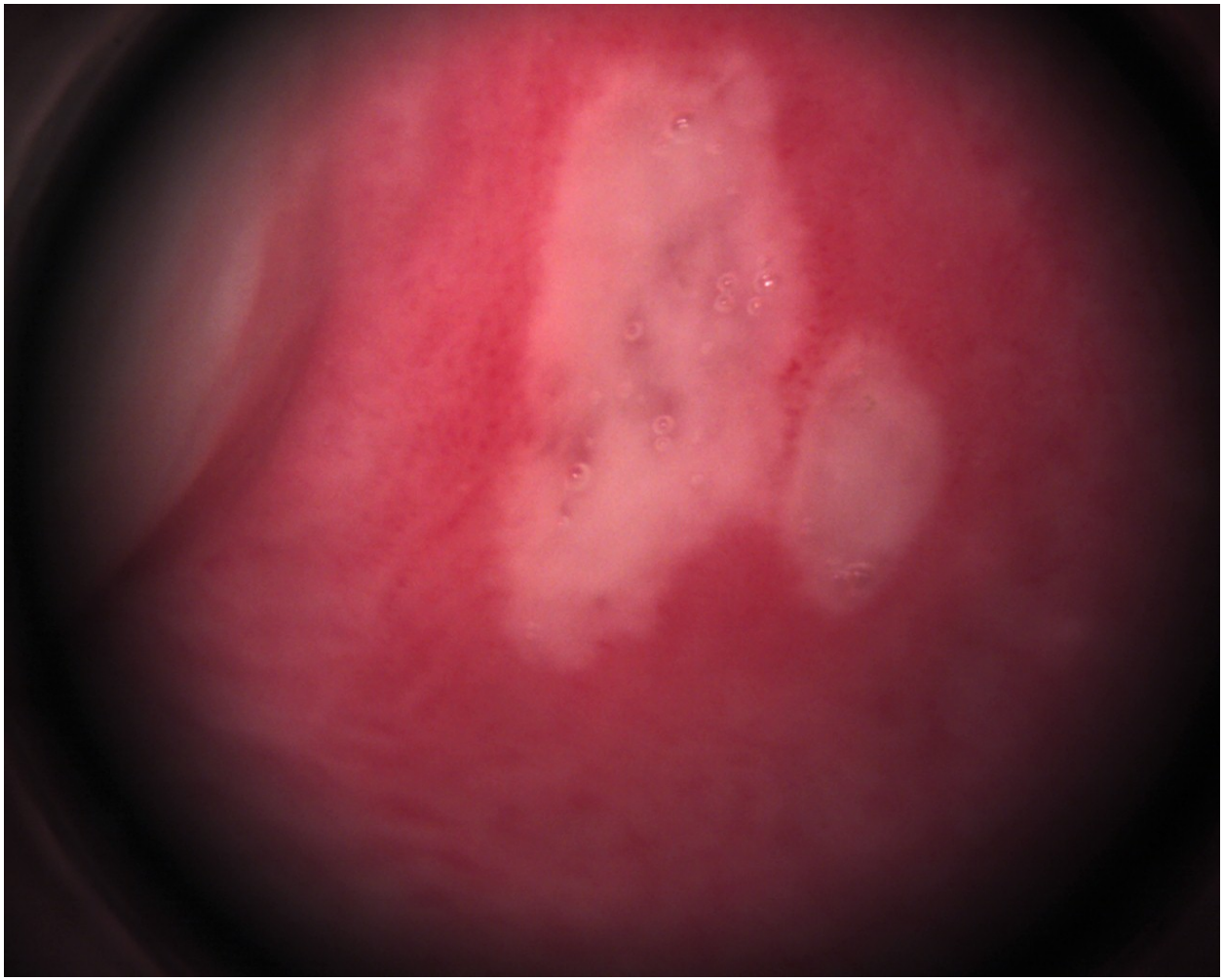
Color Accuracy



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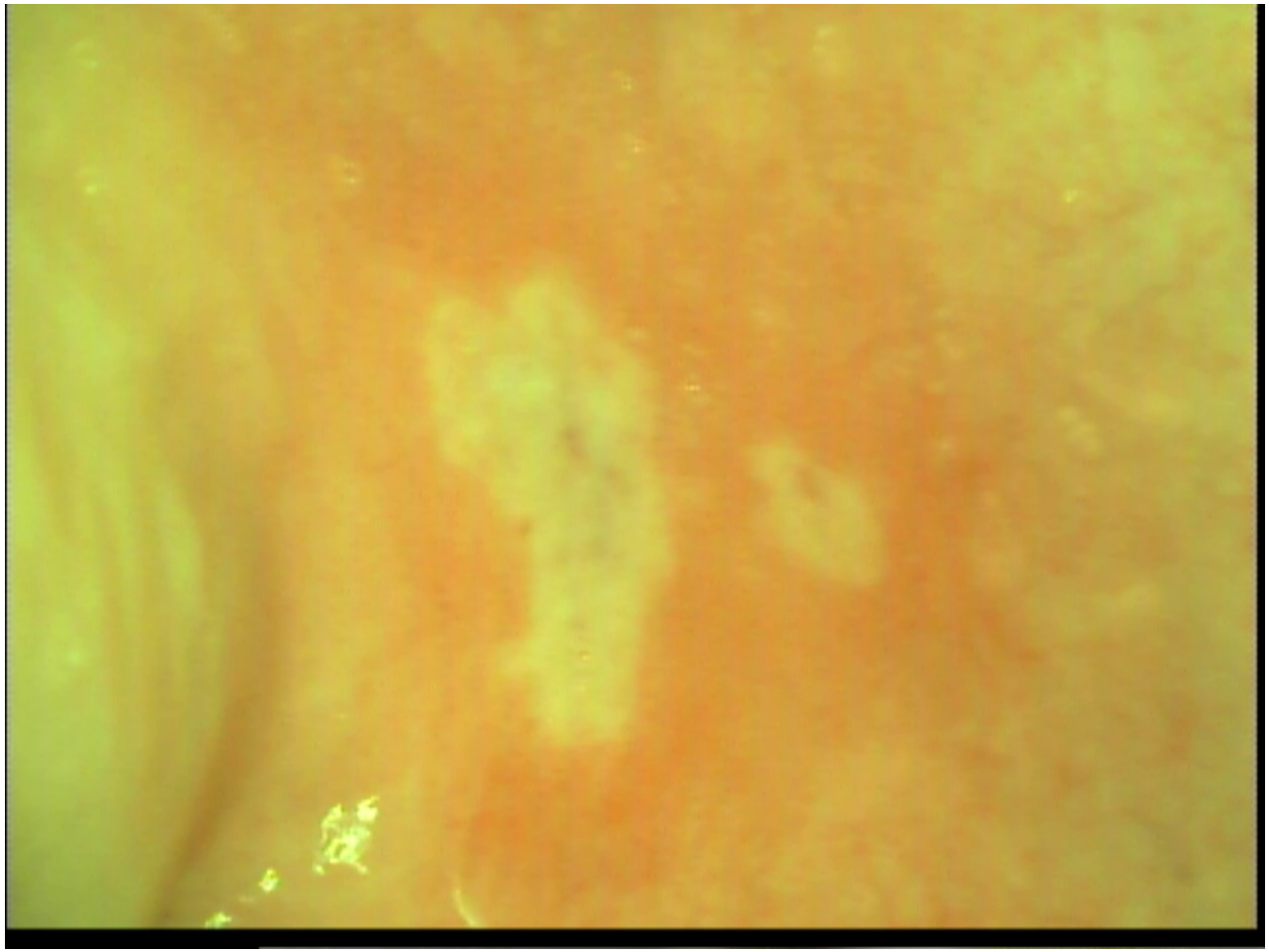
Color Accuracy



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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 is 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

Questions?

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