

CRYSTAL CLEAR BPPV

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Charleston Vestibular Update- November 2023



T



Thomas
Jefferson
University

Jefferson
Medical
College



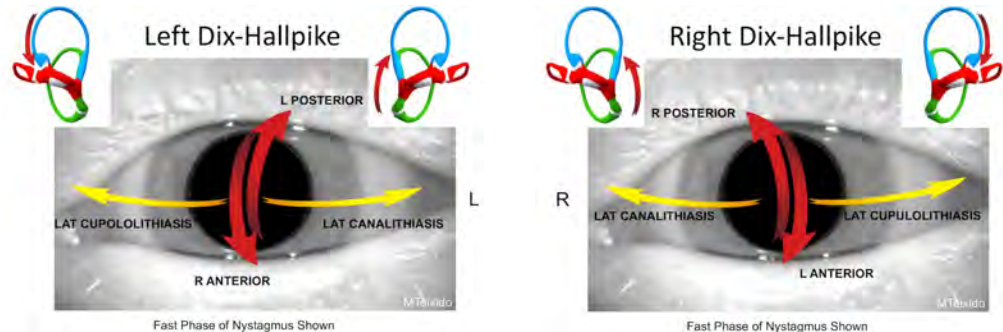
Wilmington, Delaware and Philadelphia, Pennsylvania,
USA

Course objectives

- To review 3-D **anatomy** from an actual membranous labyrinth to inform our conceptual model of BPPV
- To translate our knowledge of anatomy to understanding of **eye movements**
- To review **diagnostic maneuvers** for BPPV variants using a 3D model
- To review **treatment maneuvers** for BPPV variants using a 3D model
- To introduce a **practical model** for diagnosis and treatment of posterior canal BPPV

Resources

- The Handout:



- Slides
- The Videos: YouTube DRMTCI / BPPVViewer.com
- Presentation Video on YouTube
- The Patient instruction sheets: Teixido Dizziness Homework
- Downloadable BPPV Viewer for Windows and iOS at BPPVViewer.com

3-D ANATOMY OF THE LABYRINTH

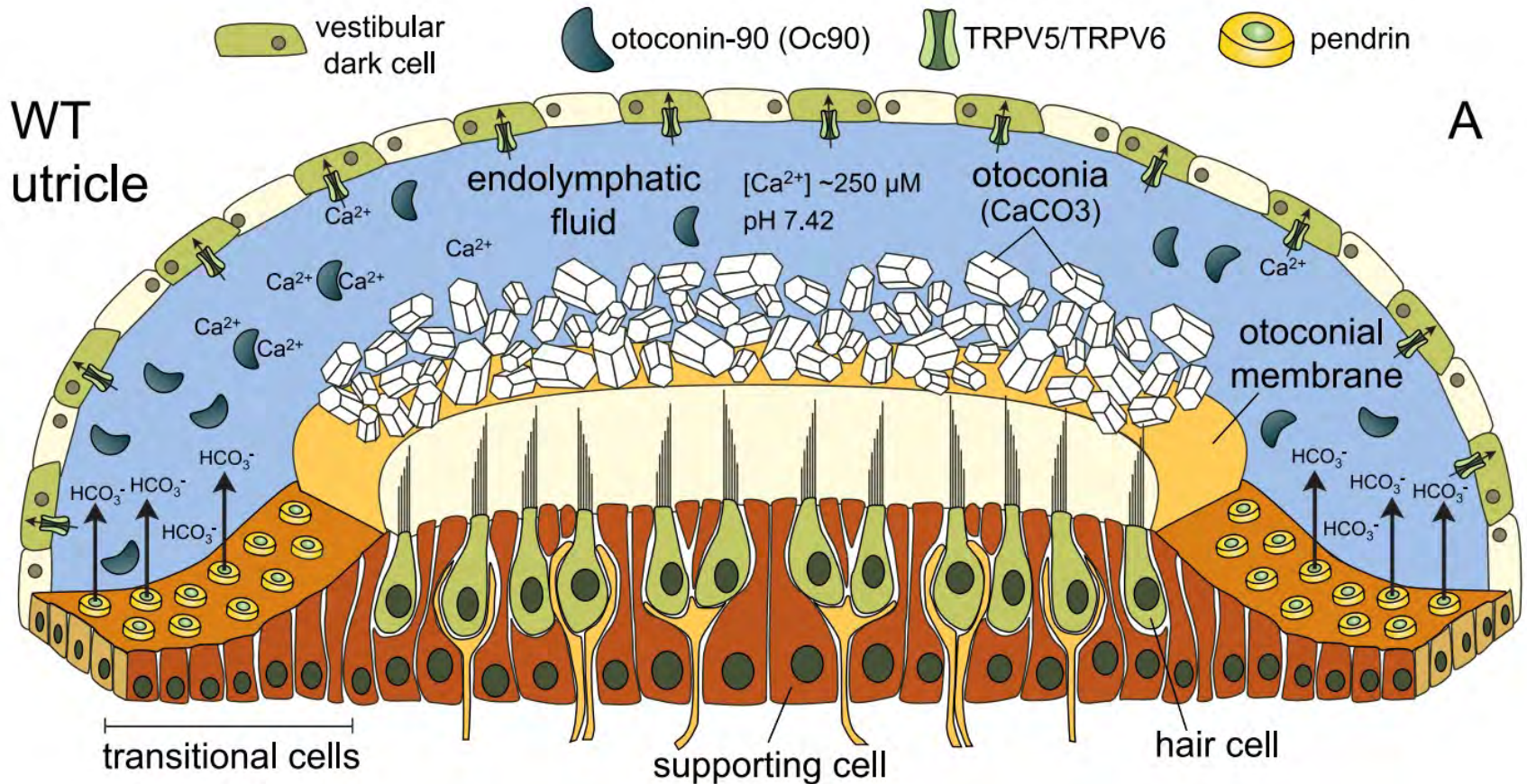
The Membranous Labyrinth



The Membranous Labyrinth

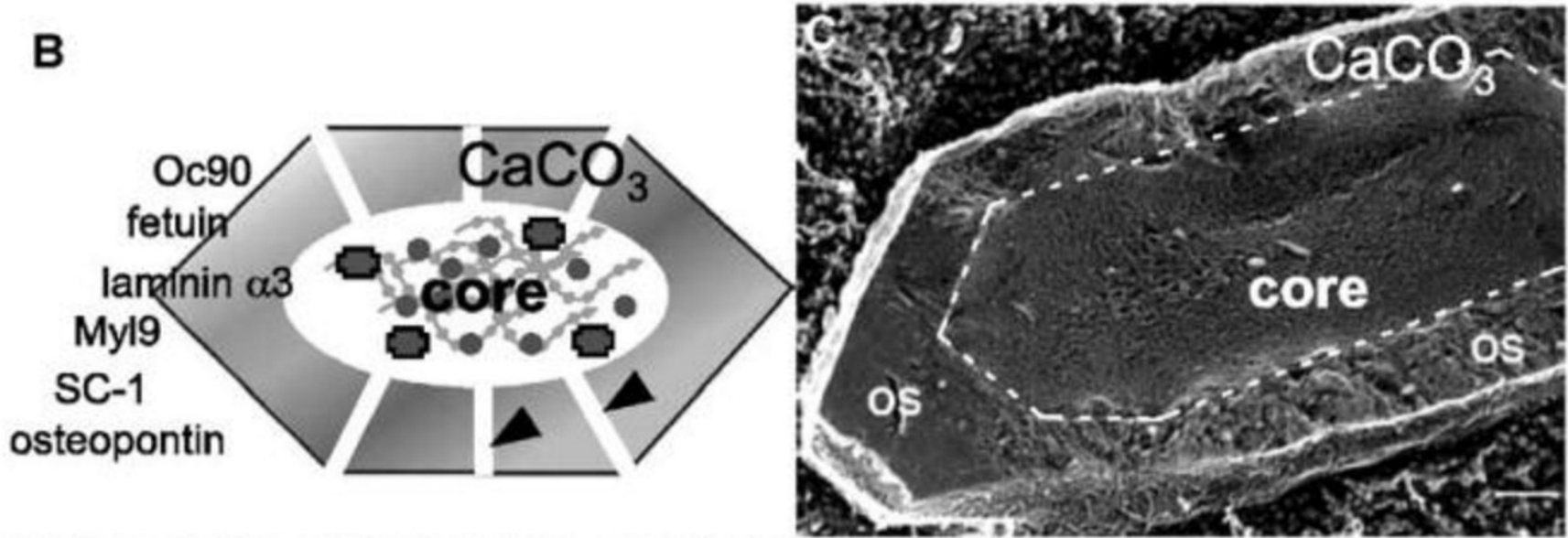


The Otolith Organ



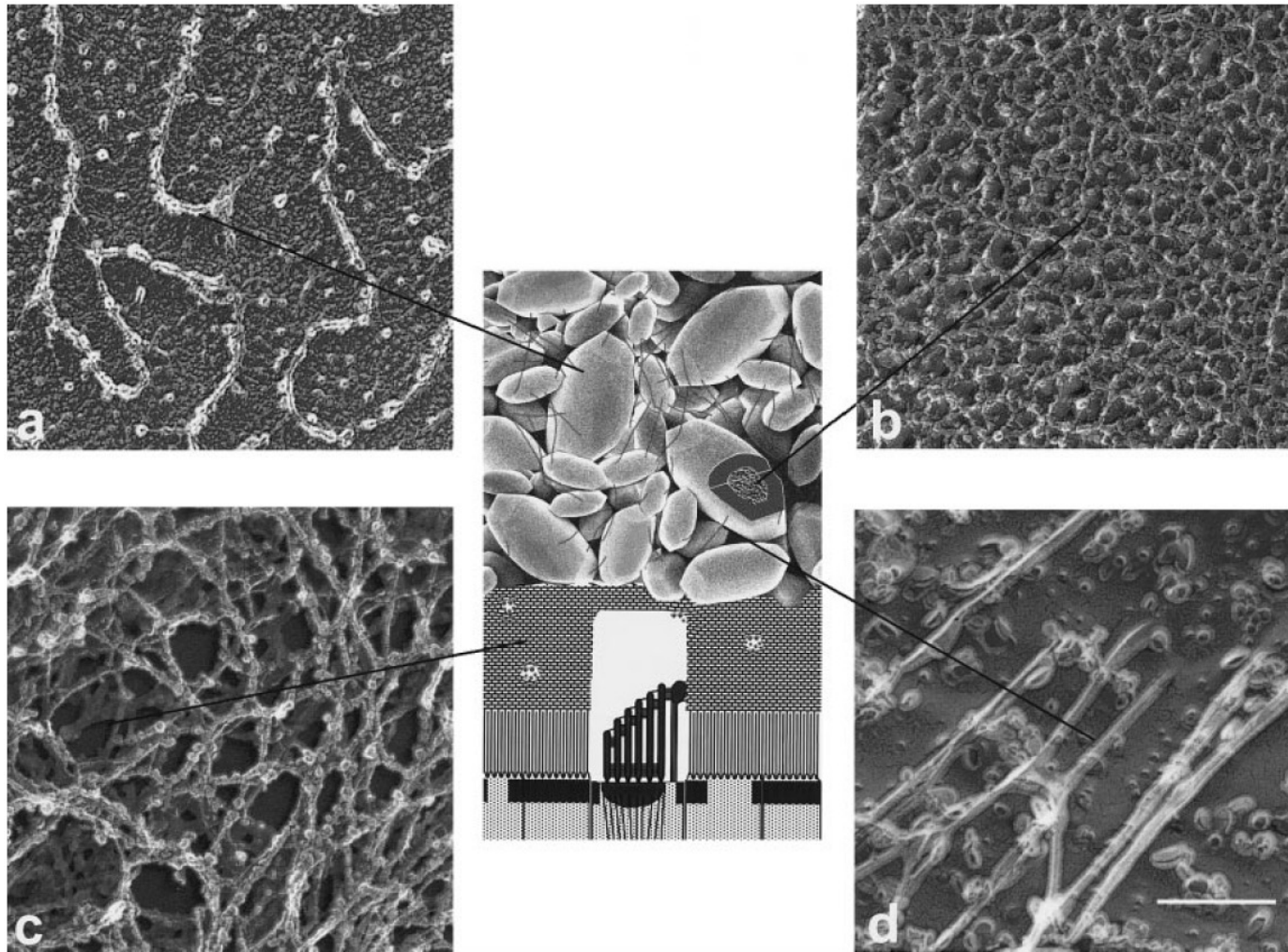
Dark cells absorb calcium.

The Otolith Life Cycle



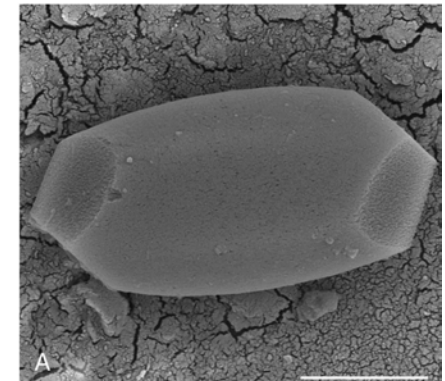
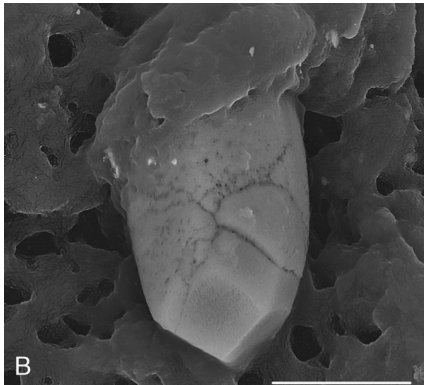
Otoliths are 40% protein matrix. Density may change as mineral is absorbed.

The Otolith Life Cycle



Otolith Geometry is Unique

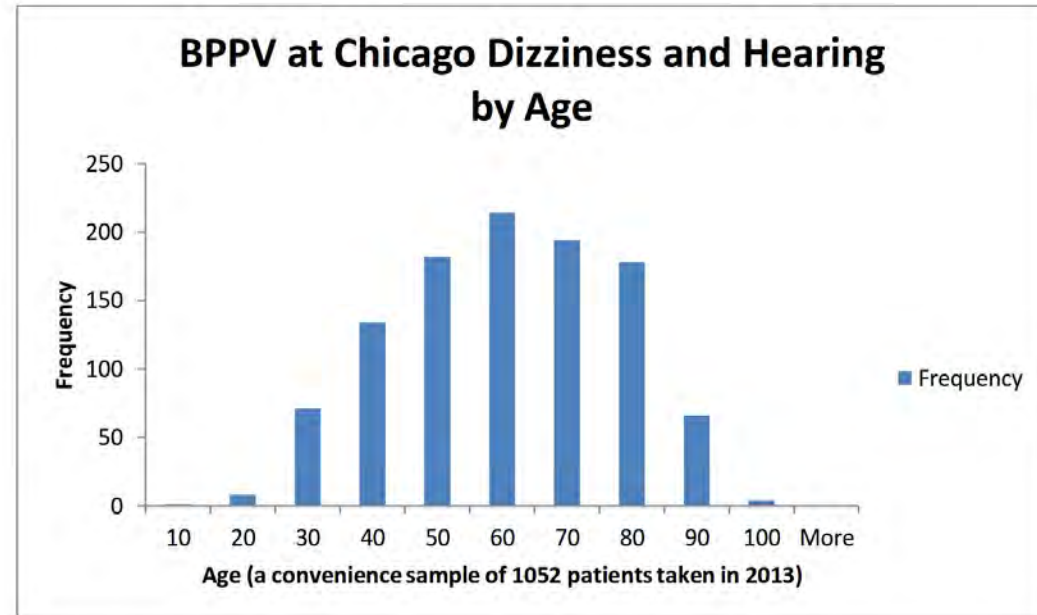
- -Not spheres
- -Hexagonal rods with rhombohedral faces
- -Angle of repose not known
- -Unique shape affects drag, clumping and otolith/wall interactions
- -Unique shape affects drag and fall time
- Density may be variable



Walther et al, *Otology & Neurotology*, 35:868 2014

Why do we get BPPV?

- Idiopathic
- Age
- Vestibular Neuritis
- Trauma
- Migraine
- Ménière's disease
- Vitamin D? Holick et al, *J Clin Endocrinol Metab* 2011; 96:1911–1930. ; Jeong et al, *J Neurol* 2013; 260:832-838.
- Osteoporosis? Jeong et al, *Neurology* 2009; 72: 1069-1076



Timothy C Hain MD

Why do we get confused about BPPV?

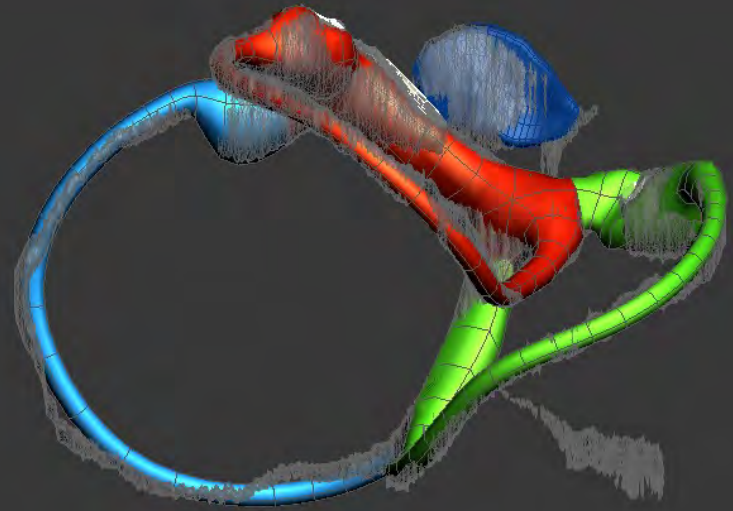
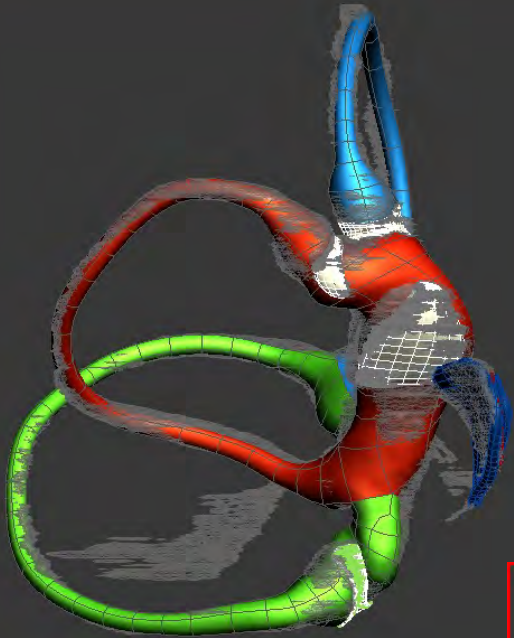
- We have only a very general concept of the anatomy of the *membranous* labyrinth.
- Illustrations used in papers are often not clear enough for readers.
- We have forgotten the link between vestibular physiology and eye movements.
- BPPV requires exceptional 3D visualization skills.

Creating a BPPV Model

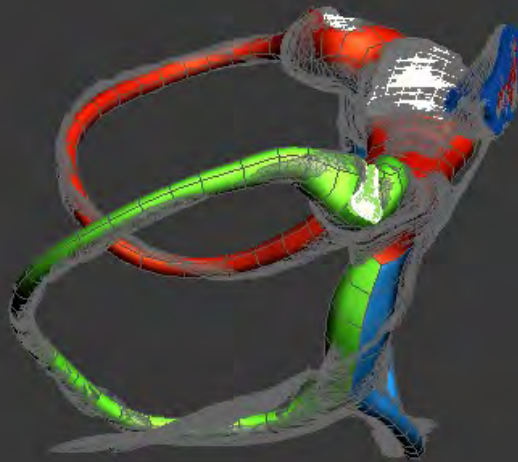


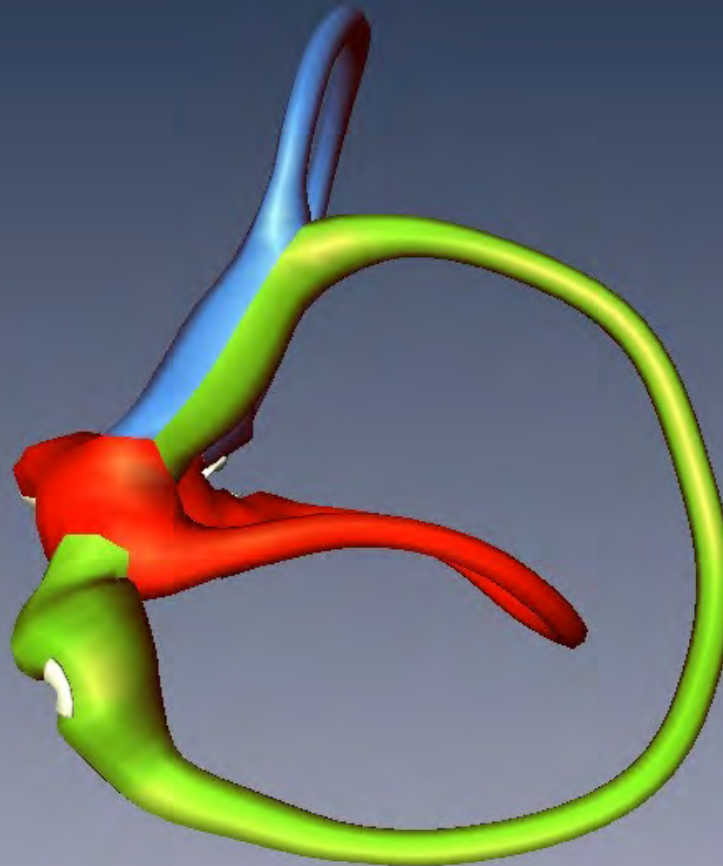
Temporal Bone Foundation
Boston, MA

100 μ segmentation and reconstruction
of human vestibular labyrinth



Smoothing and
contour averaging
using 3DSMax
Software
(Autodesk Inc. San
Rafael,CA).



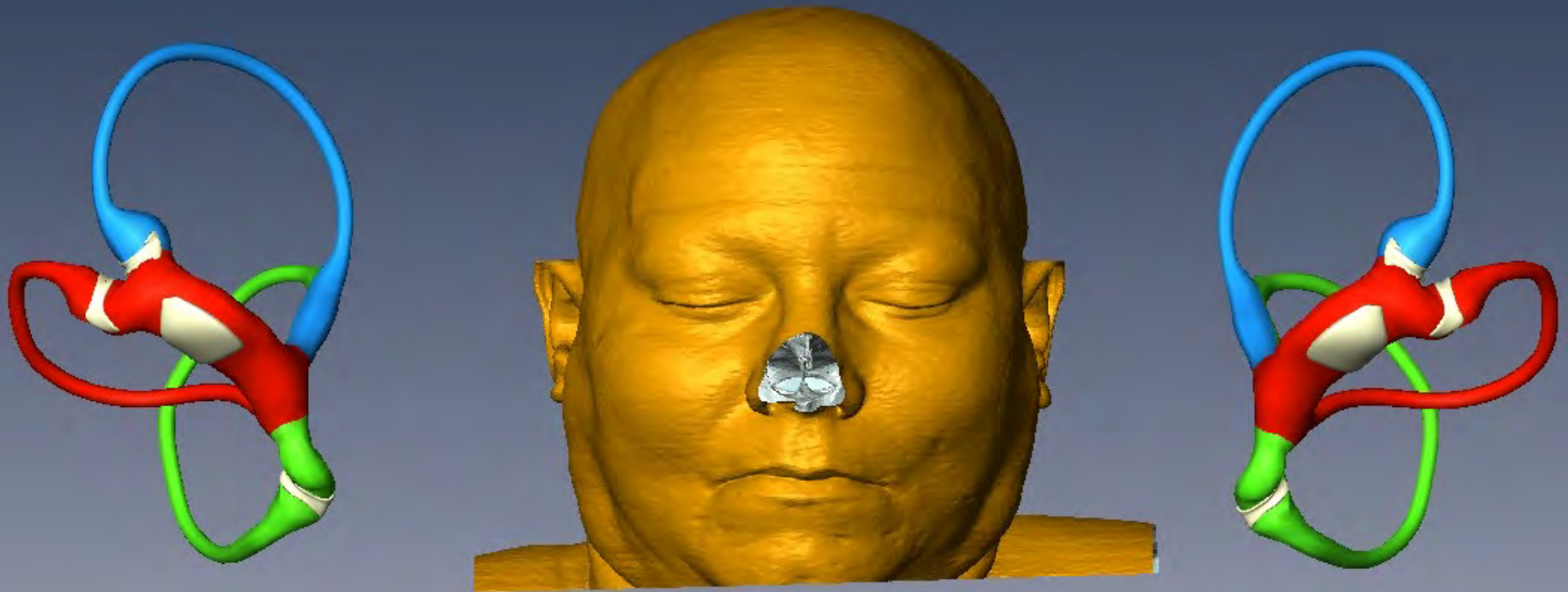


Teixido M et al, World Journal of Otorhinolaryngology- Head and Neck Surgery, Volume 1, Issue 2, March 2016

Labyrinth placed in 3D network with MRI based skull anatomy;
Amira 6.5 (Mercury Computer Systems, Chelmsford, MA, USA)



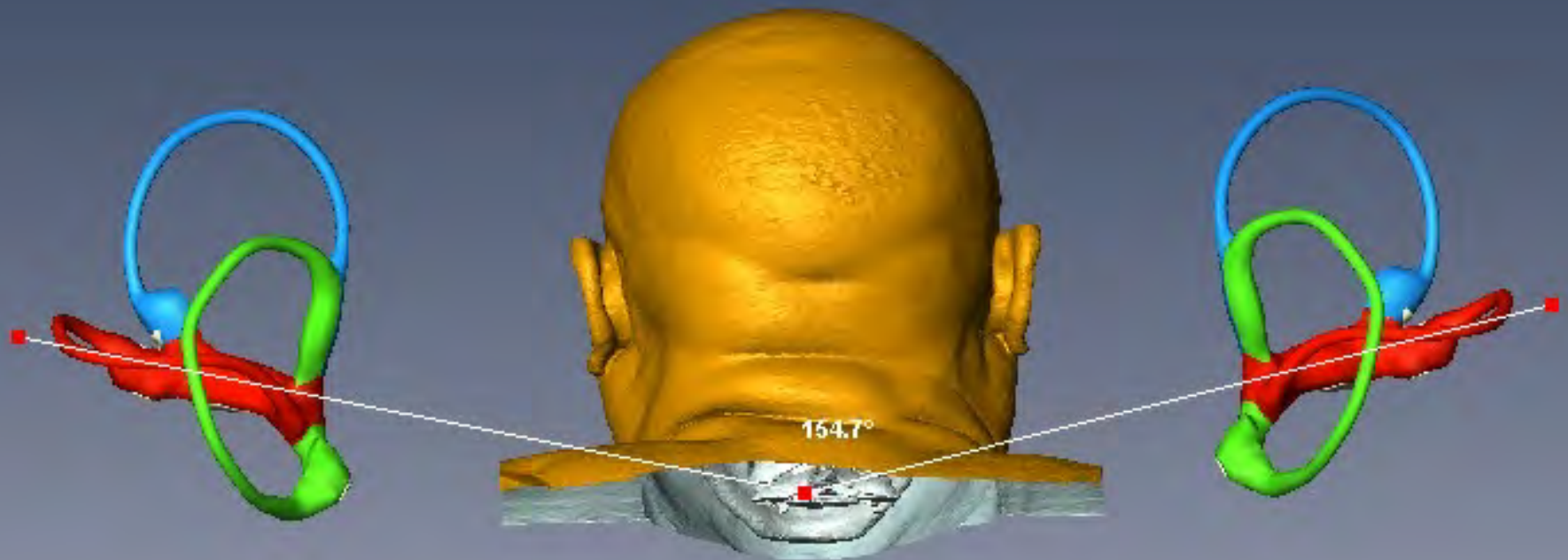
Labyrinth cloned / positioned relative to skull



Skin surface applied

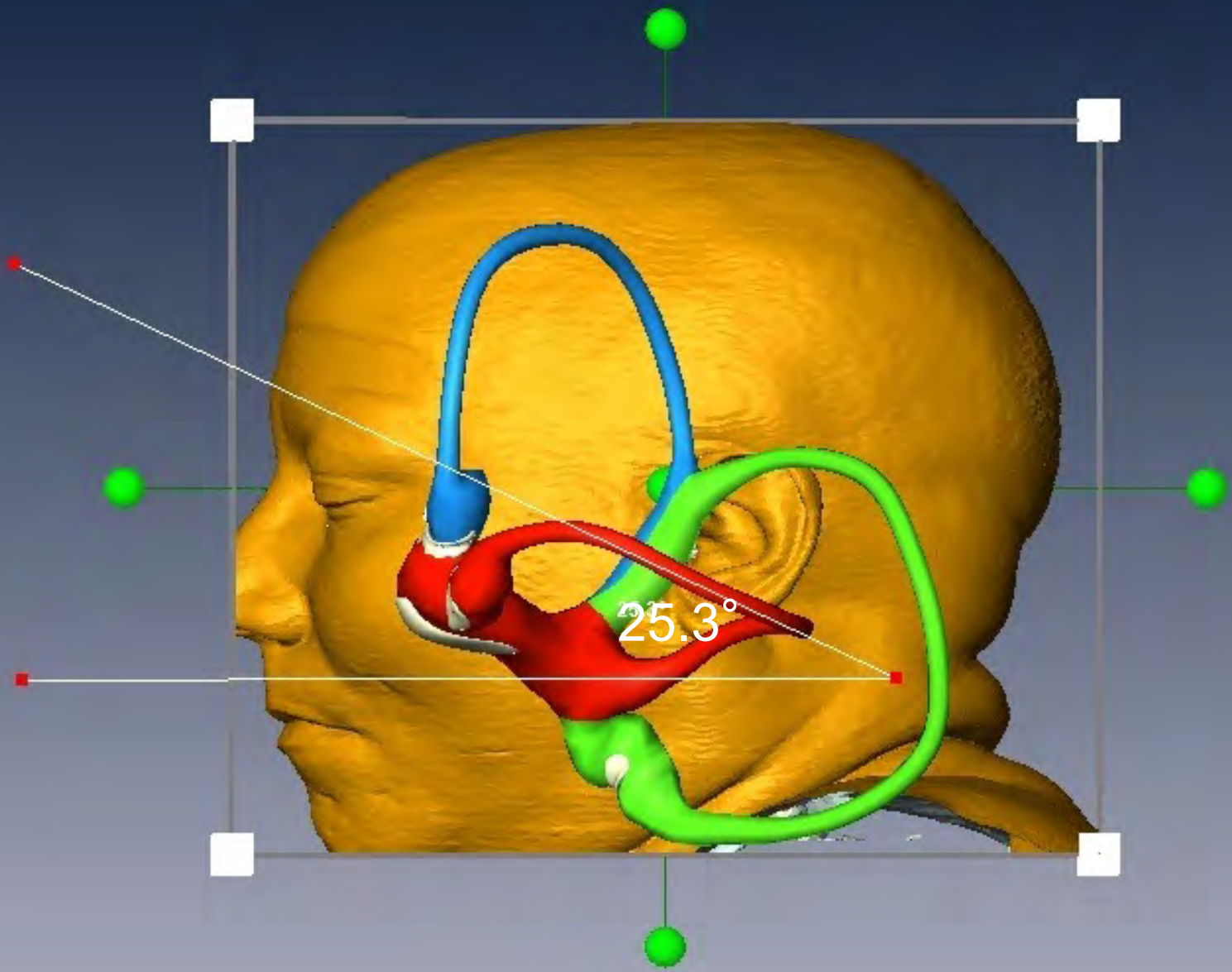


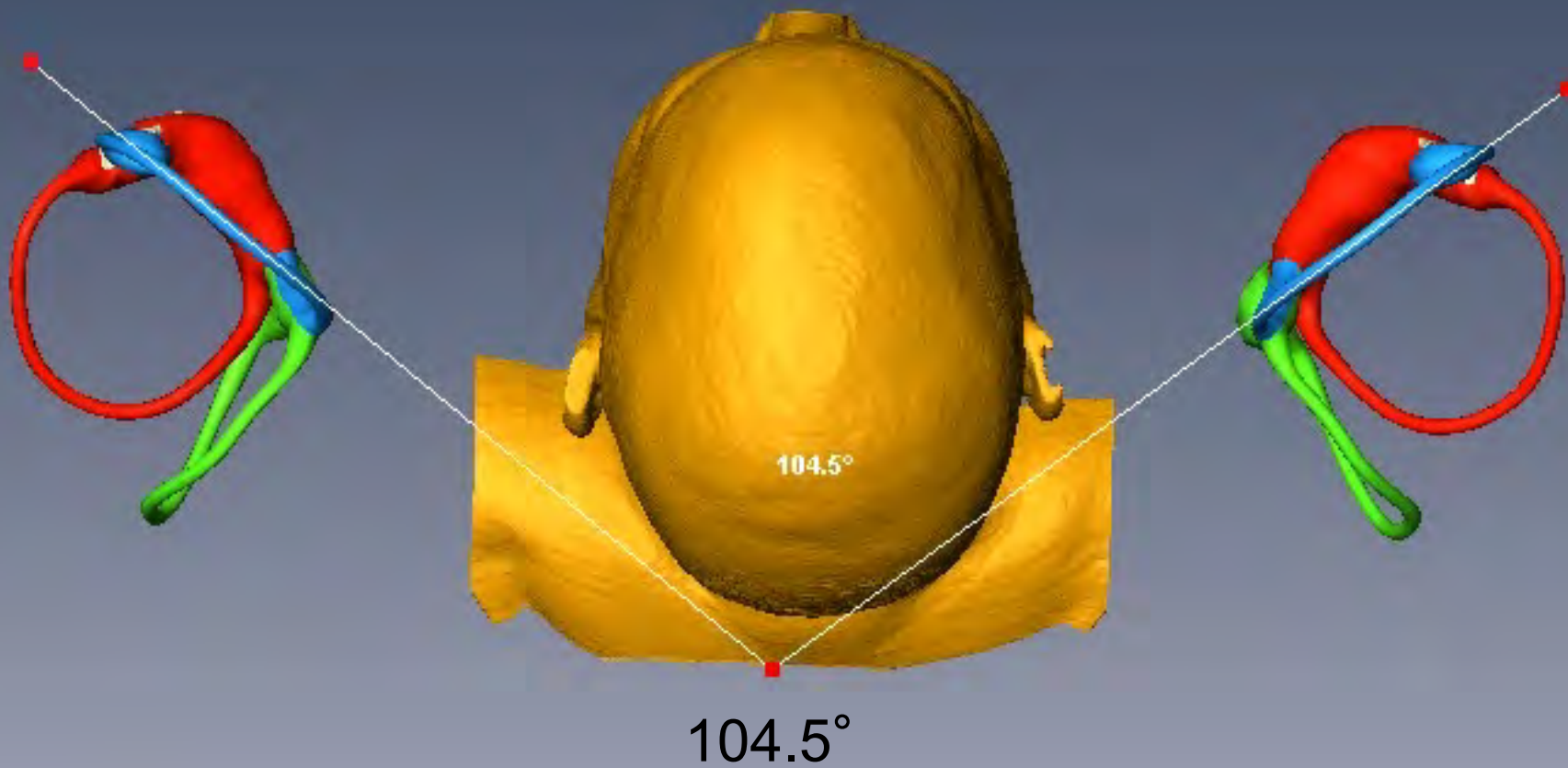
Inter-canal angle alignment



Inter-canal angle alignment

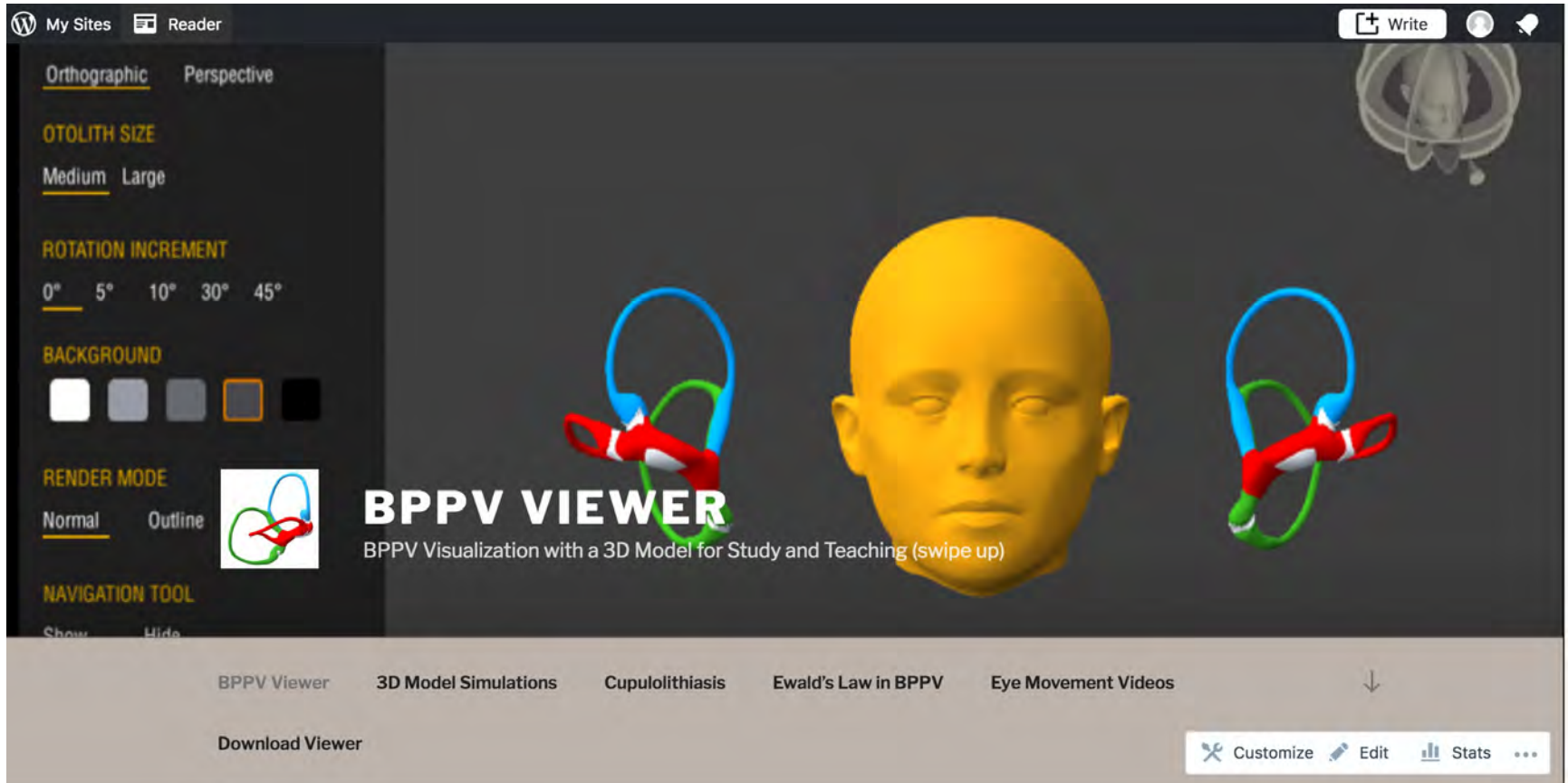
Teixido m et al, World Journal of Otorhinolaryngology- Head and Neck Surgery, Volume 1, Issue 2, March 2016



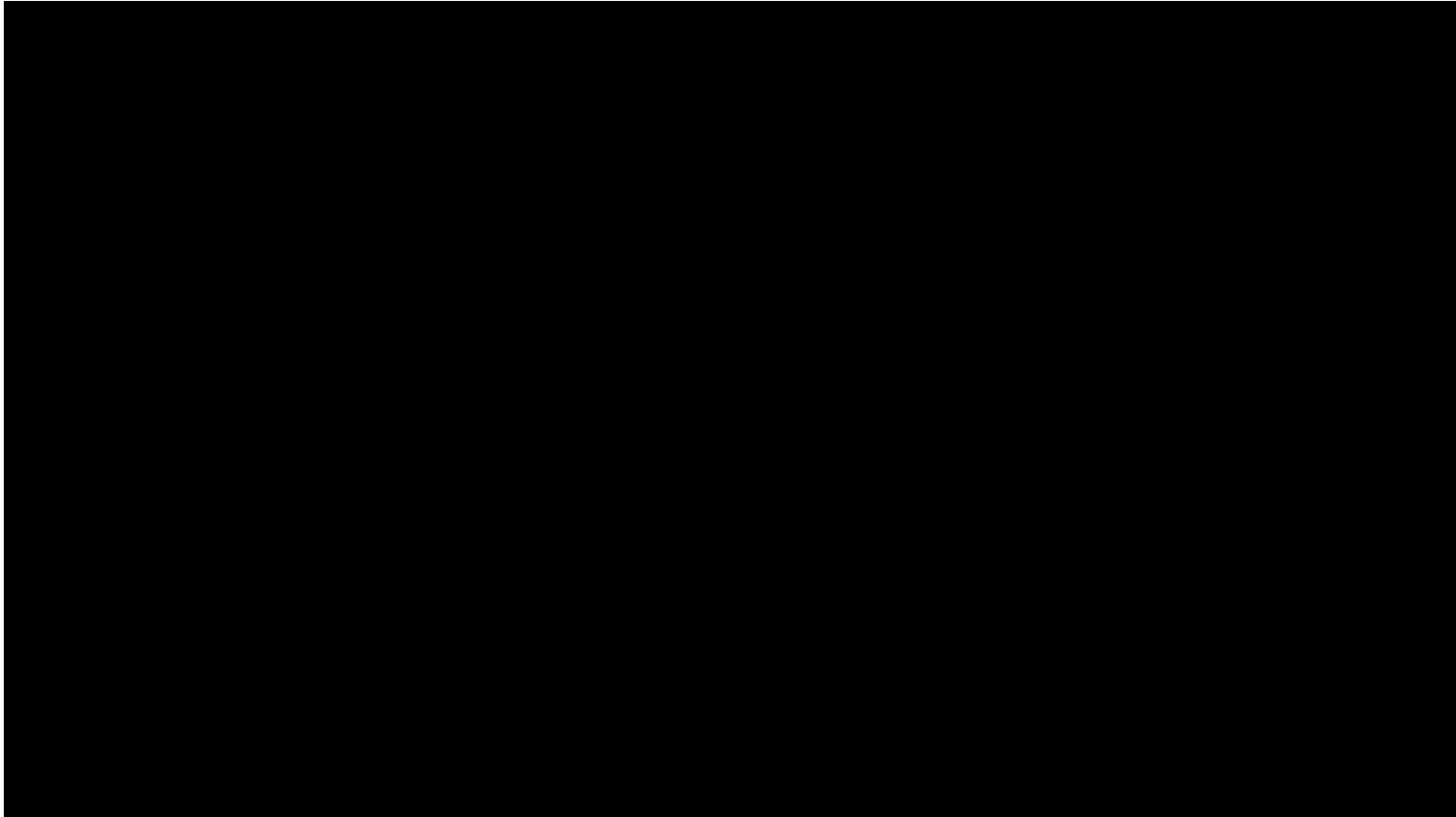


Inter-canal angle alignment

BPPV Viewer- a Downloadable Tool for Study of Otolith Disease



BPPVViewer.com

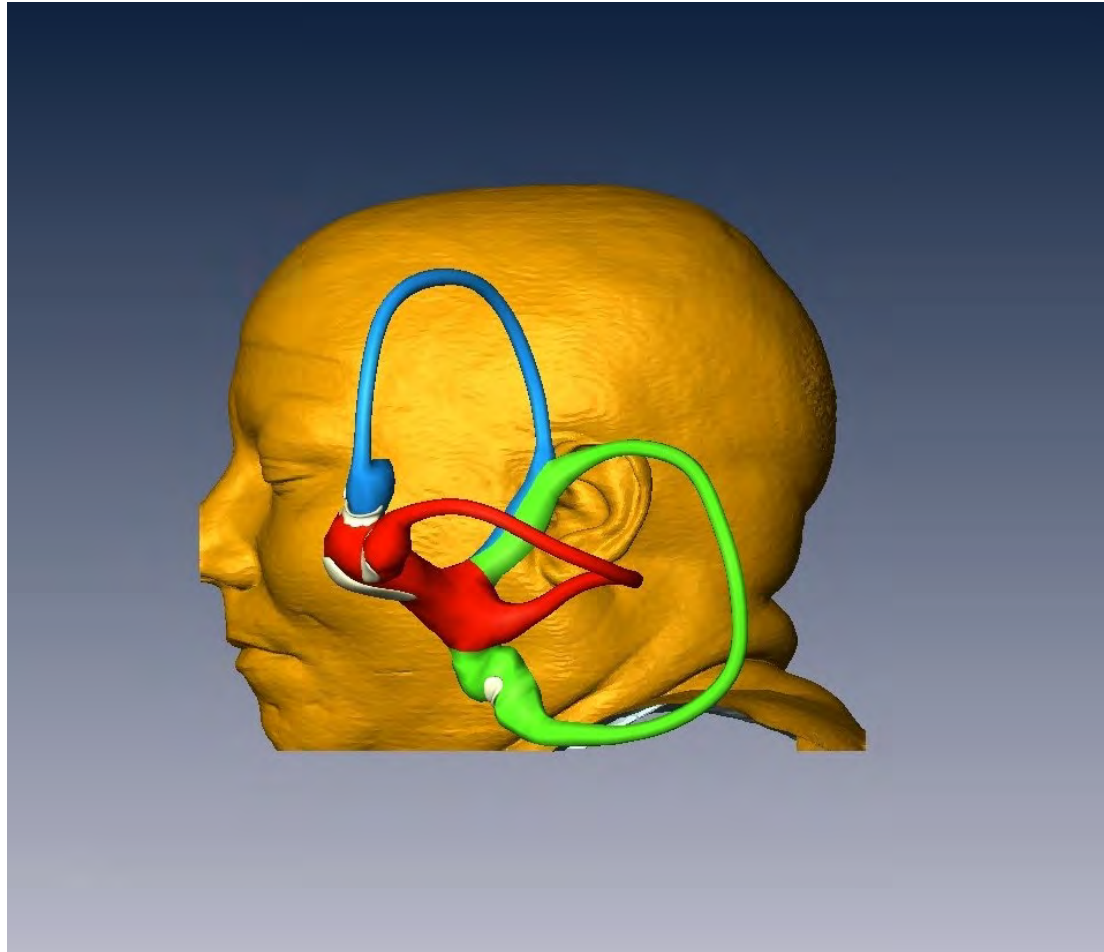


Unity3D
(2017.1.
1p2)
game
develop
ment
software
(Unity
Technol
ogies,
CA,
USA)

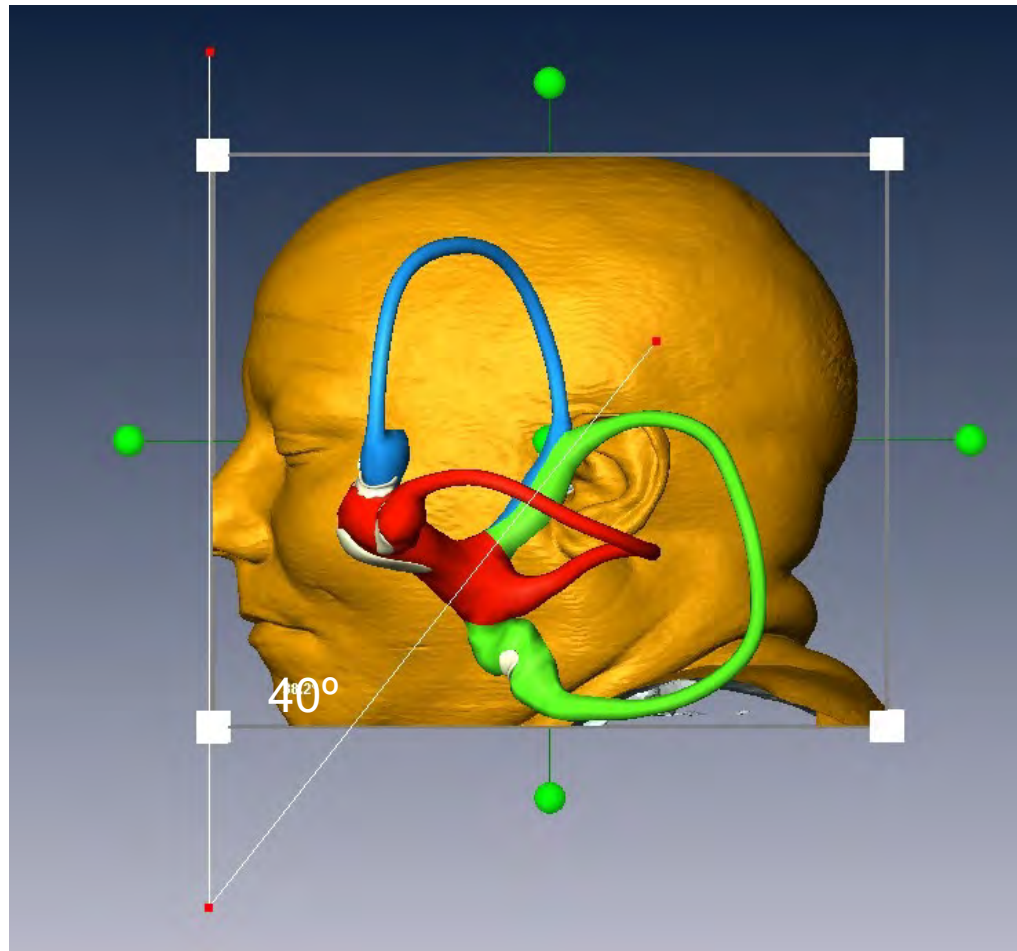
Teixido, MT, Traboulsi, H, A Downloadable BPPV Viewer for the Study of Otolith Disease- *World Journal of Otorhinolaryngology- Head and Neck Surgery*, June 2020
DOI 10.1016/j.wjorl.2018.10.1

Loading the Labyrinth

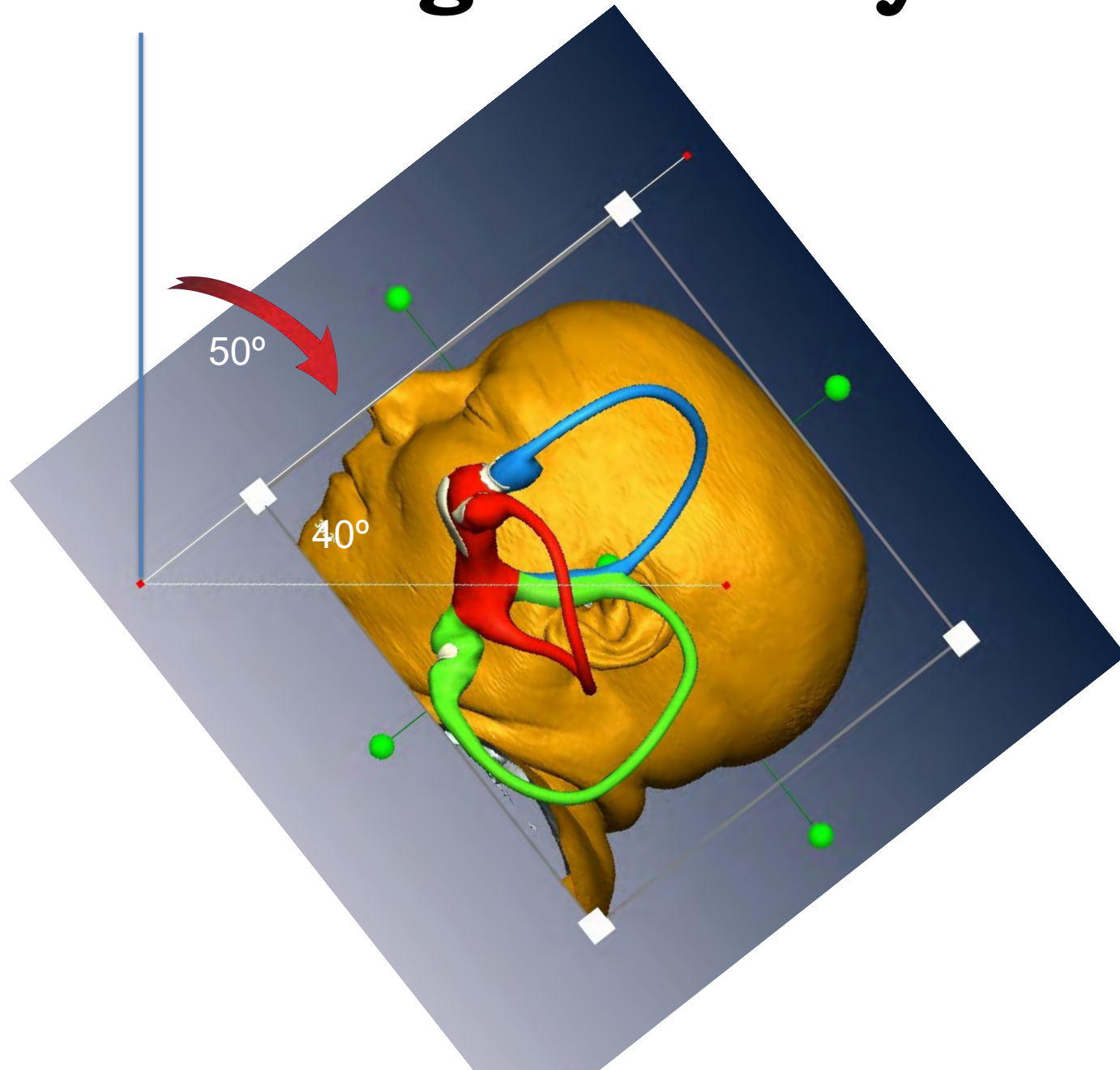
Posterior and Lateral canals



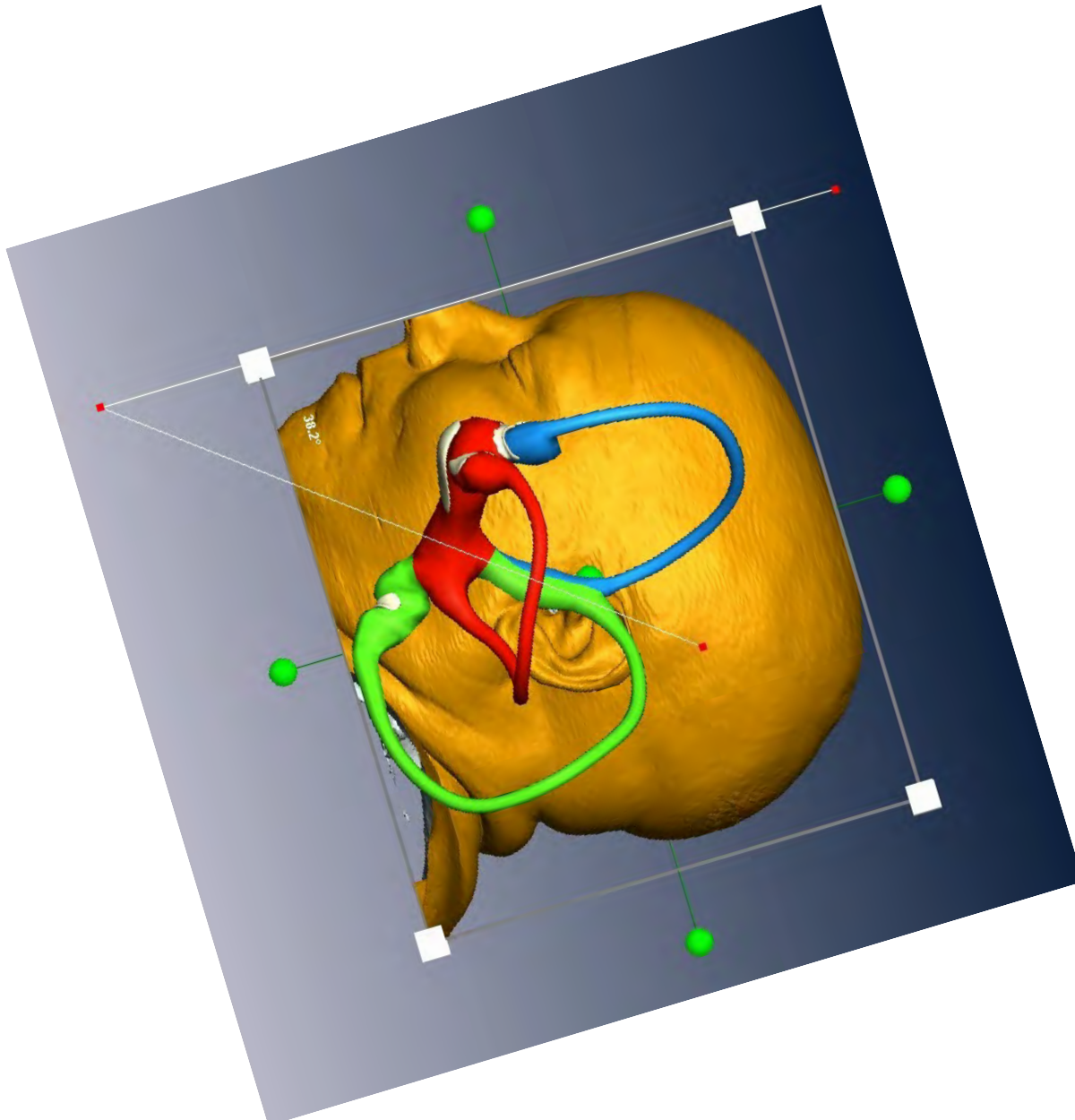
Loading the Labyrinth



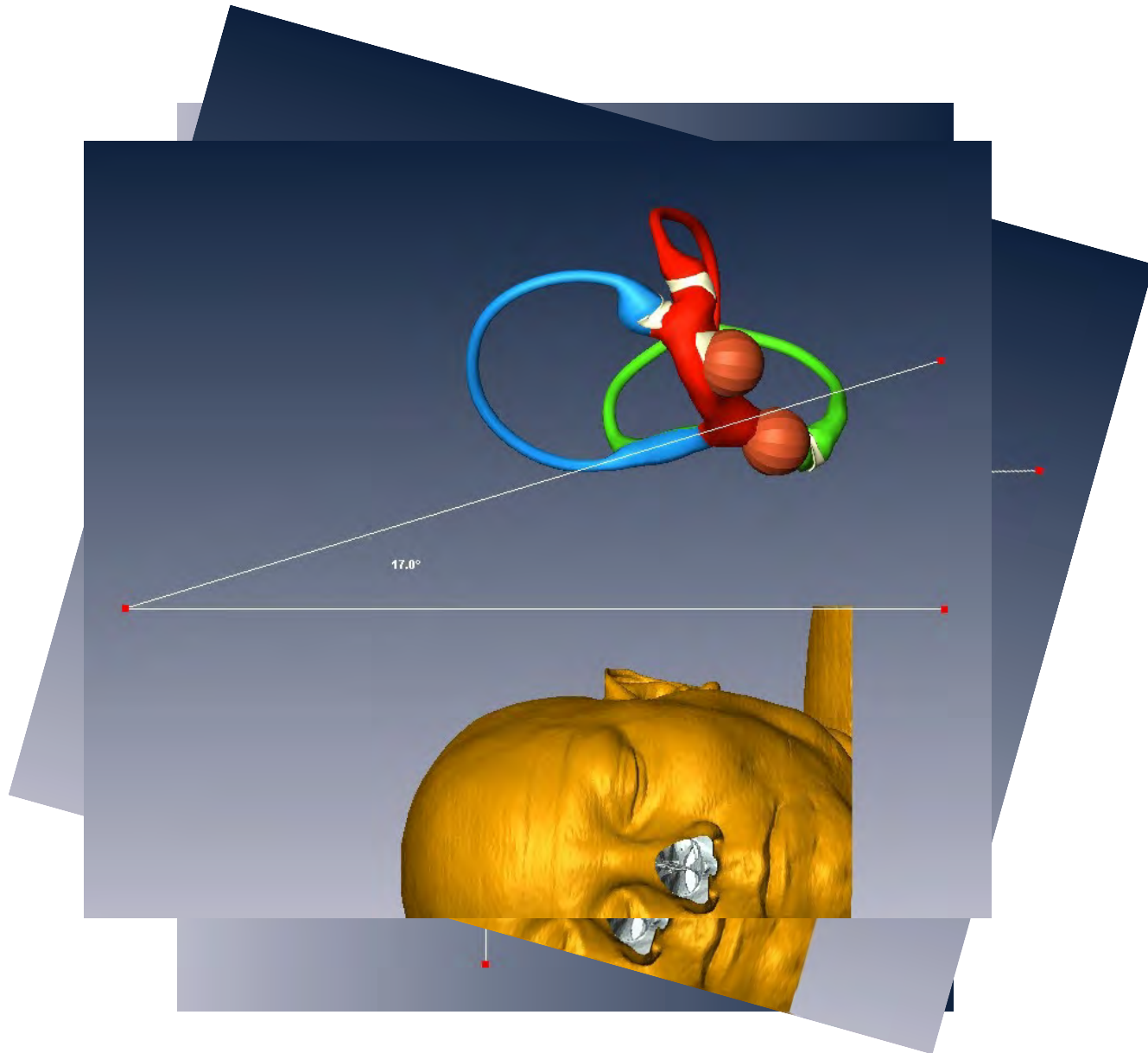
Loading the Labyrinth



Loading the Labyrinth

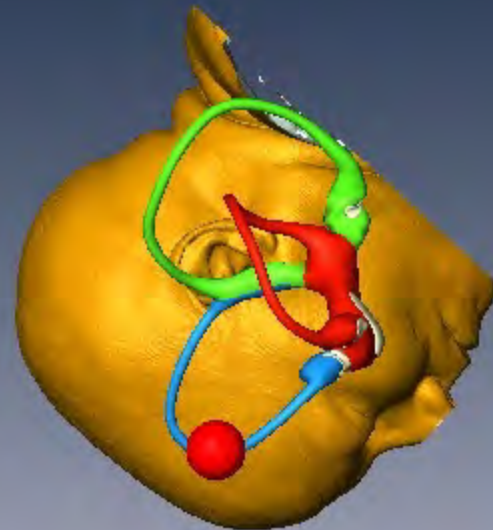


Loading the Labyrinth

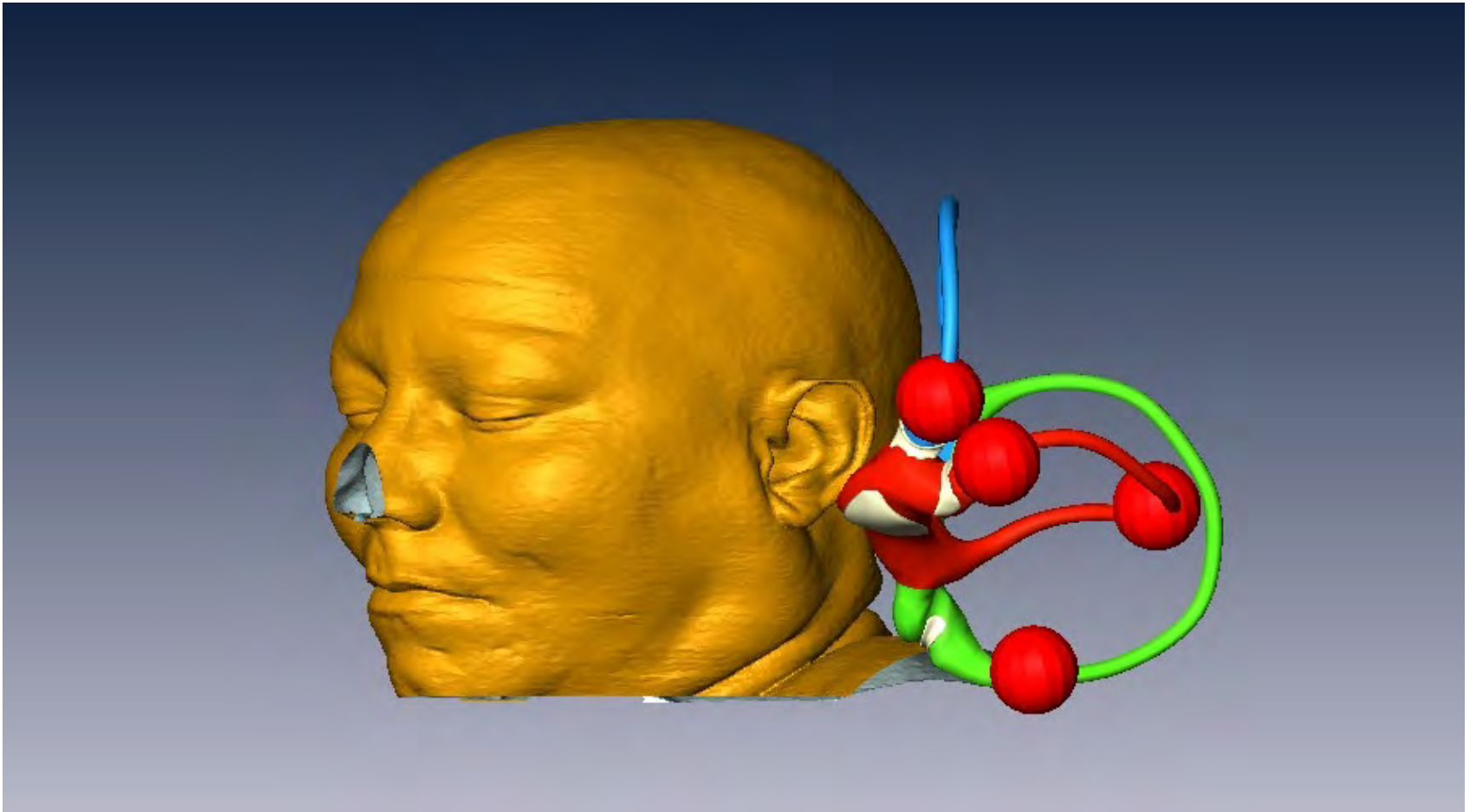


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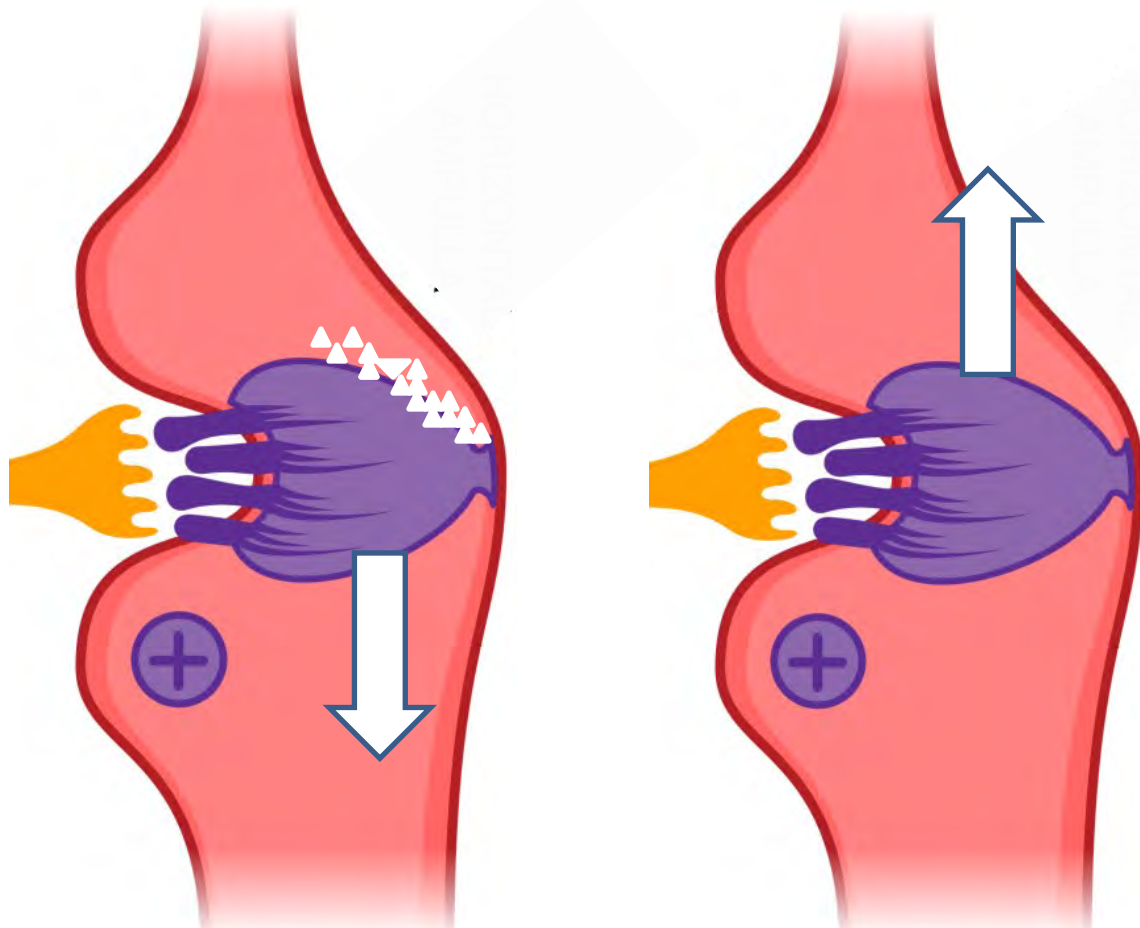
Anterior Canals



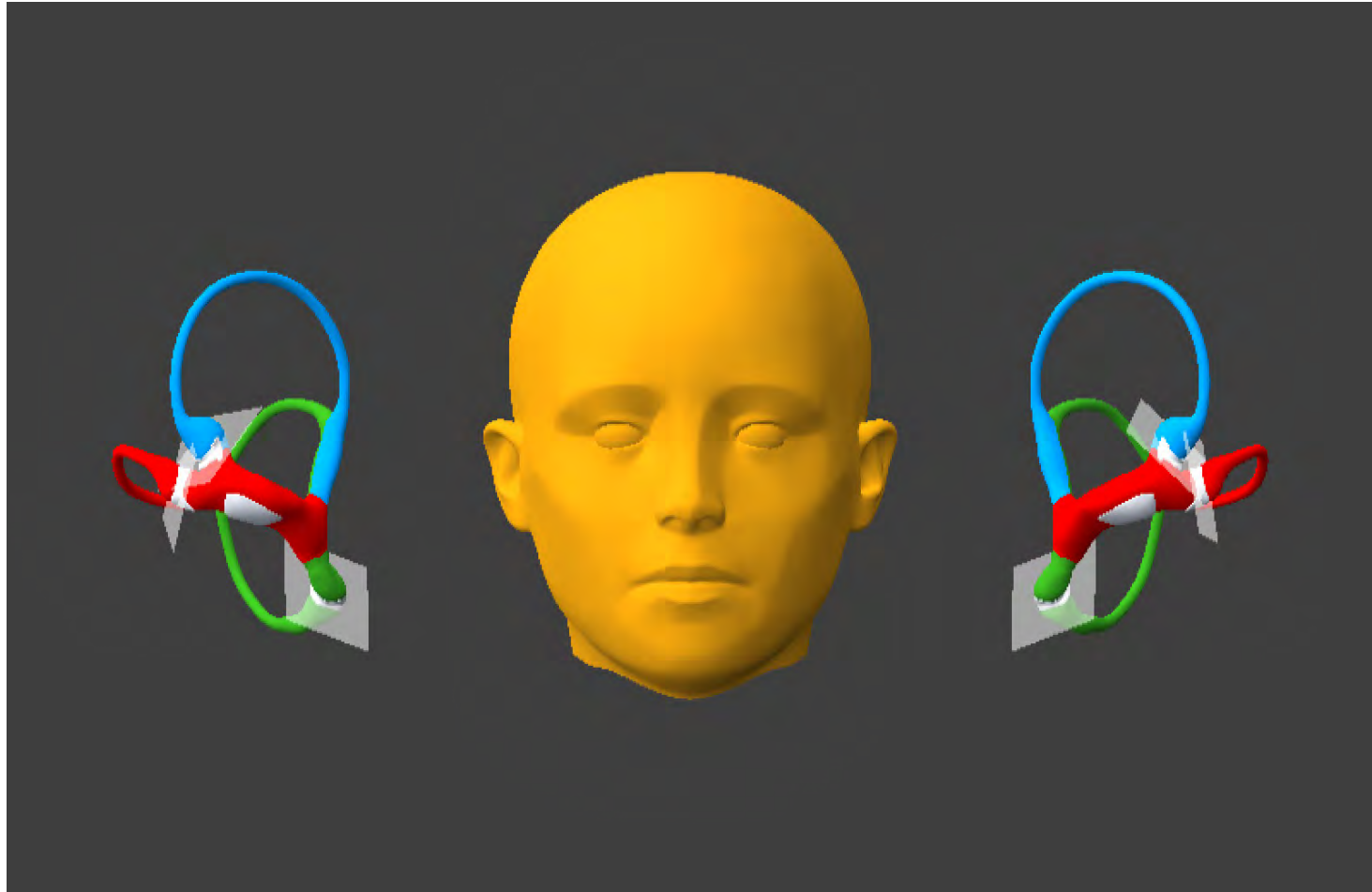
The Loaded Labyrinth



Cupulolithiasis and Light Cupula

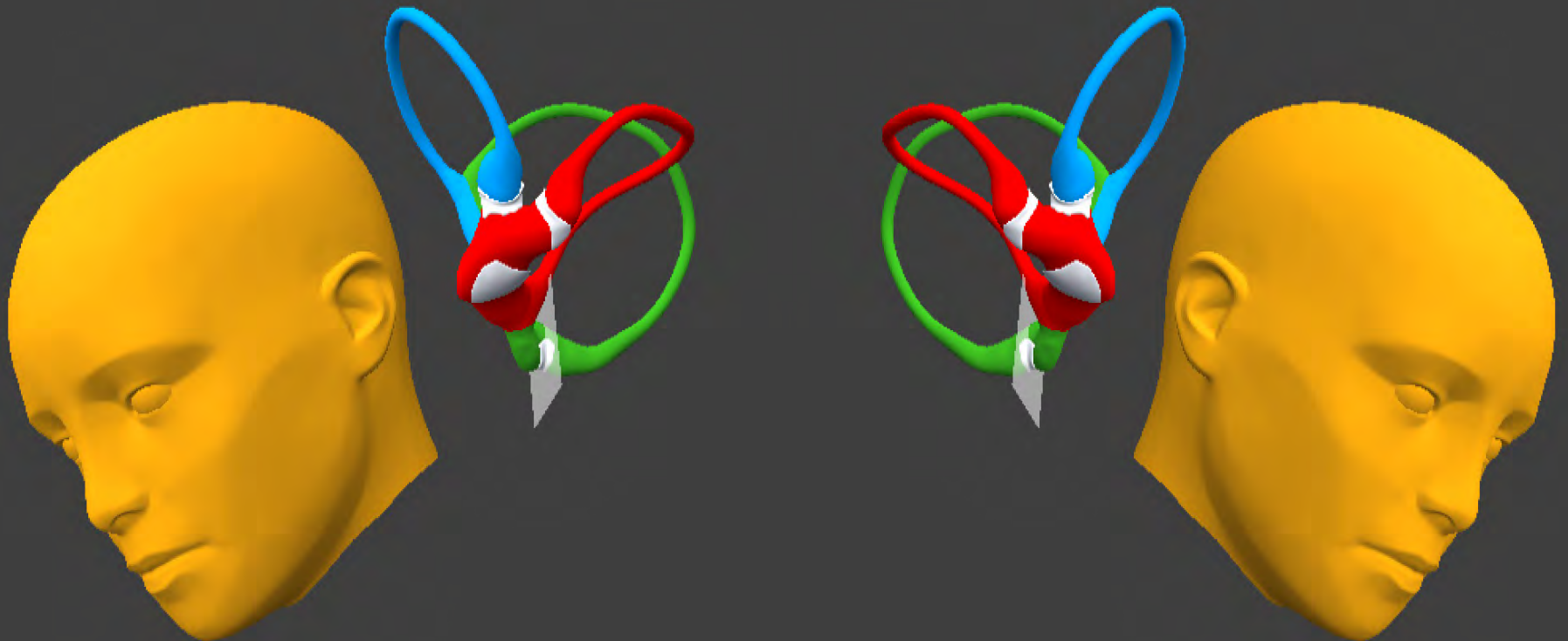


The Crista Planes

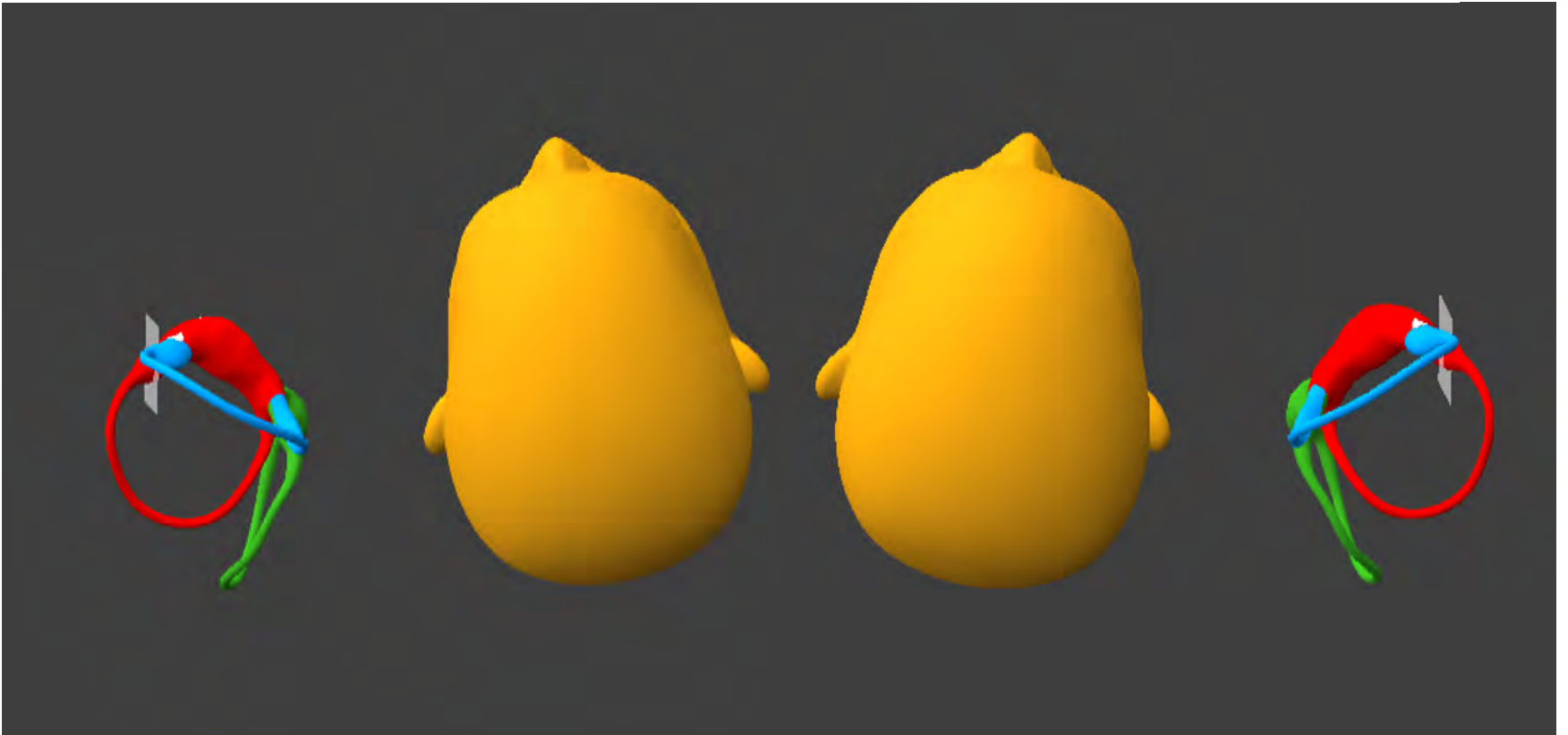


long axis of each crista deviates 25.0 to 30.4 degrees from the expected plane perpendicular to the canal axis [Acta Otolaryngol. 1989 May-Jun;107\(5-6\):362-5.](#)

Neutral Positions for Cupulae of Posterior Canals



Neutral Positions for Cupulae of Lateral Canals



Relative Incidence

Canalithiasis

Posterior > Lateral >> Anterior

Cupulolithiasis

Lateral >> Posterior

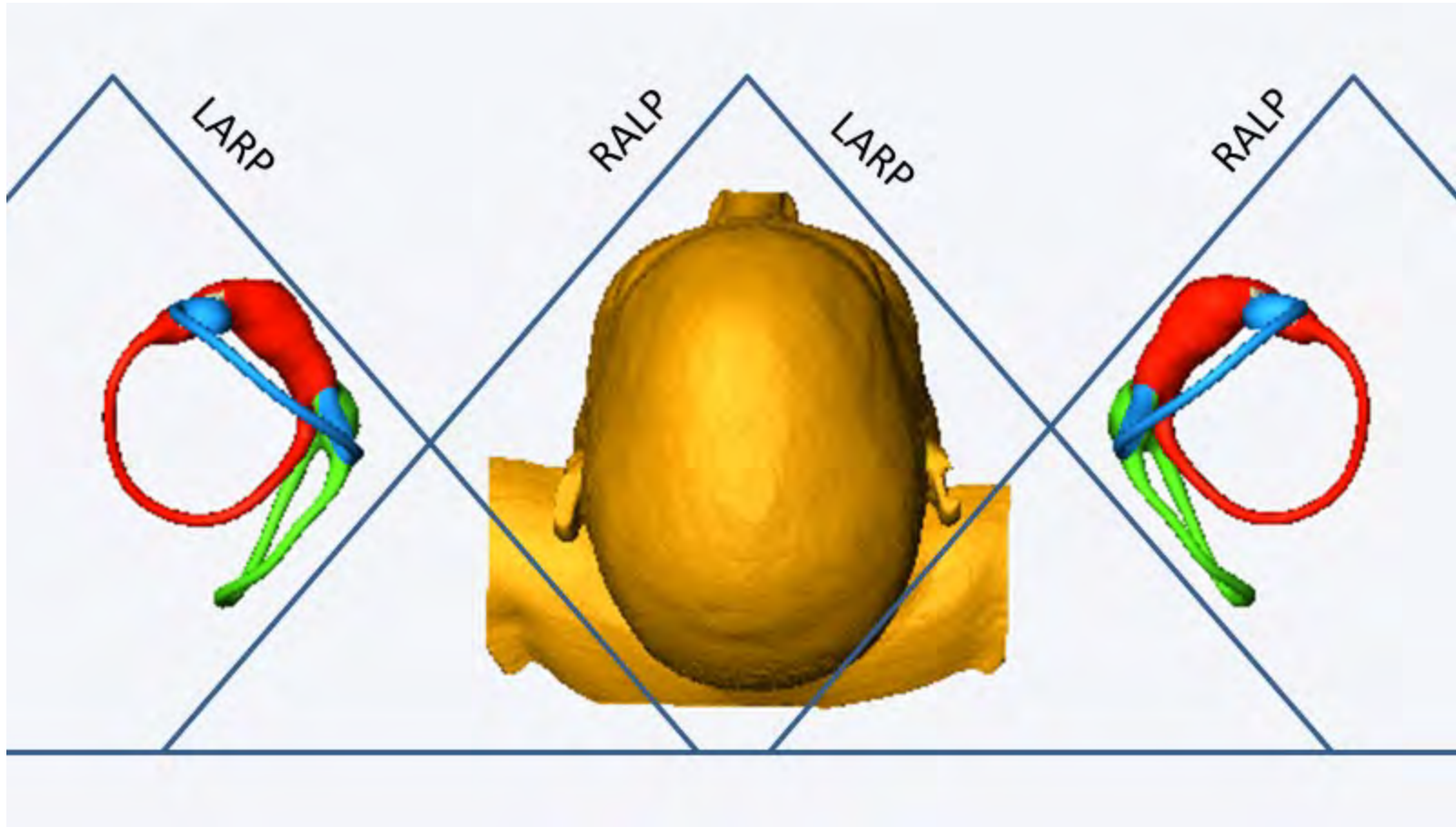
Multiple Canals

Bilat Posterior > Post/Lateral

EYE MOVEMENTS IN BPPV



Concept of Paired Canals

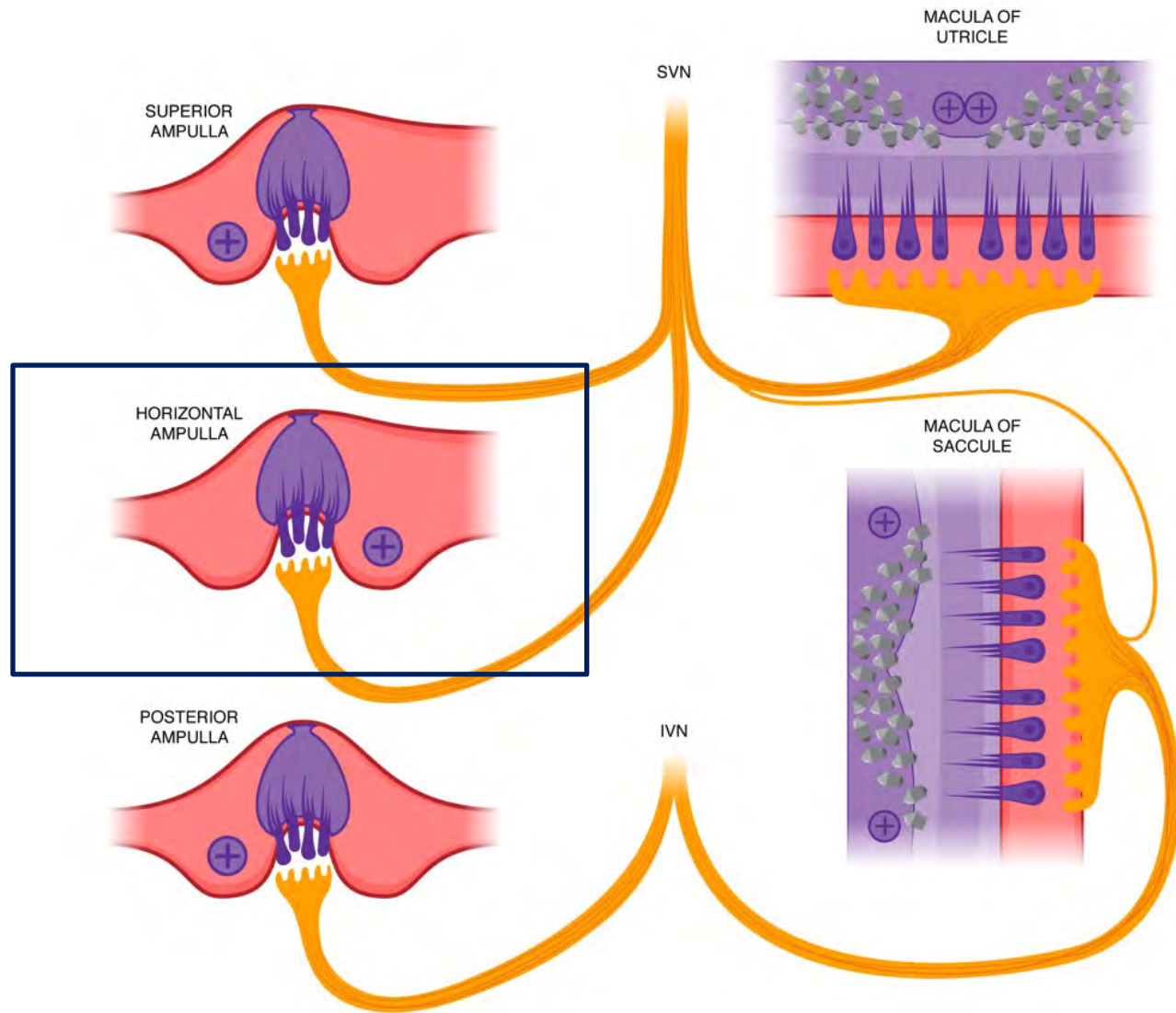


Two Key Concepts



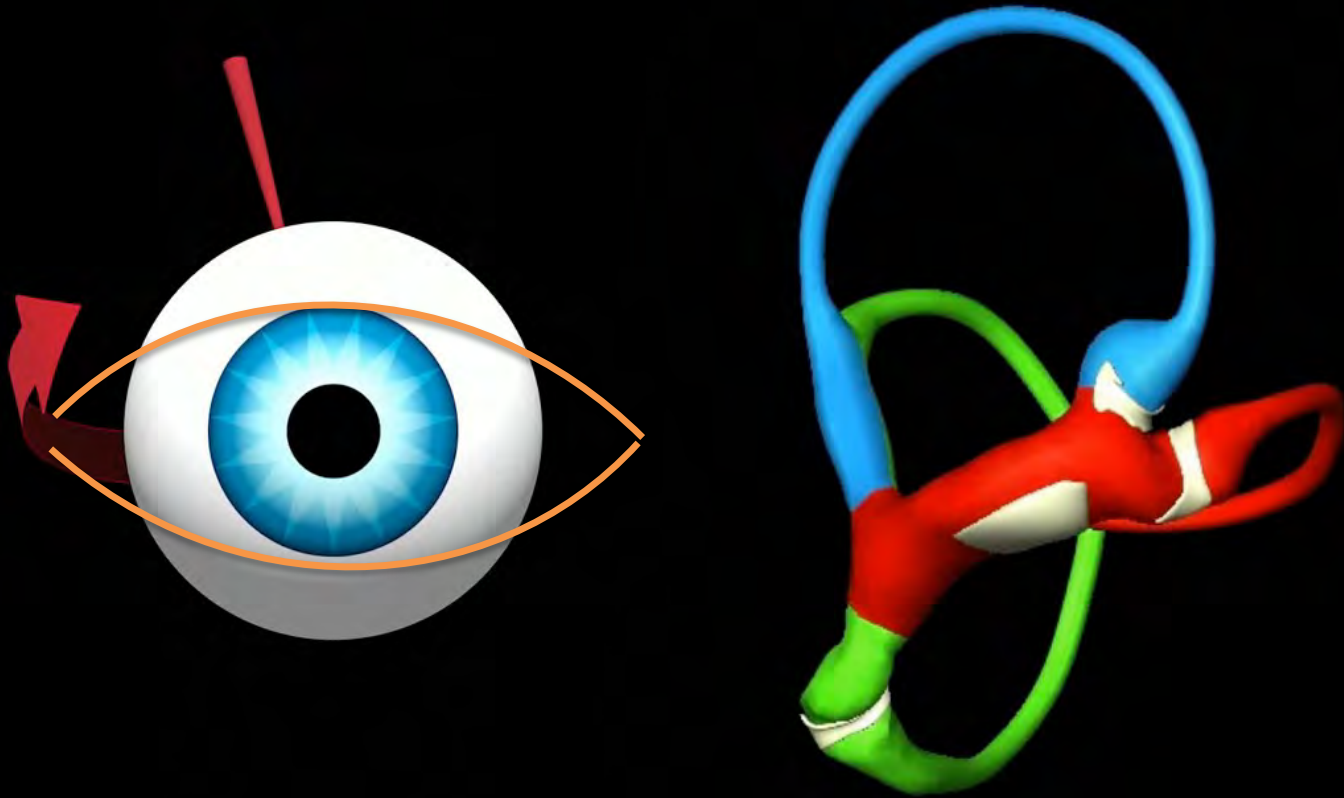
Ernst Julius Richard Ewald 1855-1921

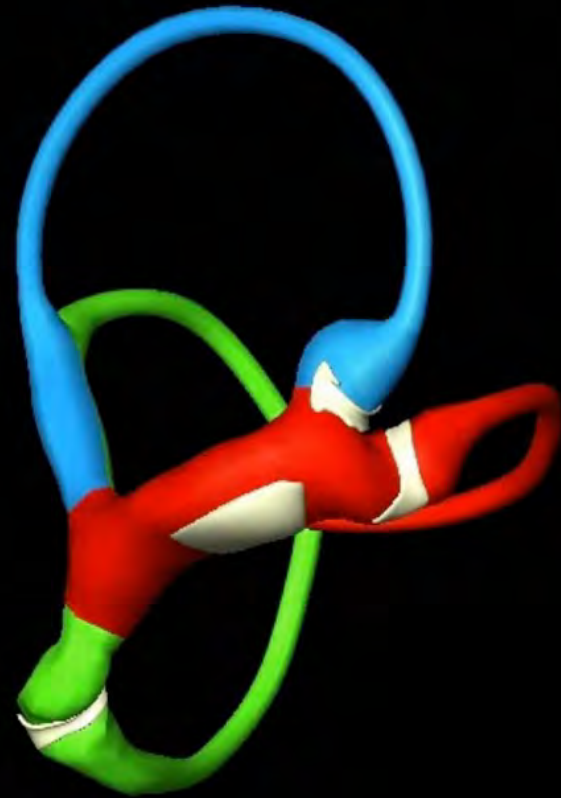
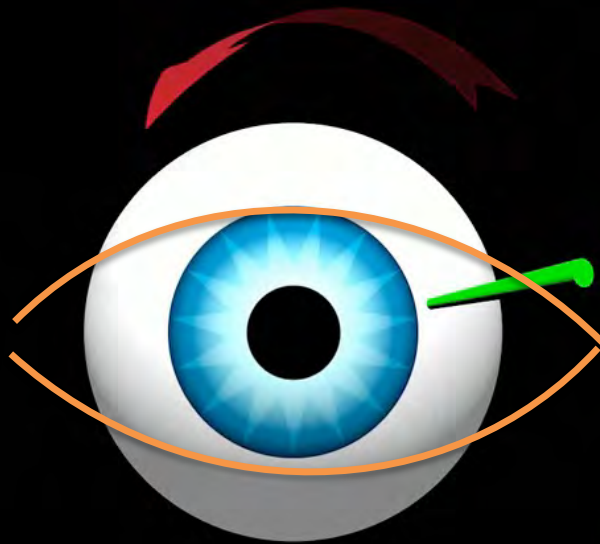
- **Ewald's first law:**
 - a. Eye movements are in the plane of the semi-circular canal being stimulated
 - b. The direction of endolymph flow determines the slow phase of nystagmus (corresponds to direction of canalith movement)
 - c. Polarization of cristae
- Posterior and superior canal BPPV will be considered together as RALP/ LARP pairs
- Lateral canals are paired

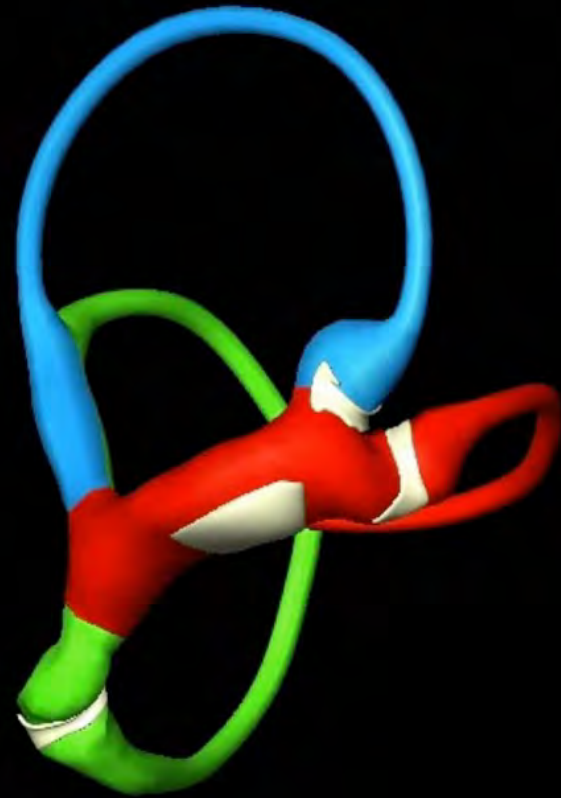
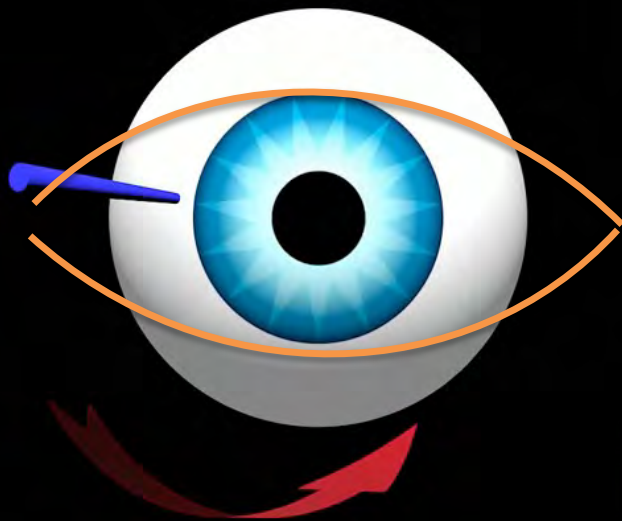


Ewald's first law:

Peripheral nystagmus is in the plane of the semi-circular canal

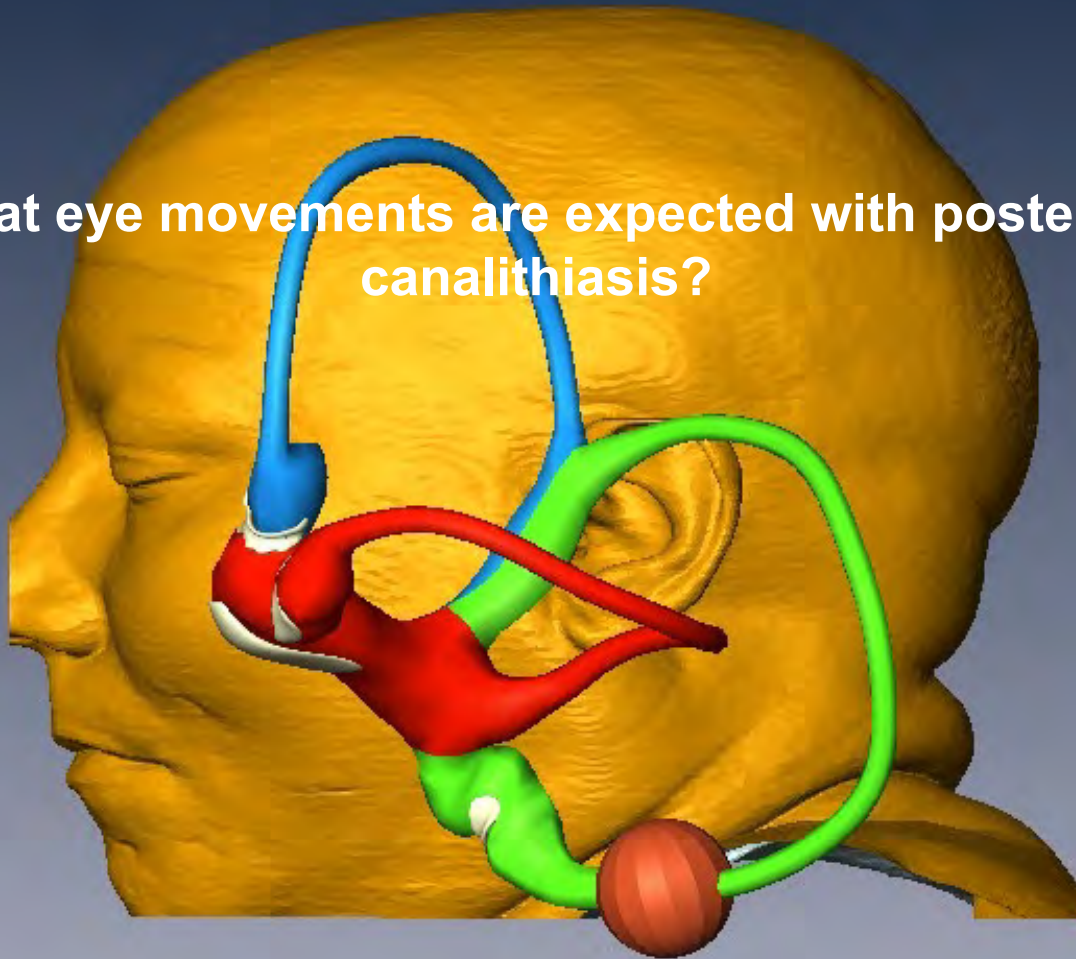






Posterior Canalithiasis

What eye movements are expected with posterior canalithiasis?



Loaded posterior canal

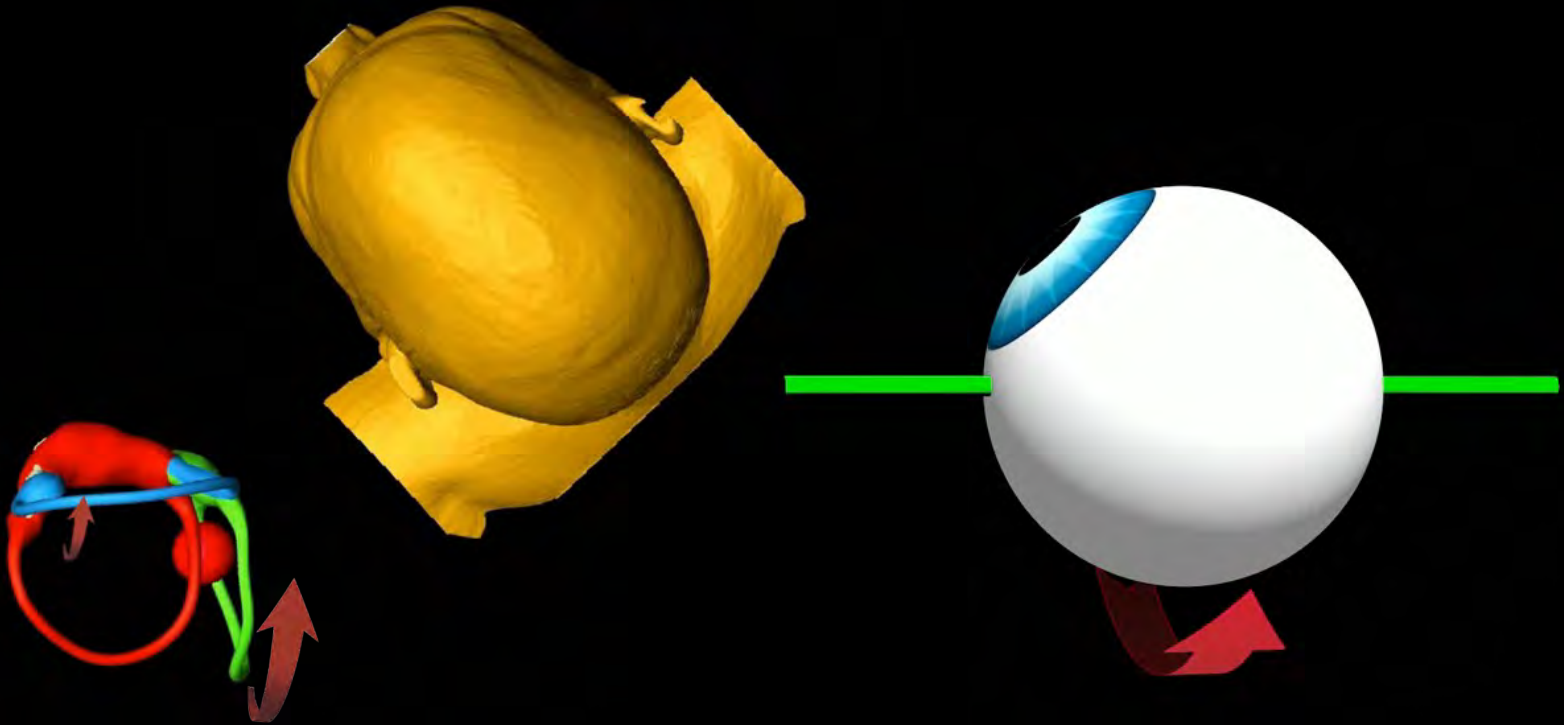
TEIXIDO

Observing Eye Movements Without Lenses

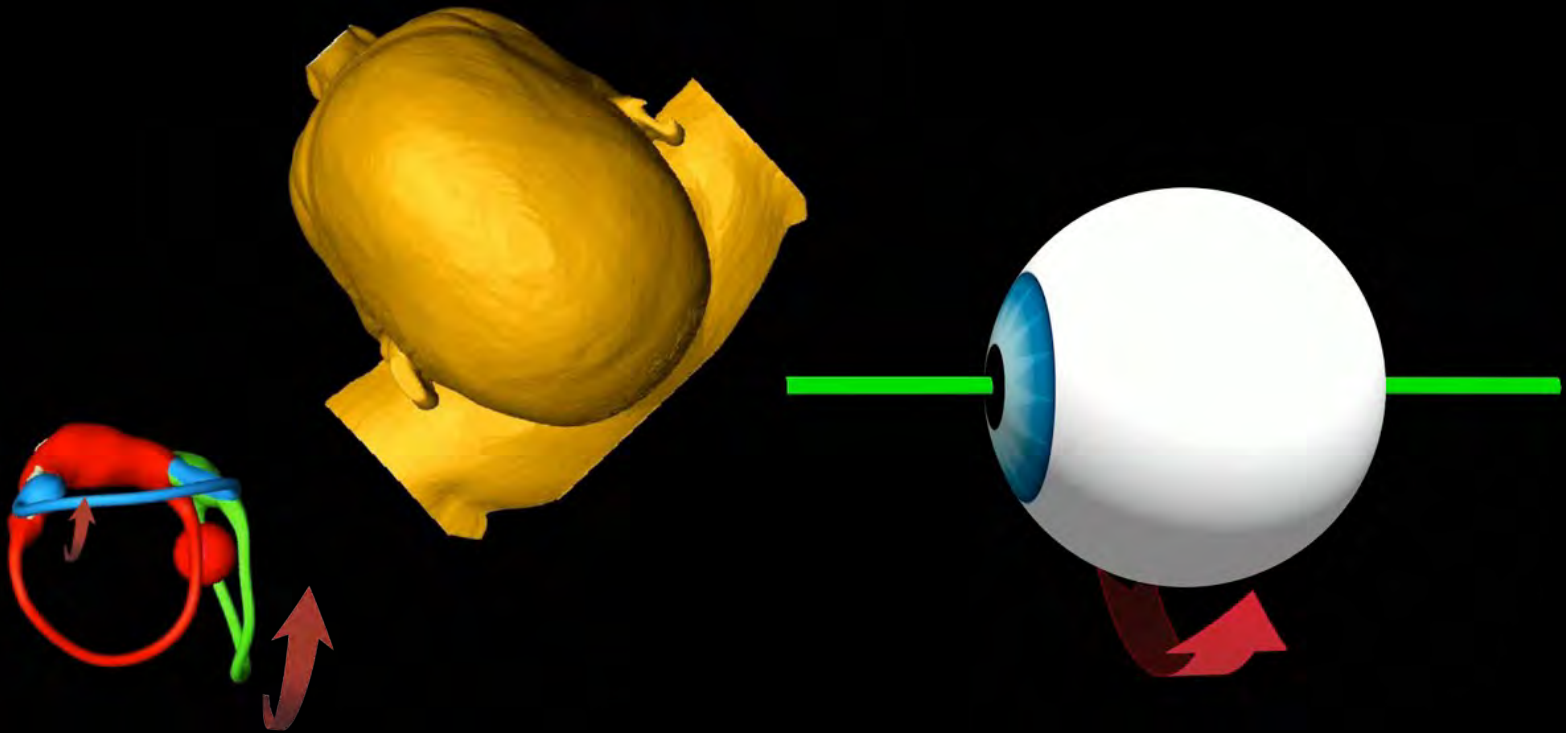


Using Ewald's First Law to Dissect Eye Movements in BPPV

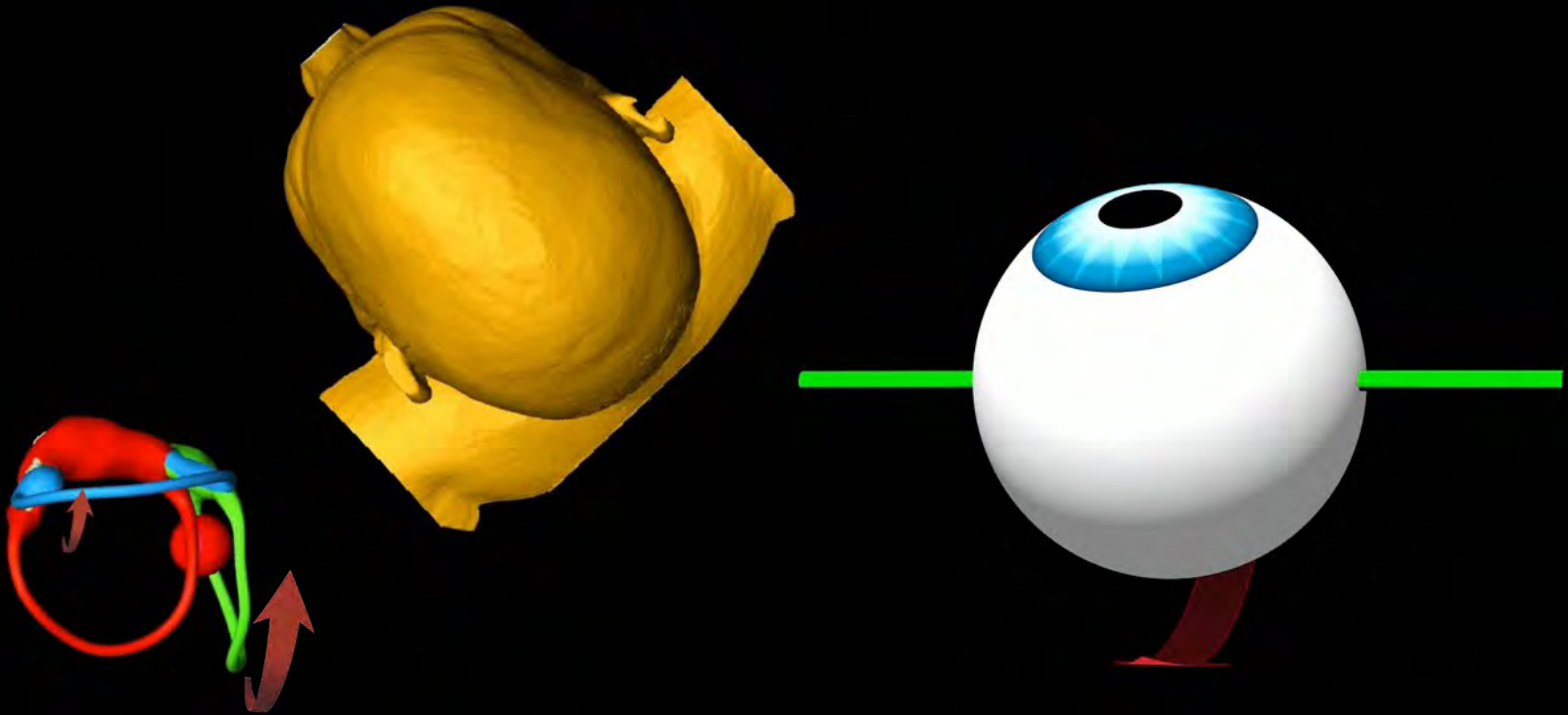
Dissecting nystagmus with gaze



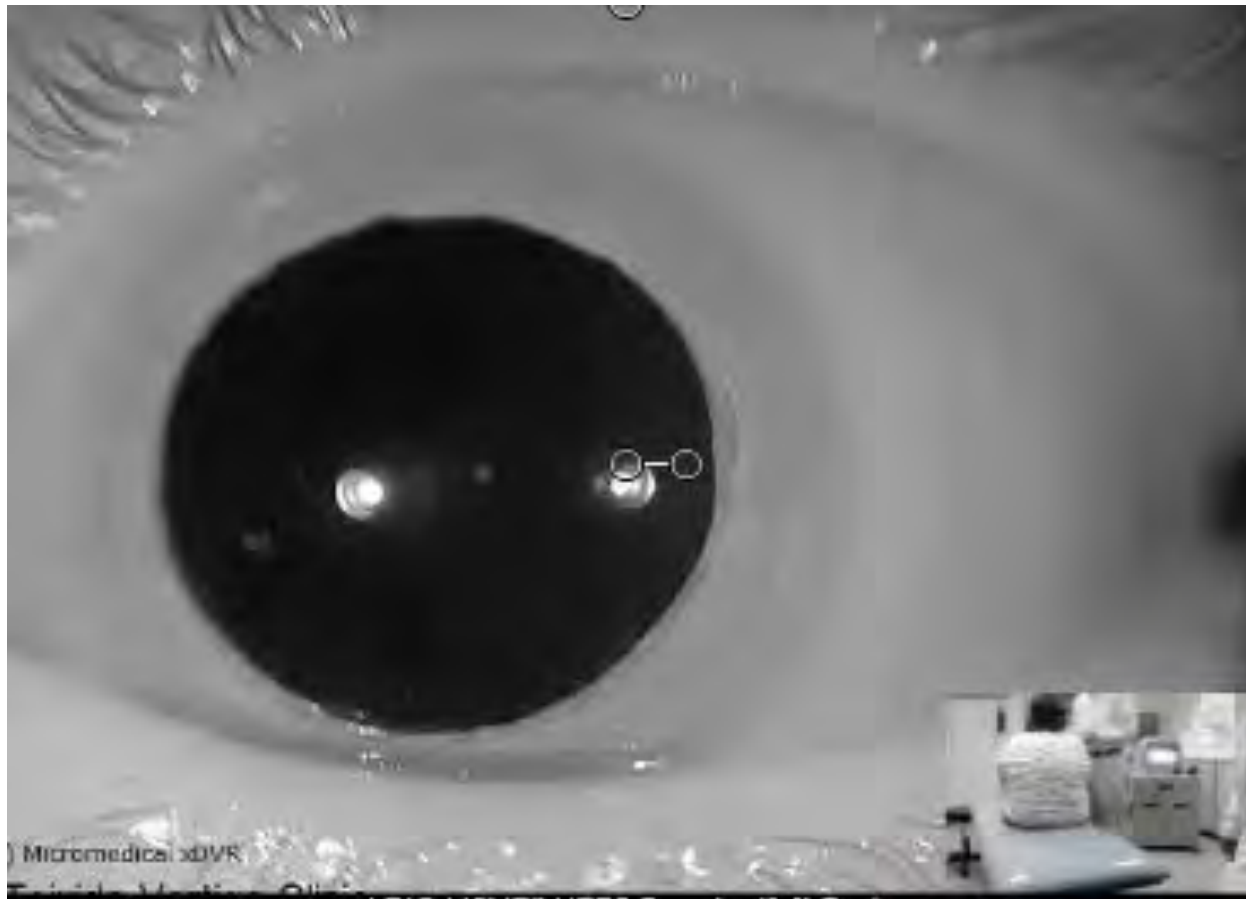
Dissecting nystagmus with gaze



Dissecting nystagmus with gaze



Posterior Canalithiasis with Gaze Separation



YouTube DRMTCI

Posterior CUPULolithiasis

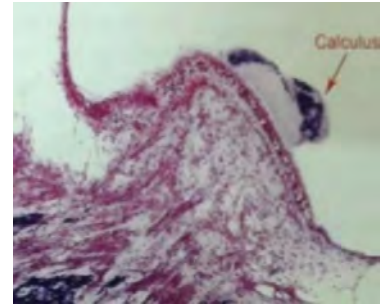
- What eye movements are expected?

Direction same as in canalithiasis

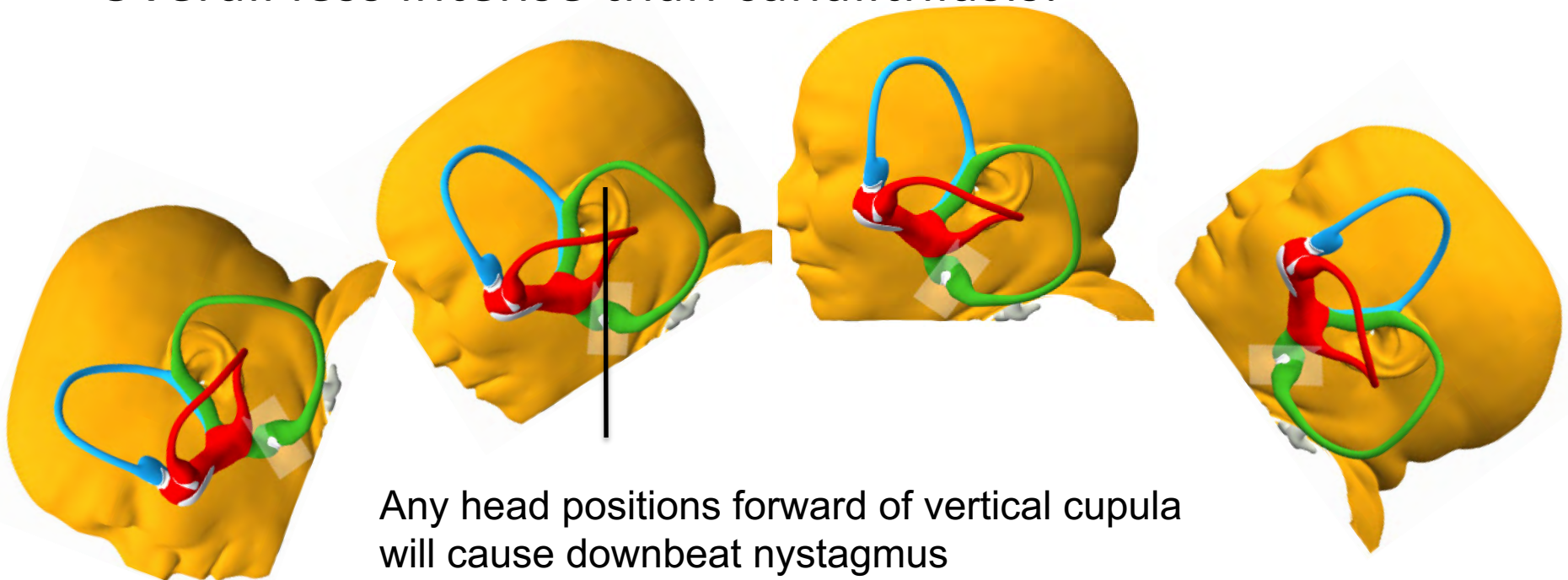
Long duration

Intensity? – Maximal 60° recline, absent 30° forward tilt

Overall less intense than canalithiasis.



Arch Otolaryngol 1969: 90, 765



Posterior CUPULOlithiasis



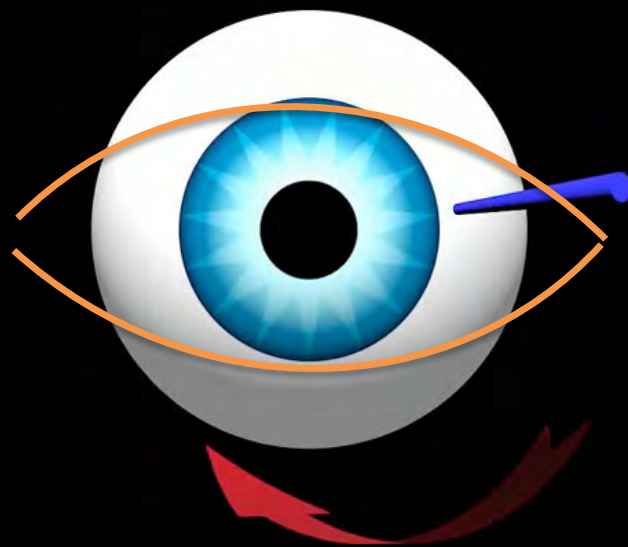
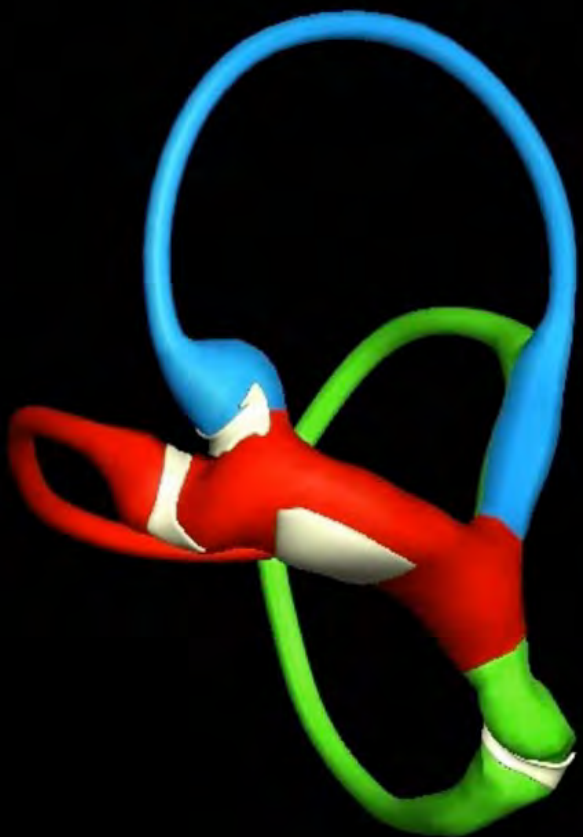
YouTube DRMTCI

Posterior CUPULOlithiasis



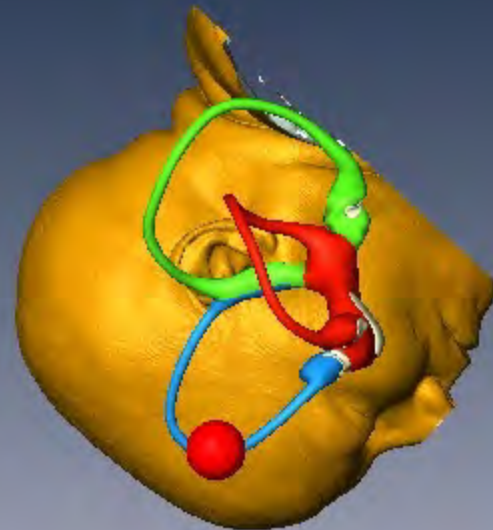
YouTube DRMTCI

Anterior Canalithiasis



Anterior Canalithiasis

- How do we get it?



Anterior Canalithiasis

- How do we diagnose it?
- Hallpike with head hanging
- Downbeat/ Ageotropic Rotary nystagmus
- Beats toward the affected ear



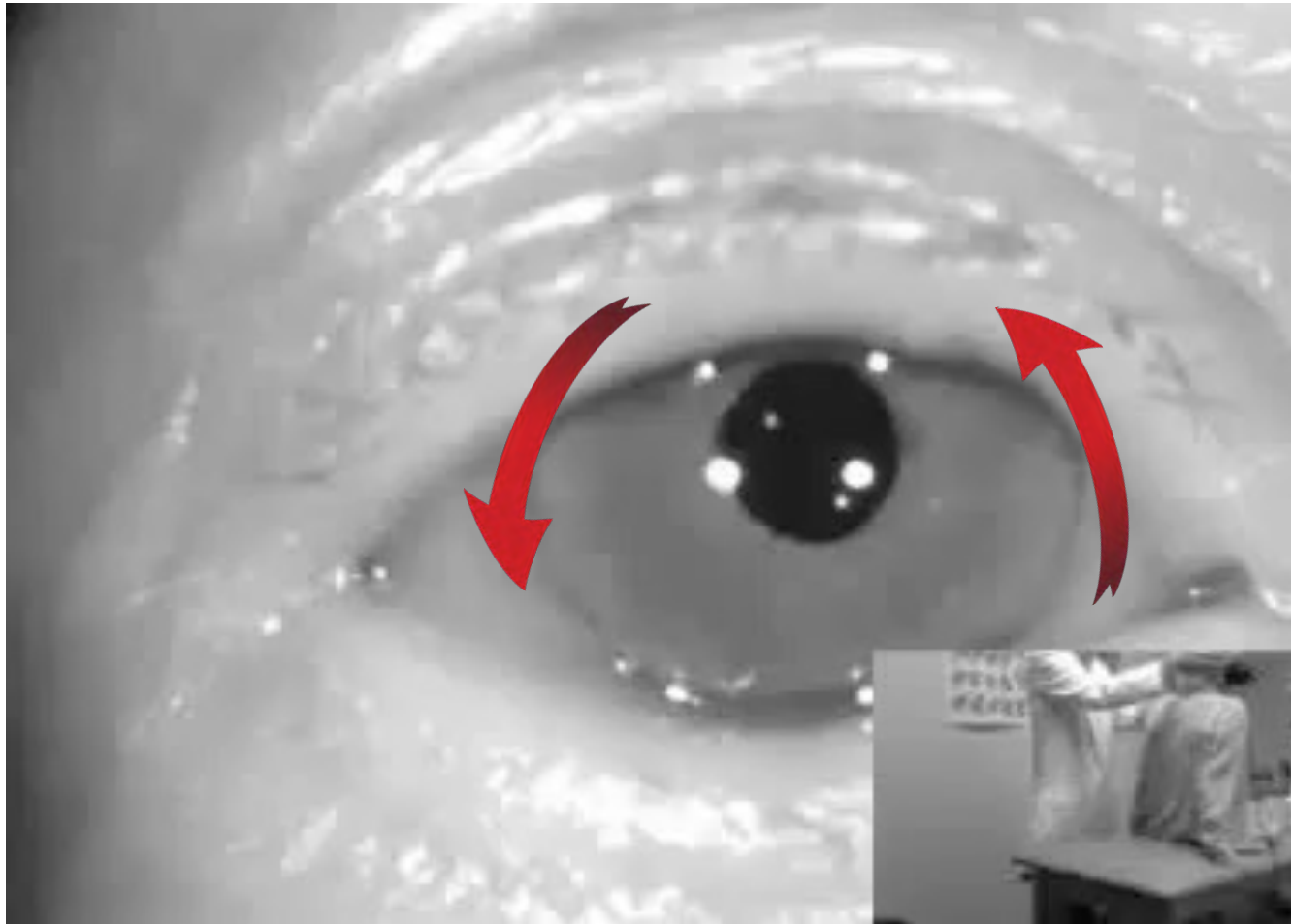
- Debris falling into posterior canal can fool you!
 - Actual anterior disease is repeatable.

Anterior Canalithiasis



YouTube Michael Teixido MD

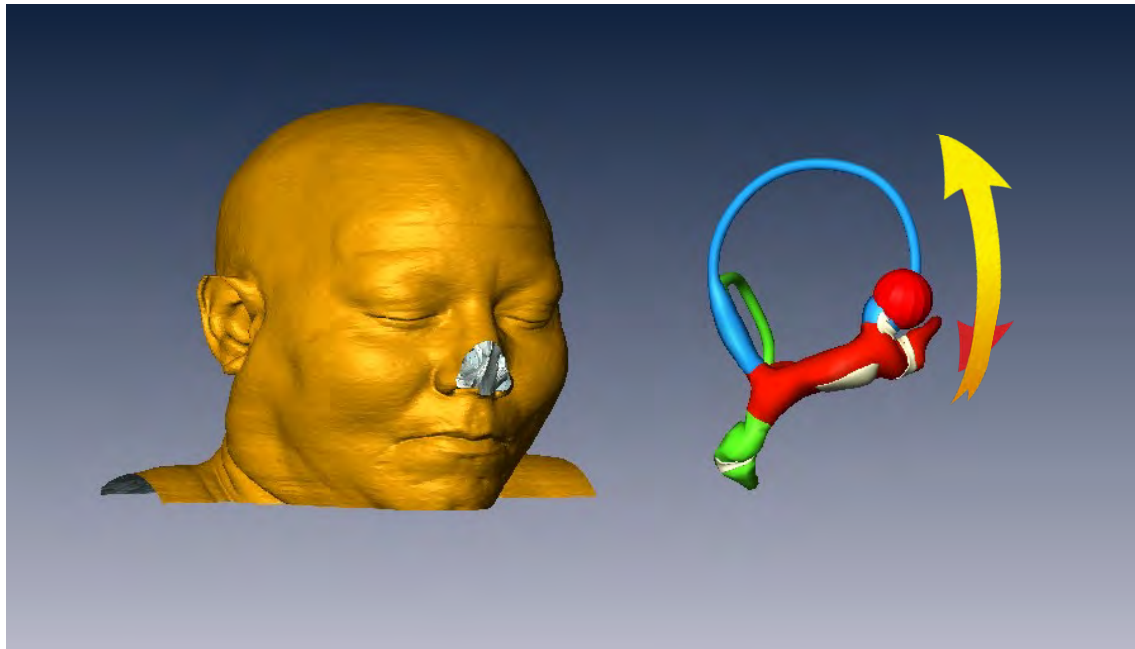
Right Posterior Canalithiasis followed by Right Anterior Canalithiasis



YouTube Michael Teixido MD

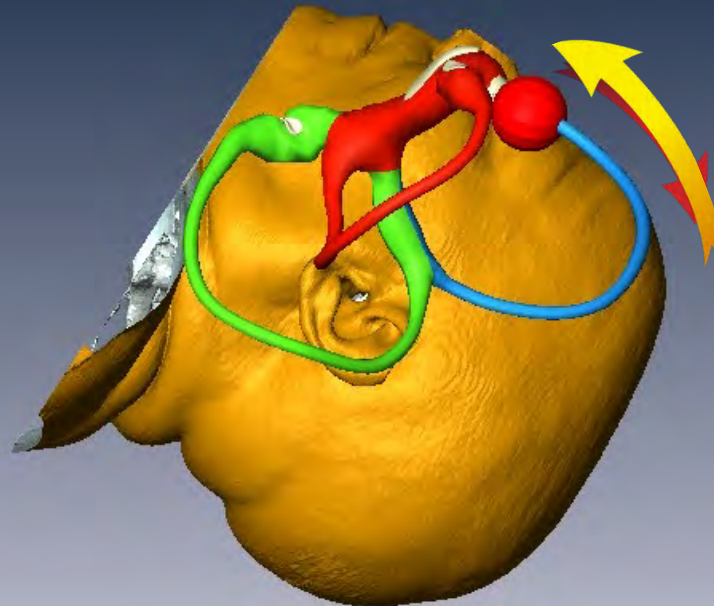
Anterior CUPULOlithiasis

- What eye movements are expected?
 - Direction
 - When standing upbeat, or none

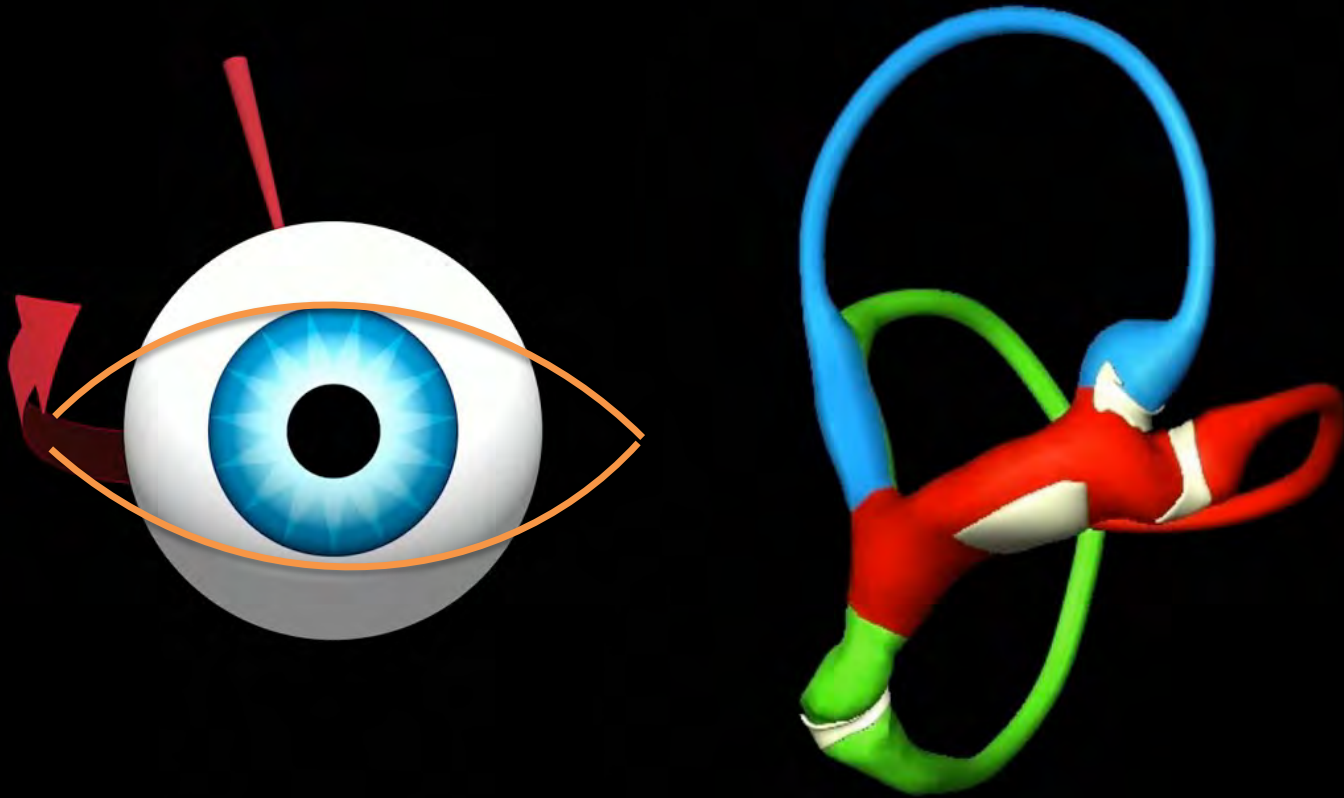


Anterior CUPULOlithiasis

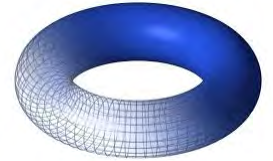
- What eye movements are expected?
 - Direction
 - When standing: upbeat or none
 - With head hanging downbeat and prolonged



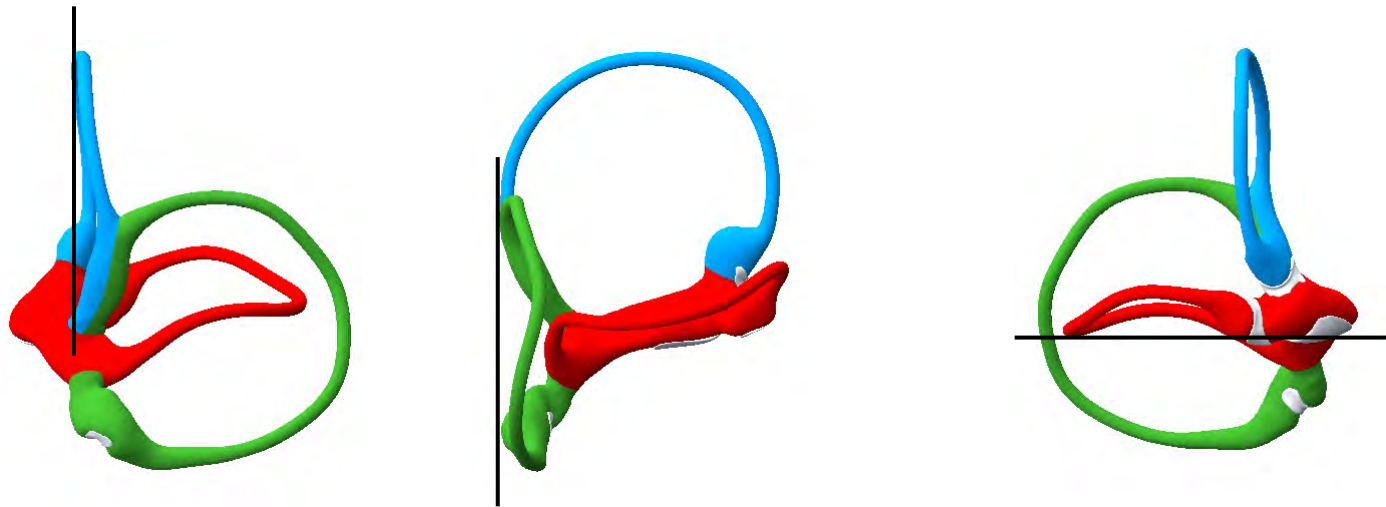
Lateral Canalithiasis



The semicircular ducts are bent toroids

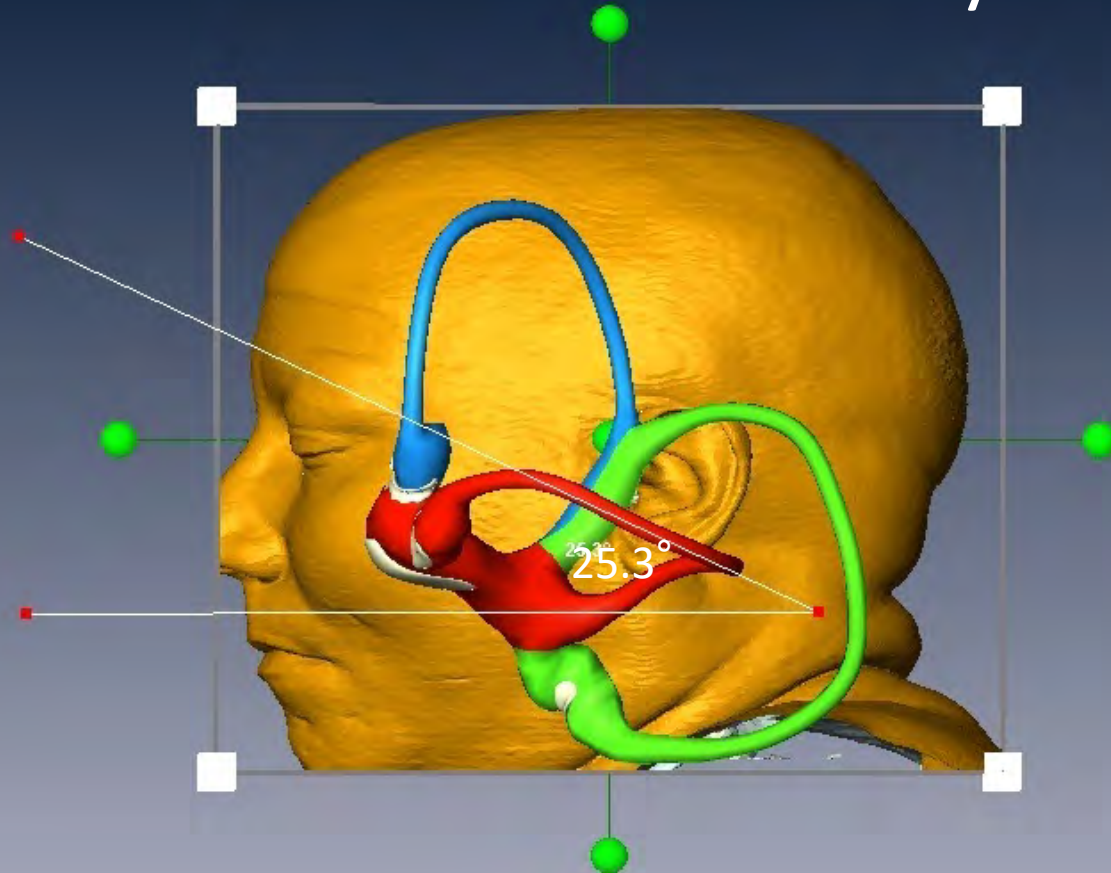


Bent toroidal configuration increases sensitivity over a wider range of angles of rotation.

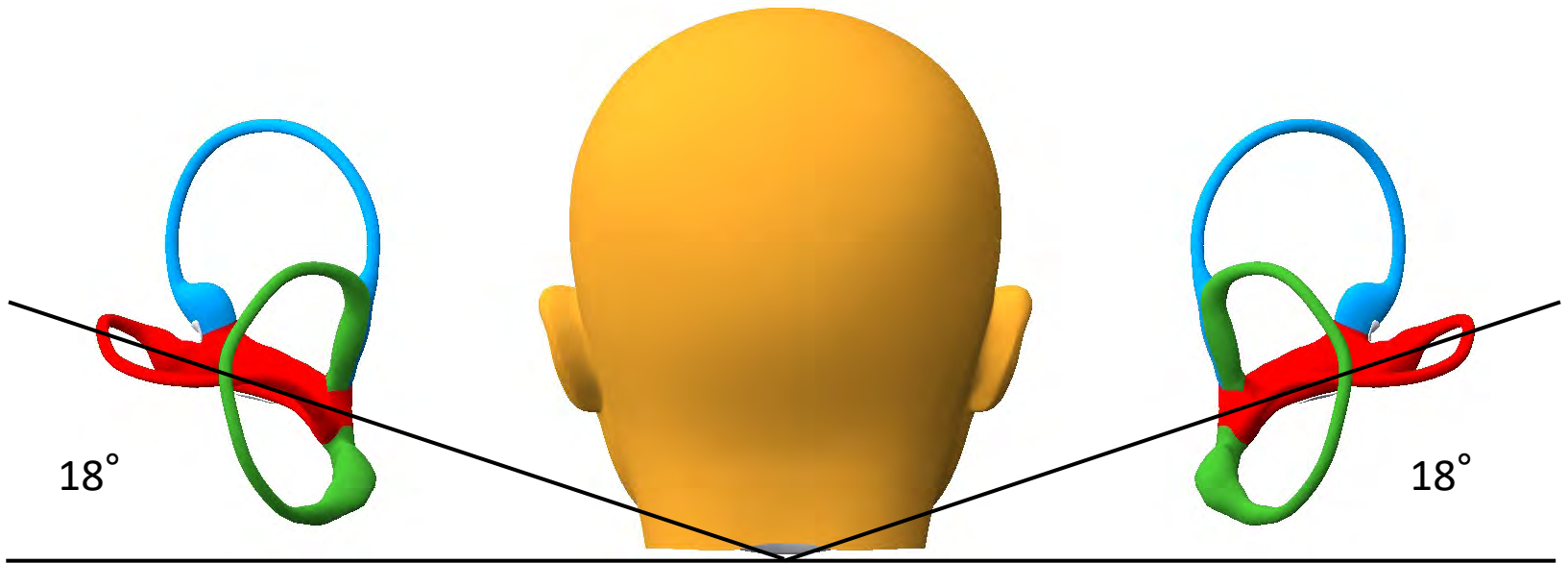


The anterior canal is the least bent and the lateral canal is the most bent.

Lateral duct anatomy

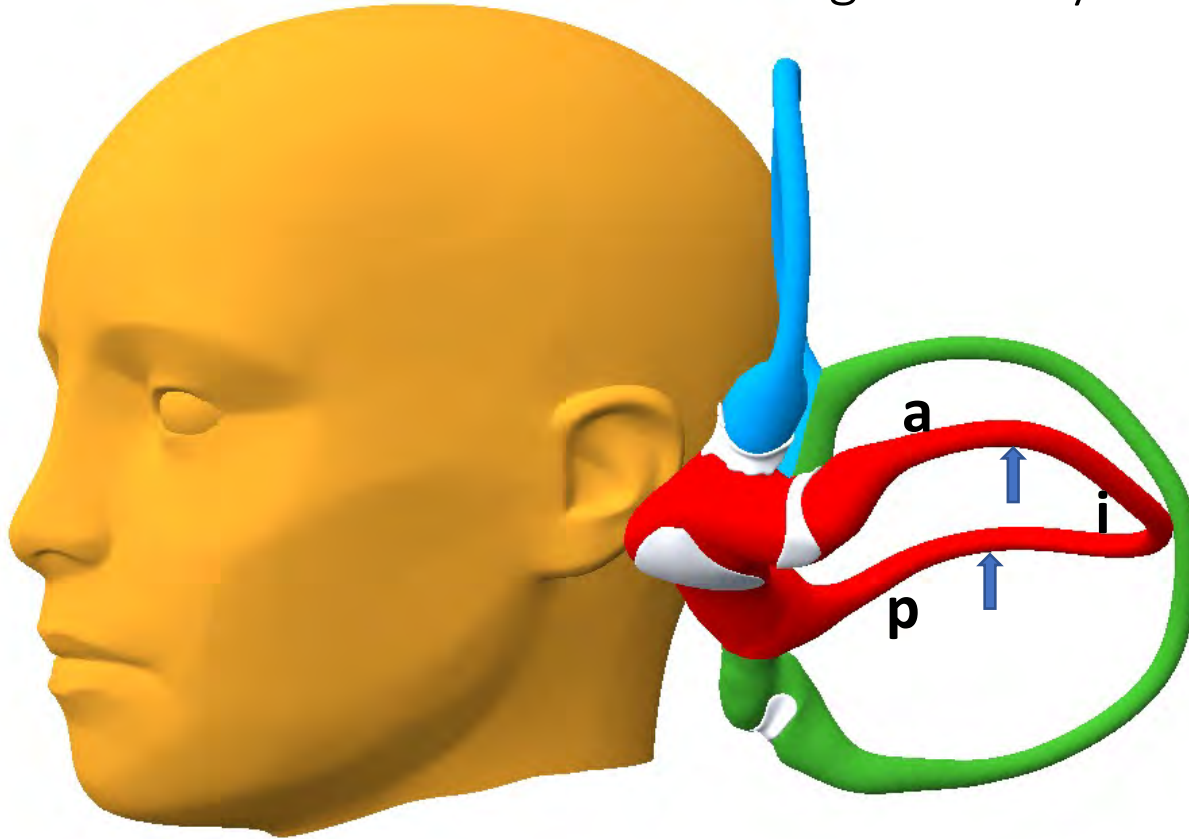


Lateral duct anatomy



Lateral duct anatomy

The lateral duct is divided into 3 segments by the bent toroid shape



-Anterior inflection

-Posterior inflection

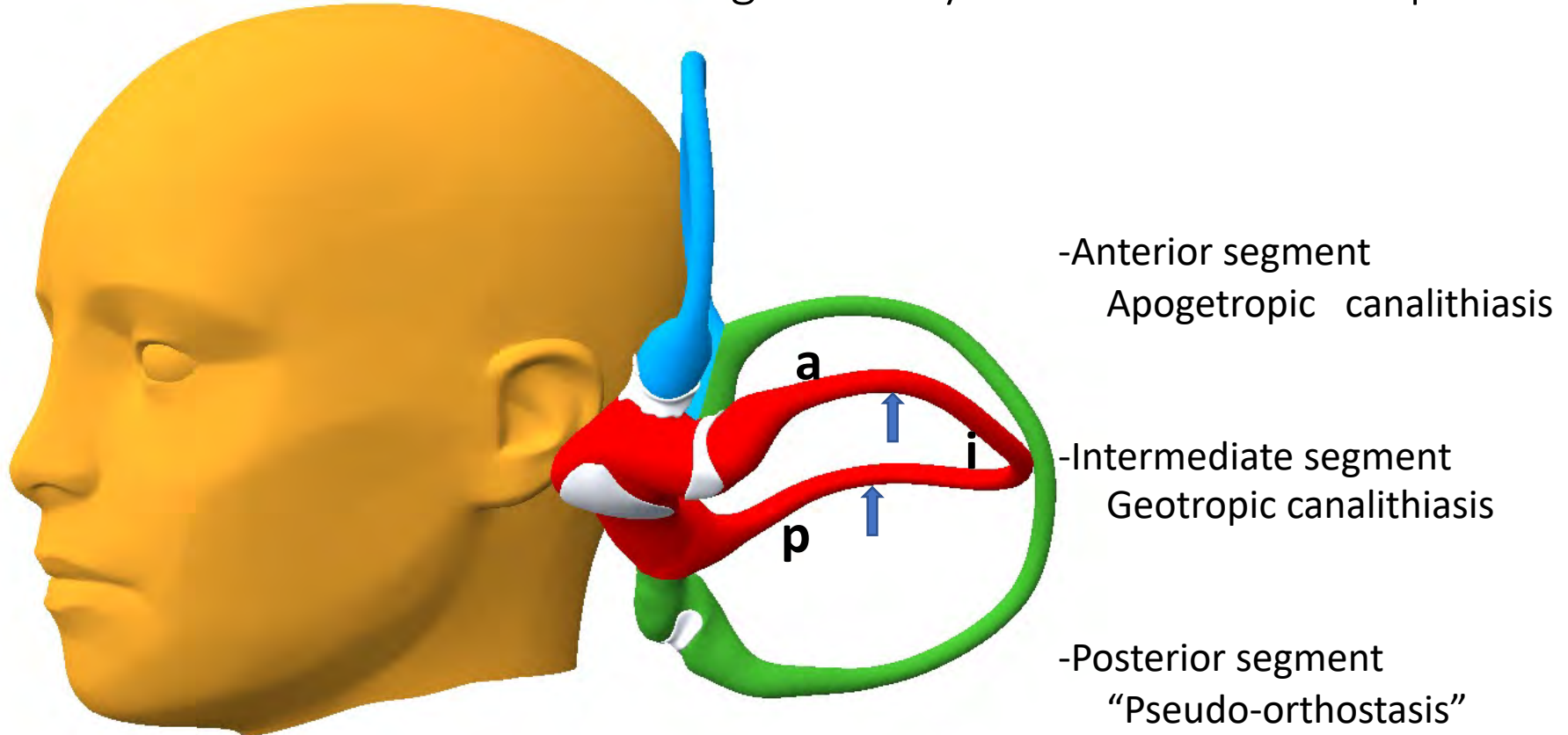
-Anterior segment

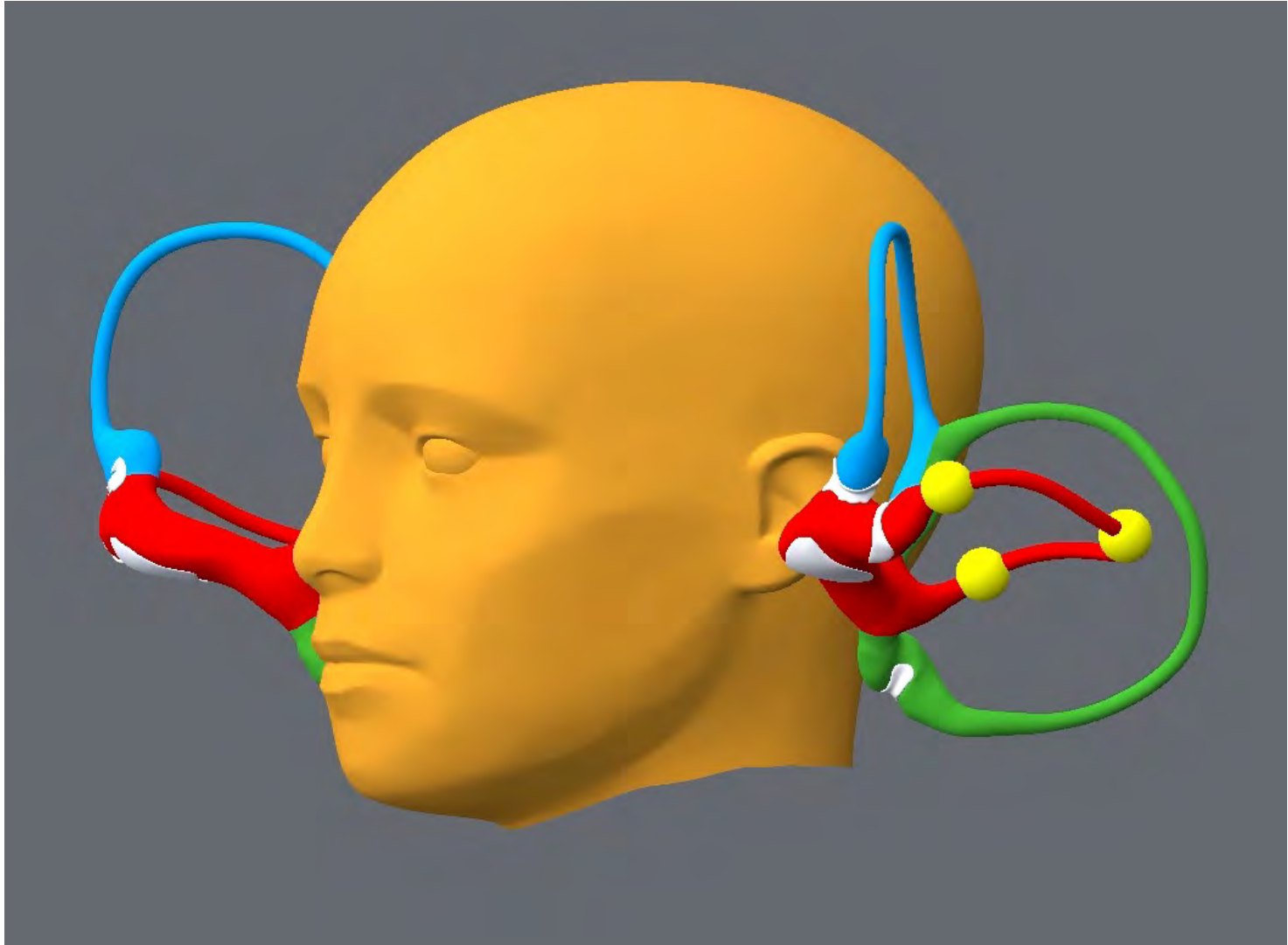
-Intermediate segment

-Posterior segment

Lateral duct anatomy

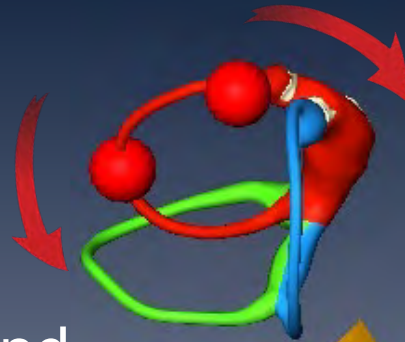
The lateral duct is divided into 3 segments by the bent toroid shape





Lateral Canalithiasis

The lateral canal “loaded” in 2 places- Dix –Hallpike to Right side first



Ageotropic and
Transient

Geotropic and
Transient



Lateral Canalithiasis

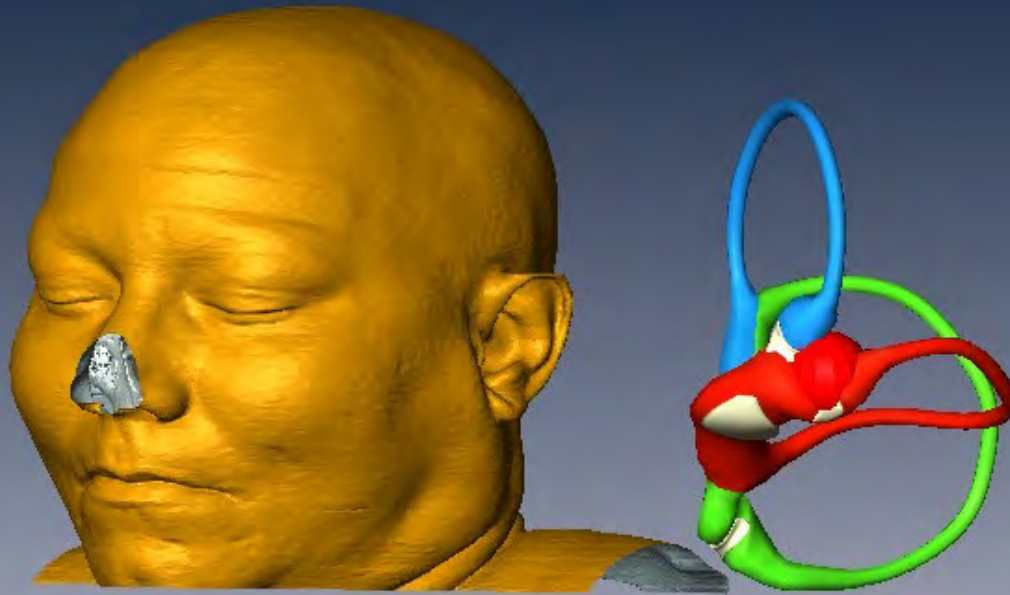


Lateral CUPULOlithiasis

Horizontal nystagmus beats AWAY from the earth

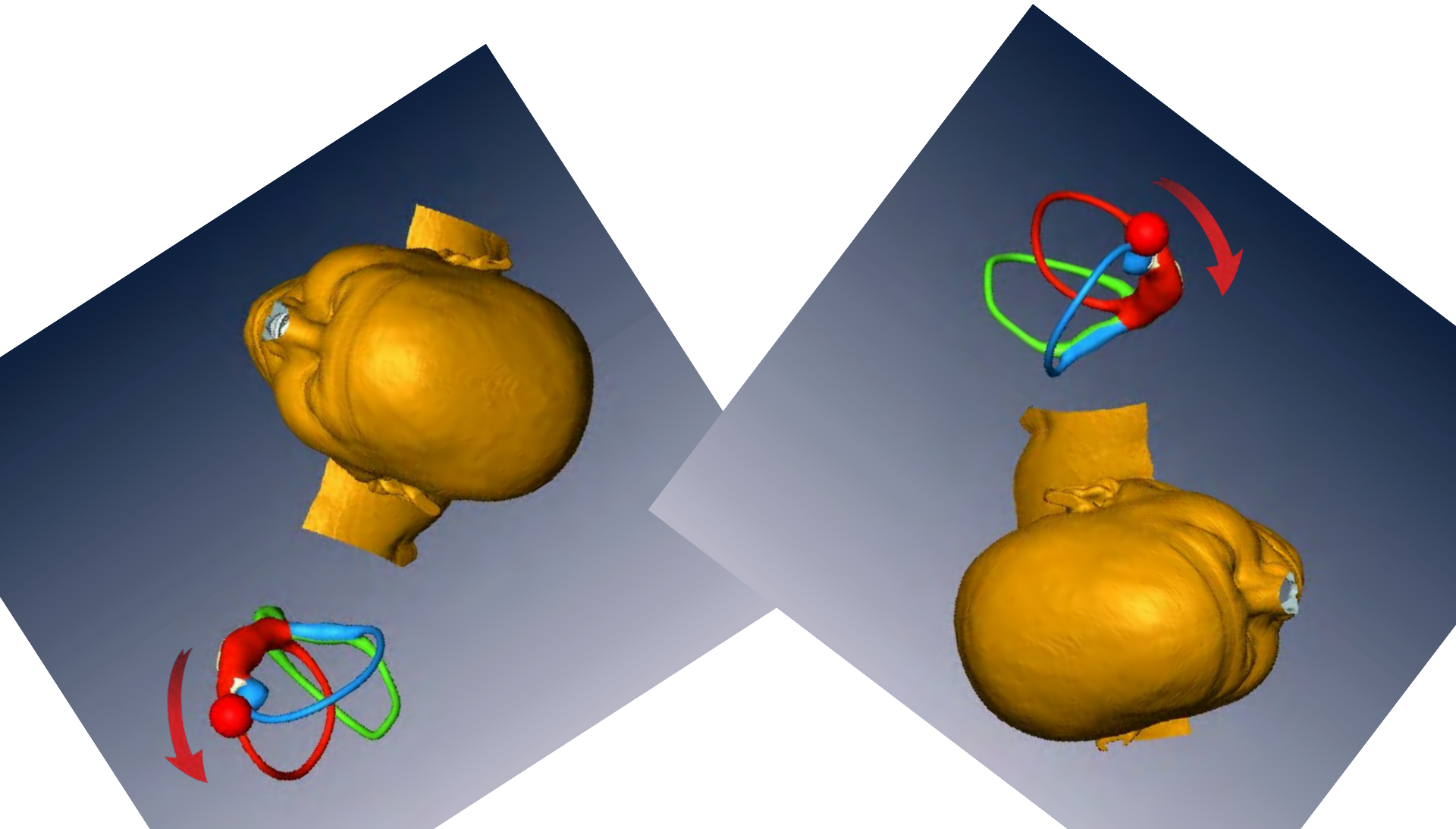
Significant chronic disequilibrium upright from heavy cupula

The patient has a null point 6-10° in the direction of the affected canal



Lateral CUPULOlithiasis

Horizontal nystagmus beats AWAY from the earth



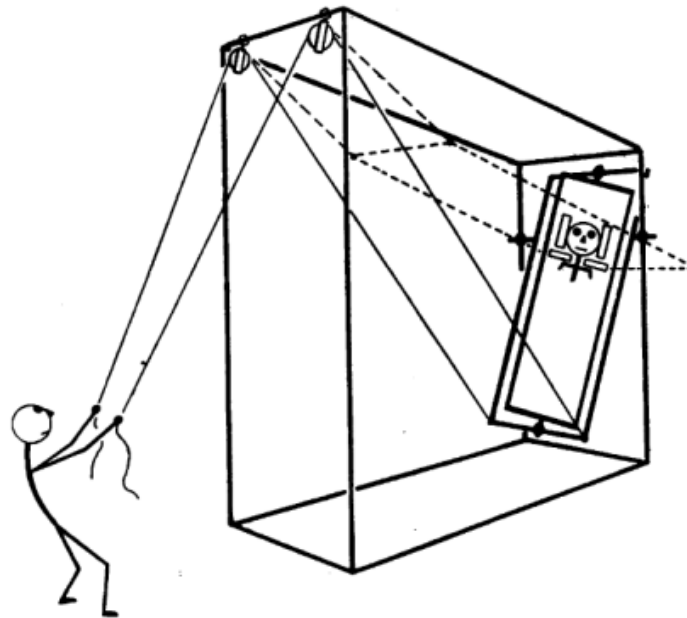
Cupulolithiasis Video



YouTube DRMTCI

Diagnosing BPPV with special maneuvers

The Dix-Hallpike Maneuver



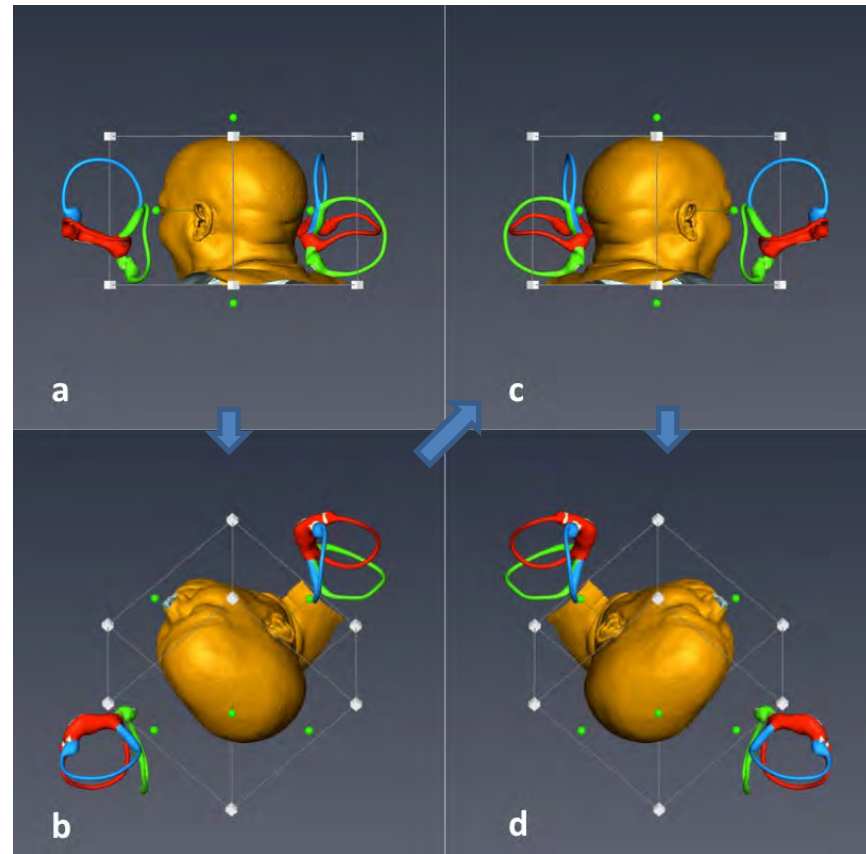
The maneuver does not need to be done quickly.

FIG. 7.

By means of apparatus shown in Fig. 7 it is possible to move the patient *en masse* into the critical position,

Dix, M.R.; Hallpike, C.S.: The pathology, symptomatology and diagnosis of certain common disorders of the vestibular system. Proc. R. Soc. Med. 45: 341-354 (1952).

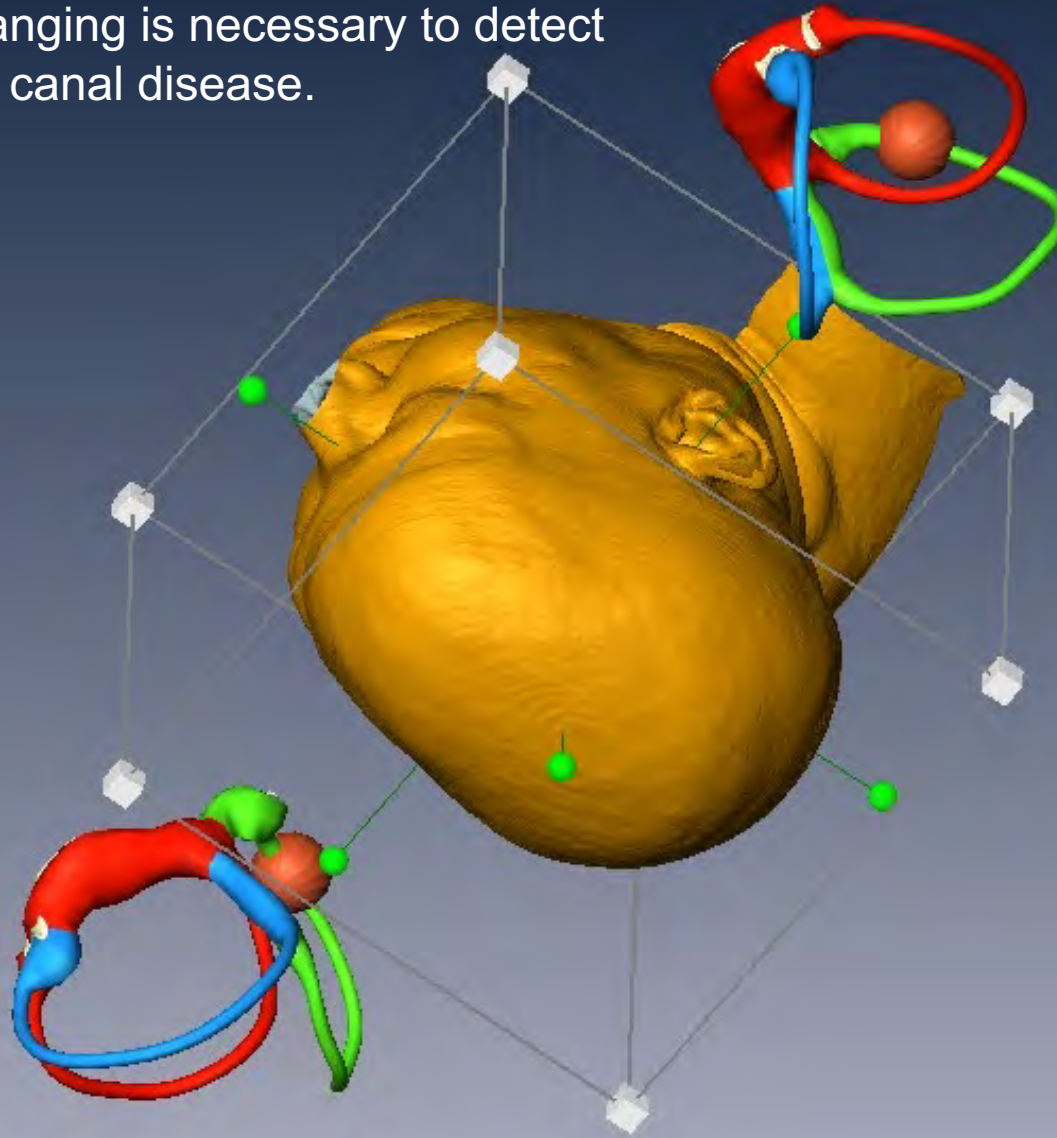
The Traditional Dix-Hallpike Maneuver



The Traditional Dix-Hallpike Maneuver



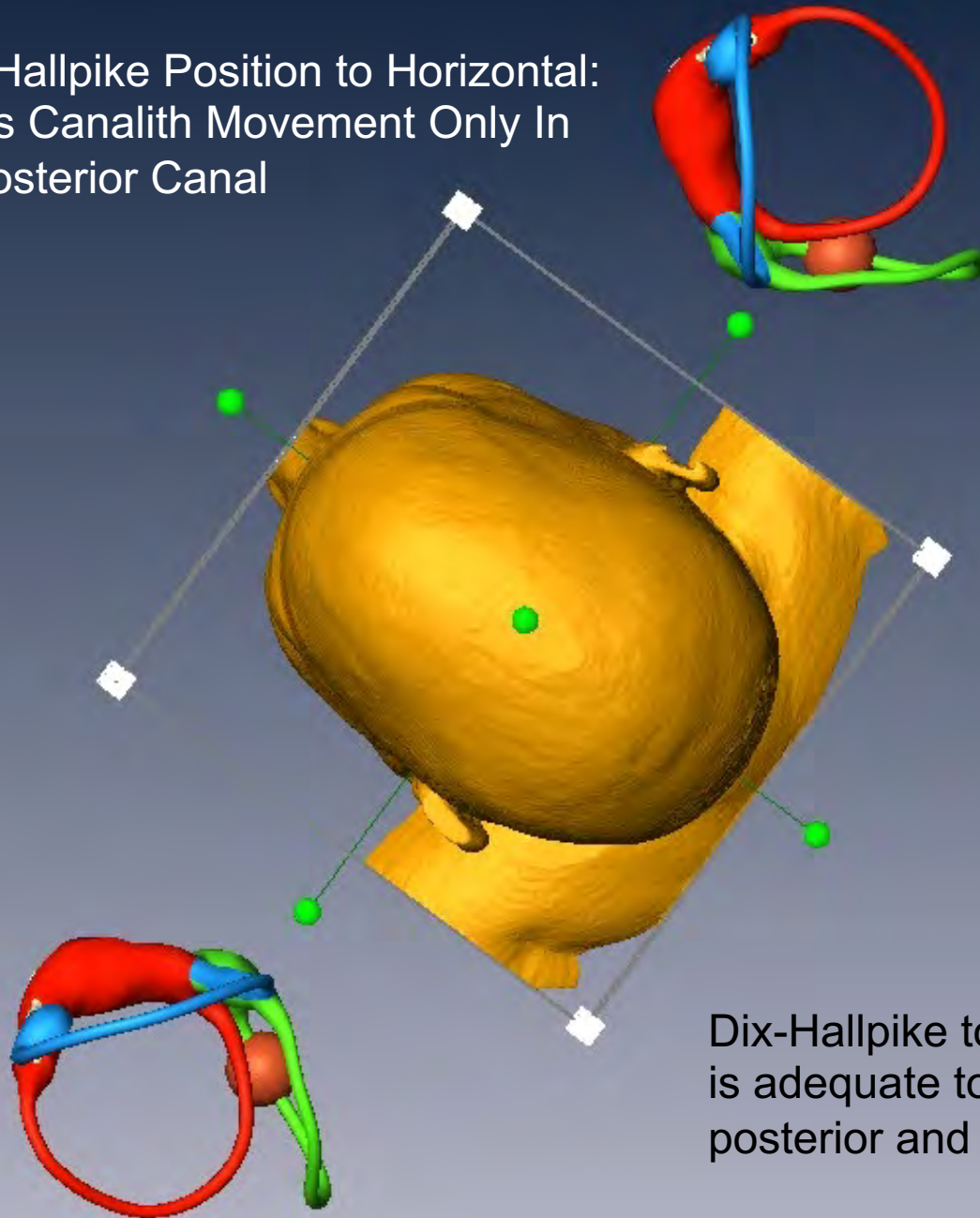
Left Dix-Hallpike Position to Below Horizontal
Head hanging is necessary to detect
Anterior canal disease.



The Traditional Dix-Hallpike Maneuver moves everything!

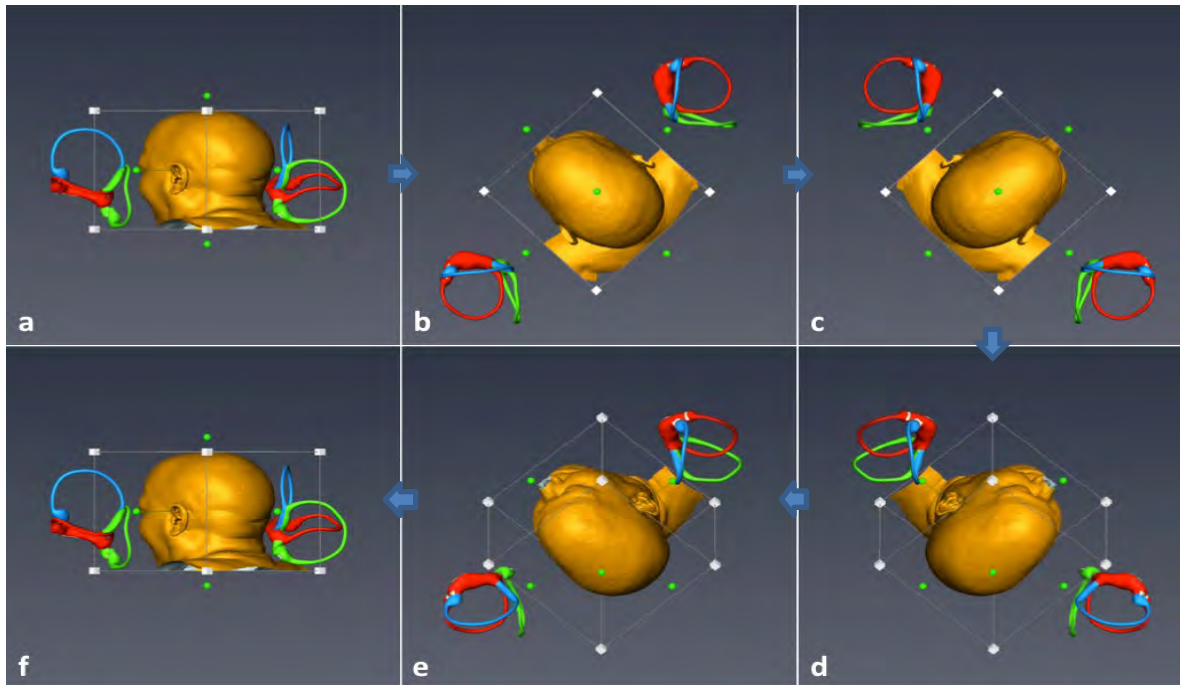


Left Dix-Hallpike Position to Horizontal:
Promotes Canalith Movement Only In
Lower Posterior Canal



Dix-Hallpike to horizontal
is adequate to reveal
posterior and lateral BPPV

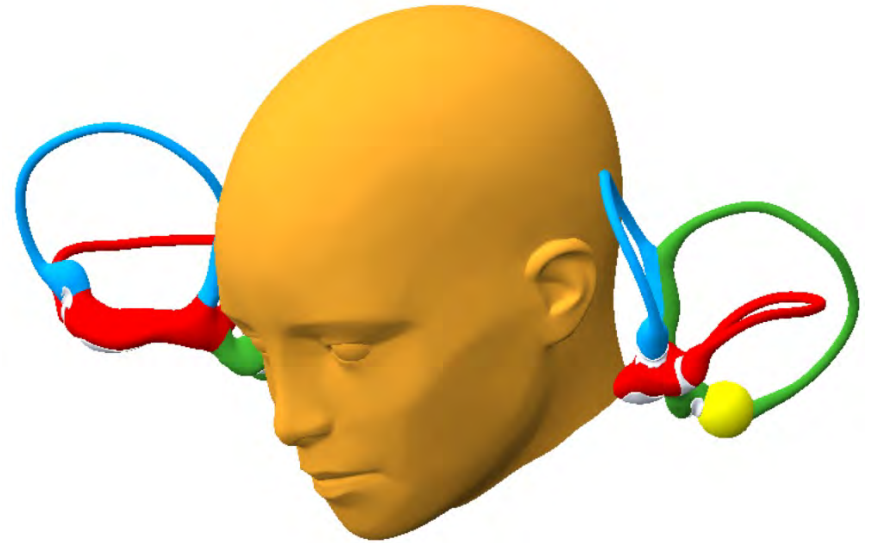
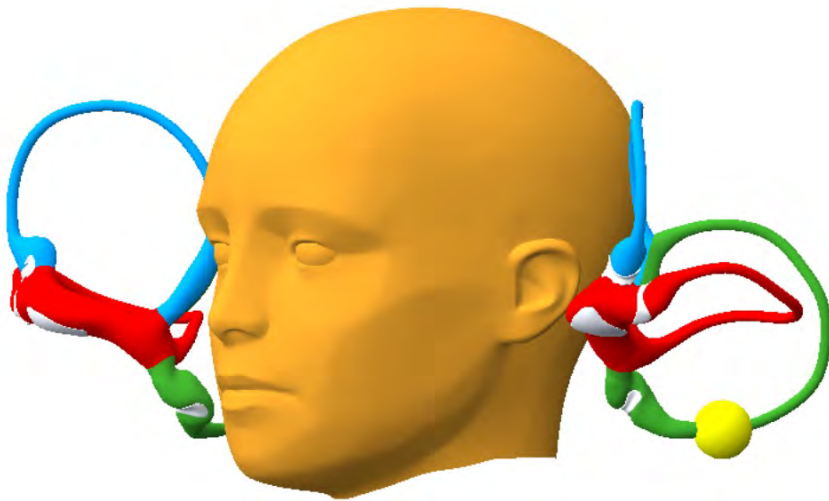
An Expanded Dix-Hallpike Maneuver for Diagnosis of Multi-canal BPPV



Traboulsi HT, Teixido MT, Qualitative Analysis of the Dix-Hallpike Maneuver in Multi-canal BPPV using a Biomechanical Model: Introduction of an Expanded Dix-Hallpike Maneuver for Enhanced Diagnosis of Multi-canal BPPV, *World Journal of Otorhinolaryngology- Head and Neck Surgery* May 2017

Loading the Dix-Hallpike Maneuver

- [J Walter et al , J Int Adv Otol.](#) Optimizing Testing for BPPV – The Loaded Dix-Hallpike 2020 Aug; 16(2): 171–175.



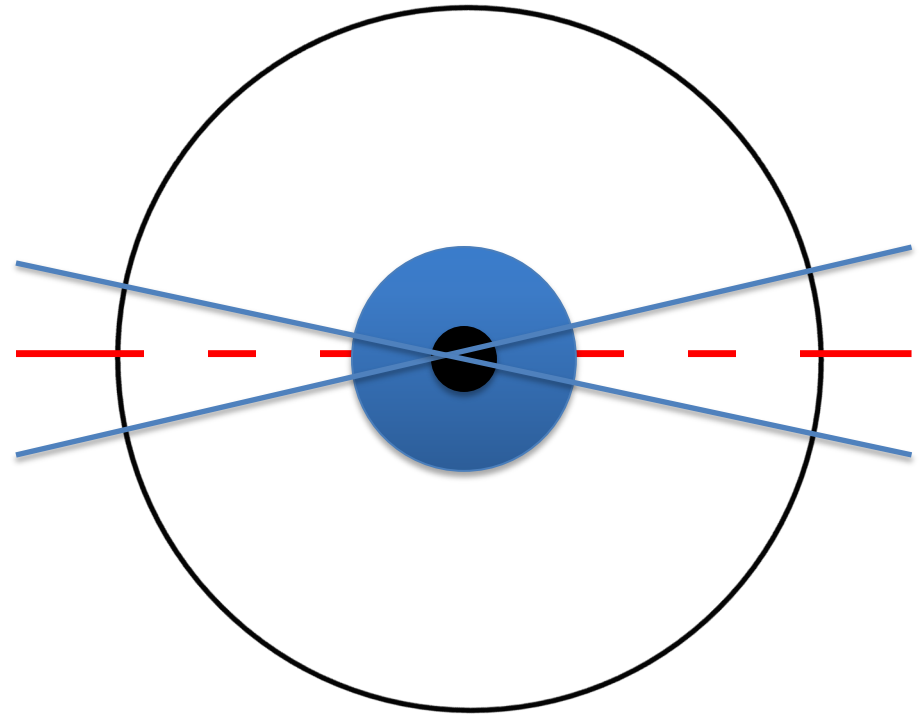
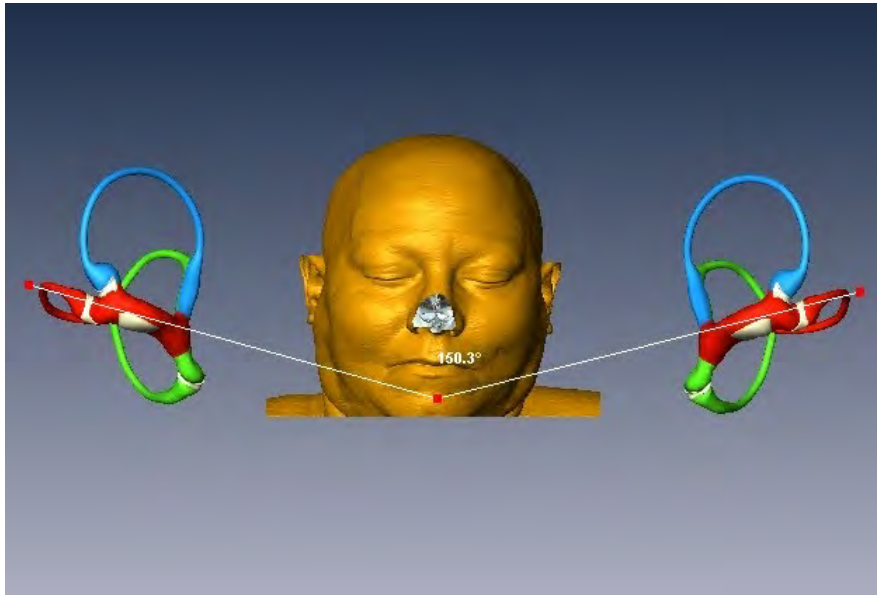
Lateral Canal Disease

- What we know:
 - Horizontal nystagmus is evident on a Dix-Hallpike maneuver; canalithiasis or cupulolithiasis present
 - Duration: Canalith-**transient** /Cupulo-**sustained**
 - Direction: Canalith- **geotropic** /Cupulo-**ageotropic**
- What we don't know:
 - Which side?
- What we can guess:
 - More likely to be on the same side as the posterior canal disease if present

Determining Side of Lateral Canalithiasis

Different Ways to Determine Side of Lateral Canal BPPV

- Absolute axis of nystagmus



Drawback: Too Complicated

Cupulolithiasis Video



YouTube DRMTCI

Different Ways to Determine Side of Lateral Canal BPPV

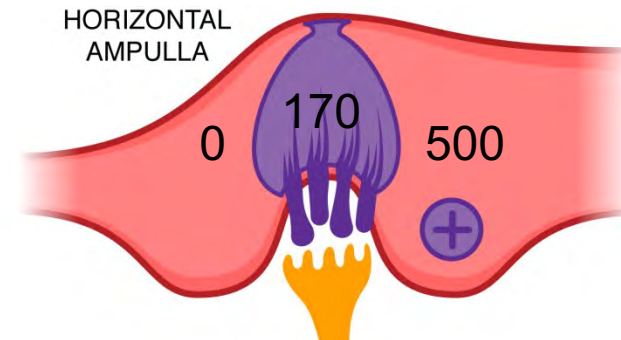
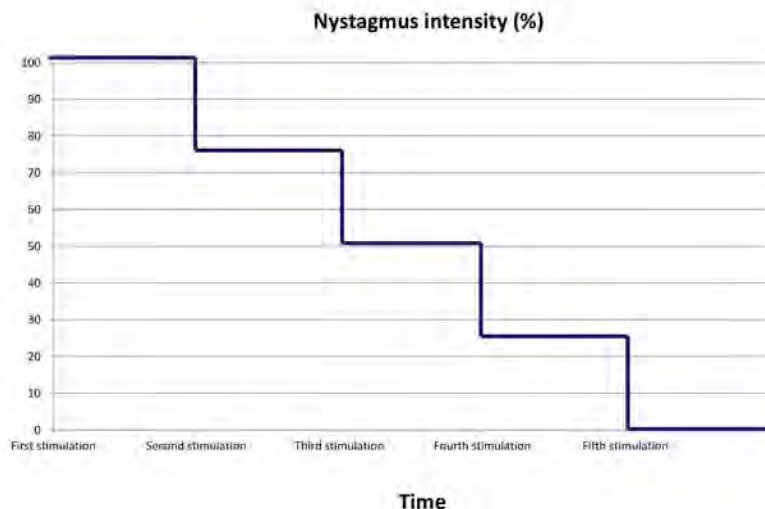
- Absolute axis of nystagmus
- Intensity of nystagmus on **supine roll test**

-Ewald's second law:

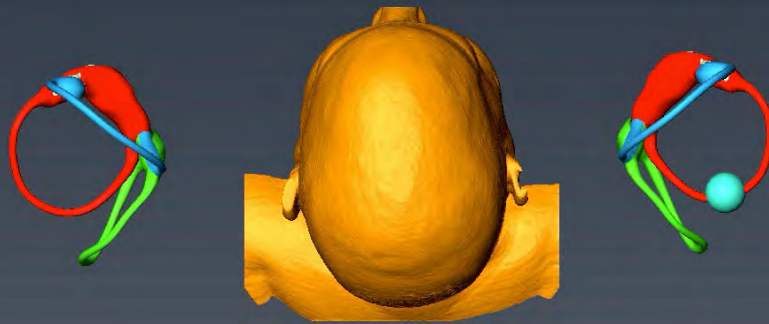
Nystagmus caused by excitatory stimulus is stronger than nystagmus caused by inhibitory stimulus

-Drawback- fatigability of response

Fatigability of Nystagmus



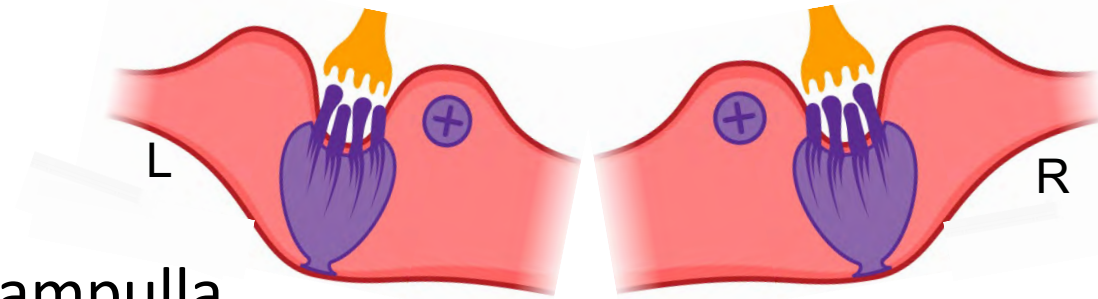
Supine Roll for Lateral Canalithiasis



Supine Roll for Lateral Canalithiasis

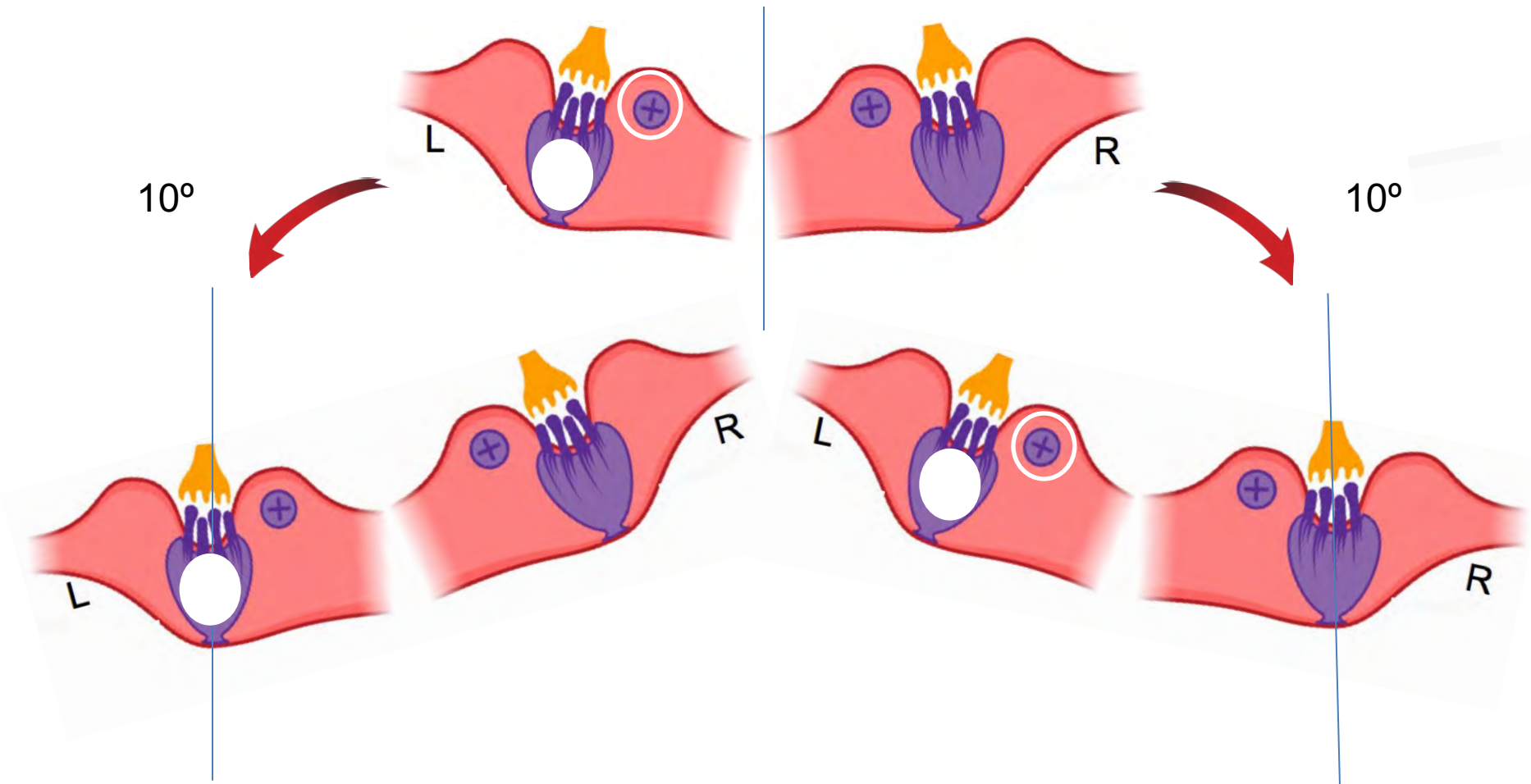


Ways to Determine Side of Lateral Canal CUPULOLITHIASIS



- Find nul position
 - 10° to the R for R ampulla
 - 10° to the L for L ampulla
- Response strongest with head tilted away from side
- Head vibration (Ewald's 2nd law)
- Side doesn't matter; treatment is
Vibration/Head Shake/Hopping + Brandt-Daroff
- Log Roll does not work

Null Point to Determine Side of Lateral Canal CUPULolithiasis



Crystal Clear BPPV

- Reviewed anatomy
- Reviewed eye movements/ Ewald's Laws
- Reviewed Diagnostic Maneuvers

Treatment of BPPV

Treatment of Posterior Canal BPPV

- Brandt-Daroff exercises
- Canalith Repositioning (Epley)
- Liberatory Maneuver (Semont)
- Rapid Sit-Up (Teixido)
- 360° rotation

Treatment of Posterior Canal BPPV

Brandt-Daroff Exercises



Brandt T, Daroff RB. Physical therapy for benign paroxysmal positional vertigo. Arch Otolaryngol 1980 Aug;106(8):484-485.

Brandt-Daroff Exercises

Habituation or Dispersal?

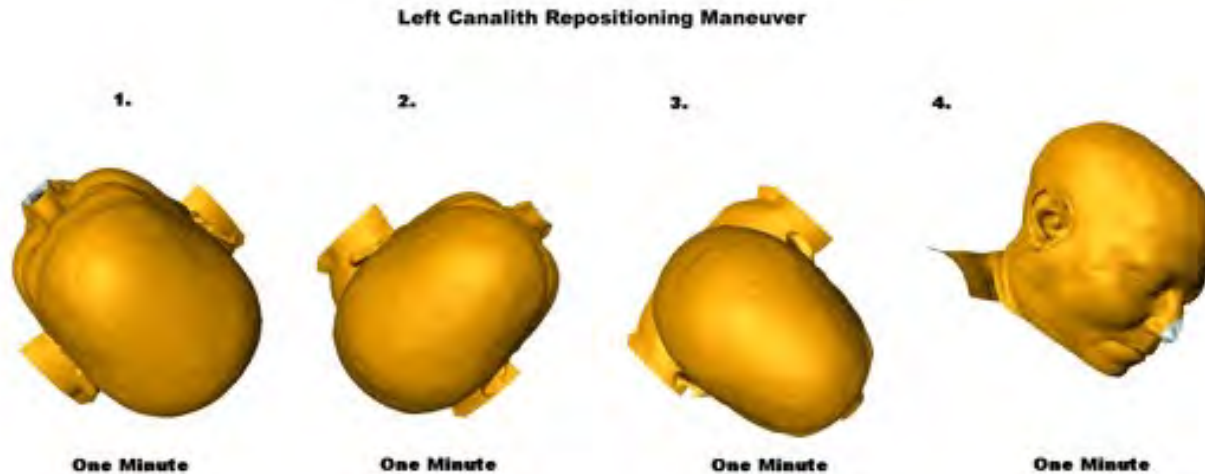


YouTube DRMTCI

Membranous labyrinth from EPL Viewer- http://tbregistry.org/3D_Viewer.htm

Treatment of Posterior Canal BPPV

Canalith Repositioning



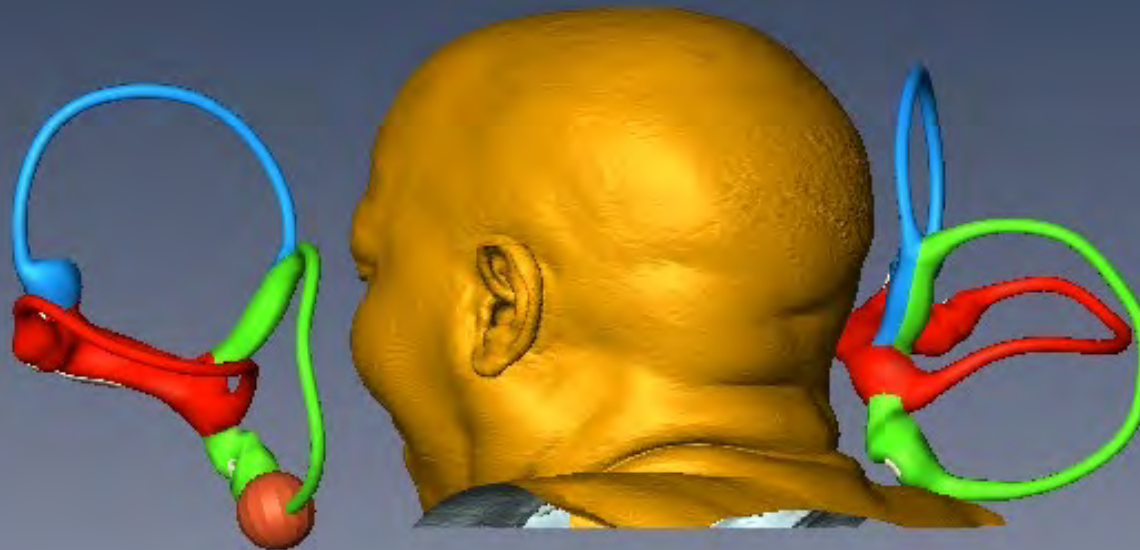
EPLEY, J.M. 1992. The canalith repositioning procedure: for treatment of benign paroxysmal positional vertigo. *Otolaryngol. Head Neck Surg.* **107**: 399–404.

Canalith Repositioning



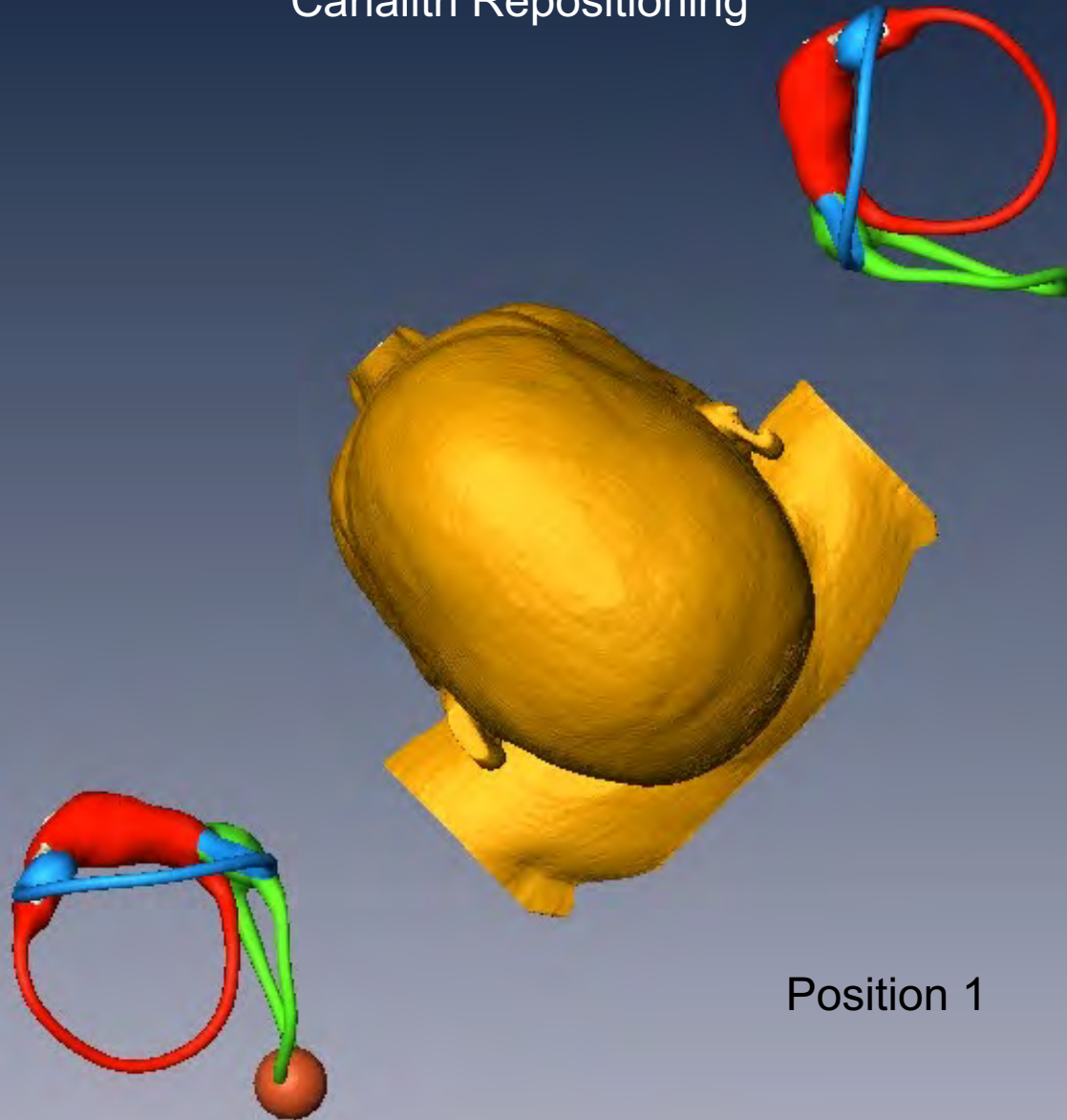
Left Posterior Canalithiasis Neutral Position

Canalith Repositioning



Preparation for Position 1

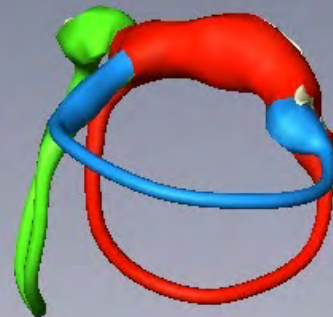
Canalith Repositioning



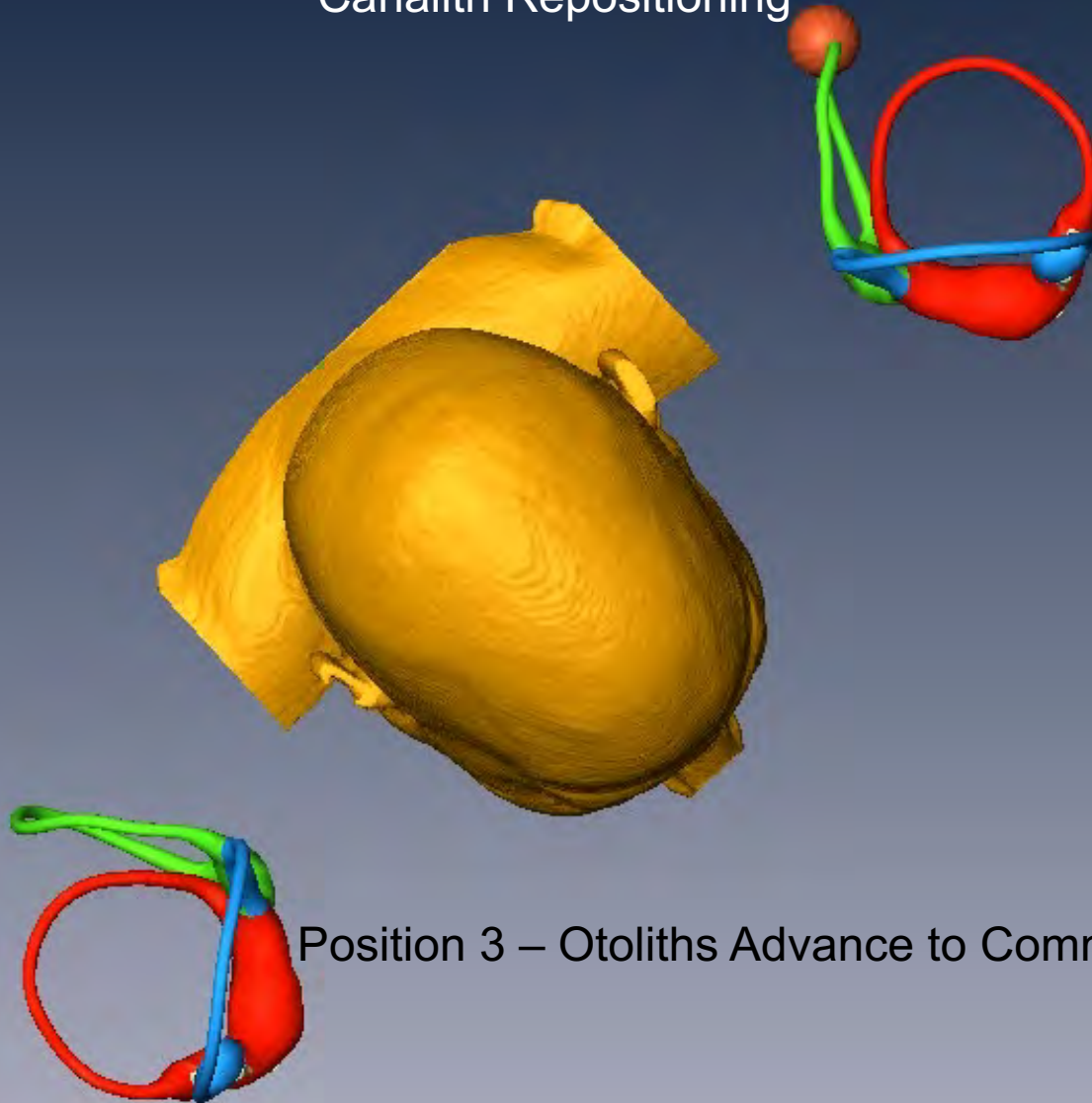
Position 1



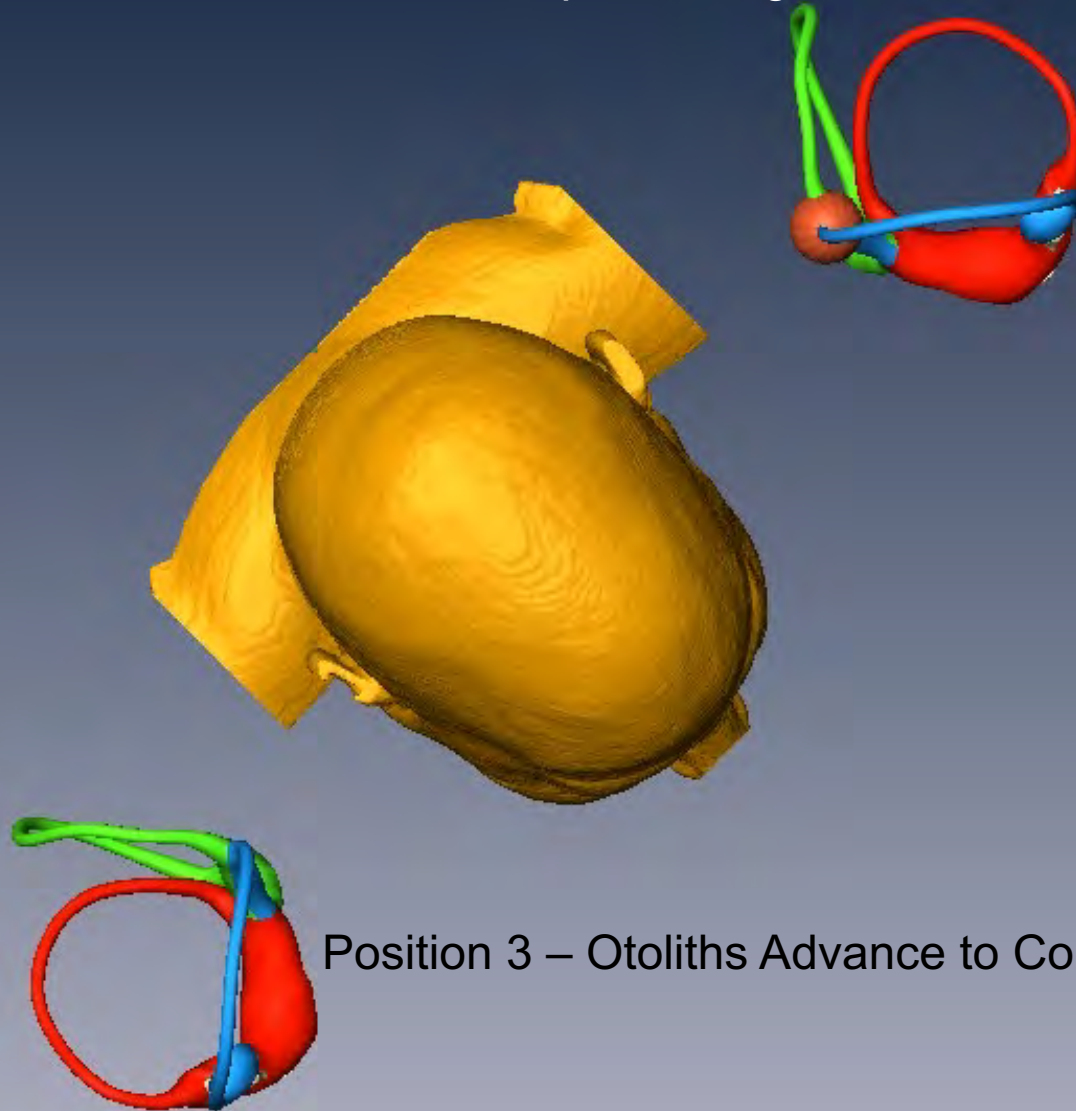
Position 2



Canalith Repositioning

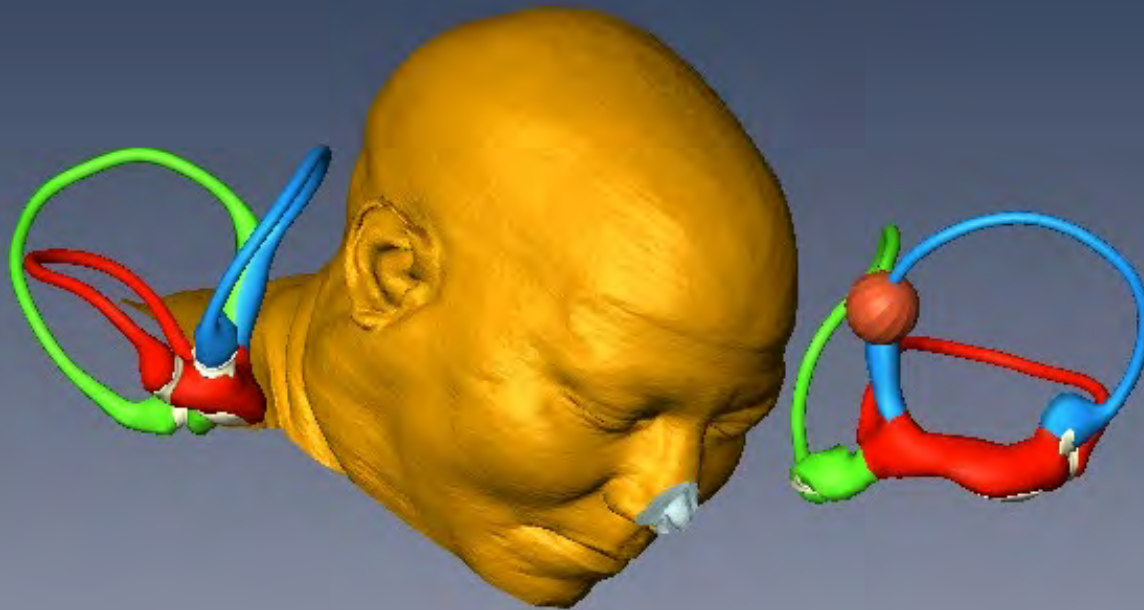


Canalith Repositioning



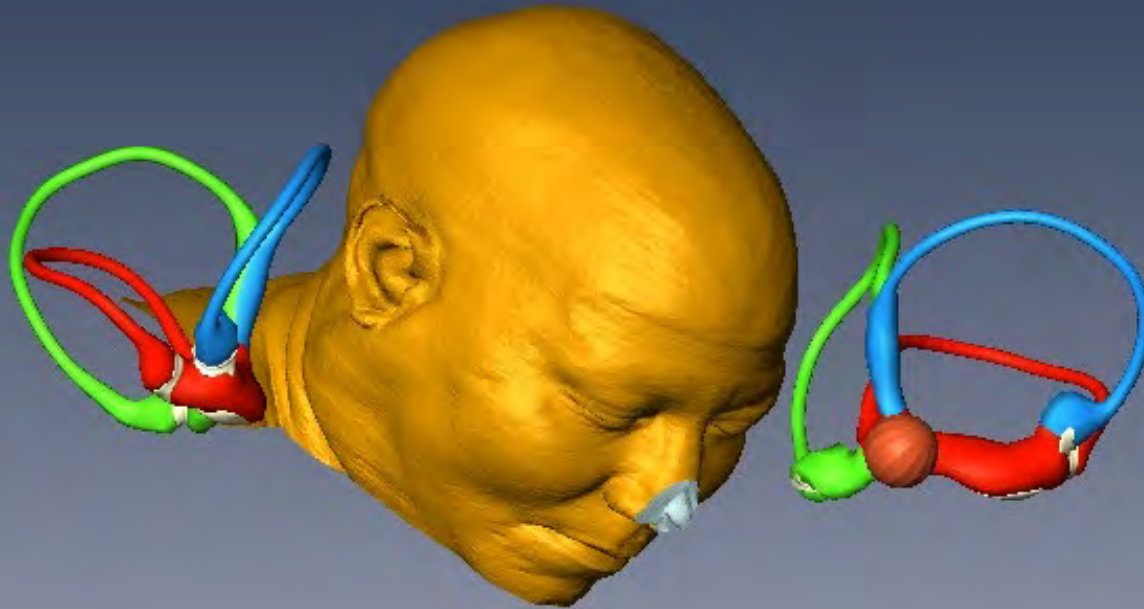
Position 3 – Otoliths Advance to Common Crus

Canalith Repositioning



Position 4 – Otoliths Advance to Utricle

Canalith Repositioning



Position 4 – Otoliths Advance to Utricle
Forward Head Position Brings Common Crus Upright

Canalith Repositioning



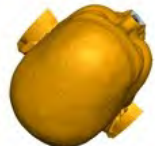
Repositioning Sequence 1 complete

Repeat Dix-Hallpike to verify success

Raise patient by CRP Sequence again

2-3 repetitions are often necessary

Canalith Repositioning Observations:

-  • Hanging head below horizontal is not essential for success but is an enhancement
- Position 2  is optional
- Use the corners of the room



Canalith Repositioning Procedure



YouTube DRMTCI

Membranous labyrinth from EPL Viewer- http://tbregistry.org/3D_Viewer.htm

Treatment of Posterior Canal BPPV

Liberatory Maneuver



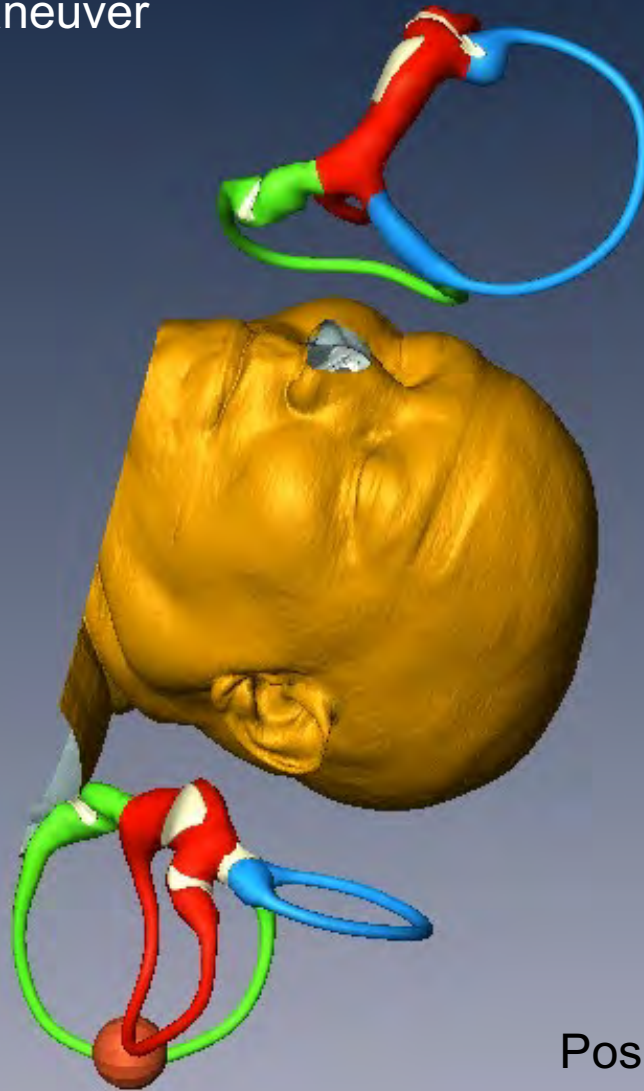
Curing the BPPV with a Liberatory Maneuver

Adv. Oto-Rhino-Laryng., vol. 42, pp. 290–293 (Karger, Basel 1988)

Liberatory Maneuver of Semont

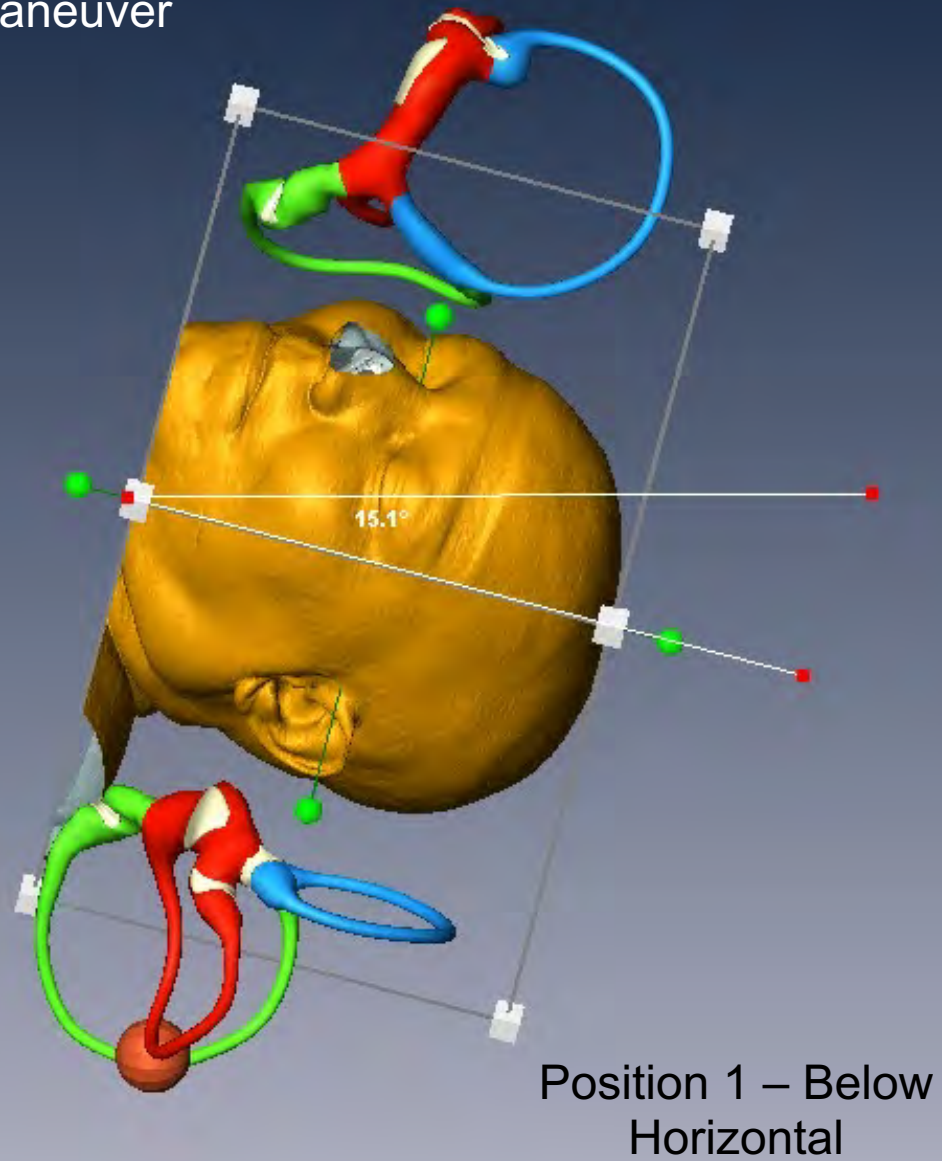


Liberatory Maneuver

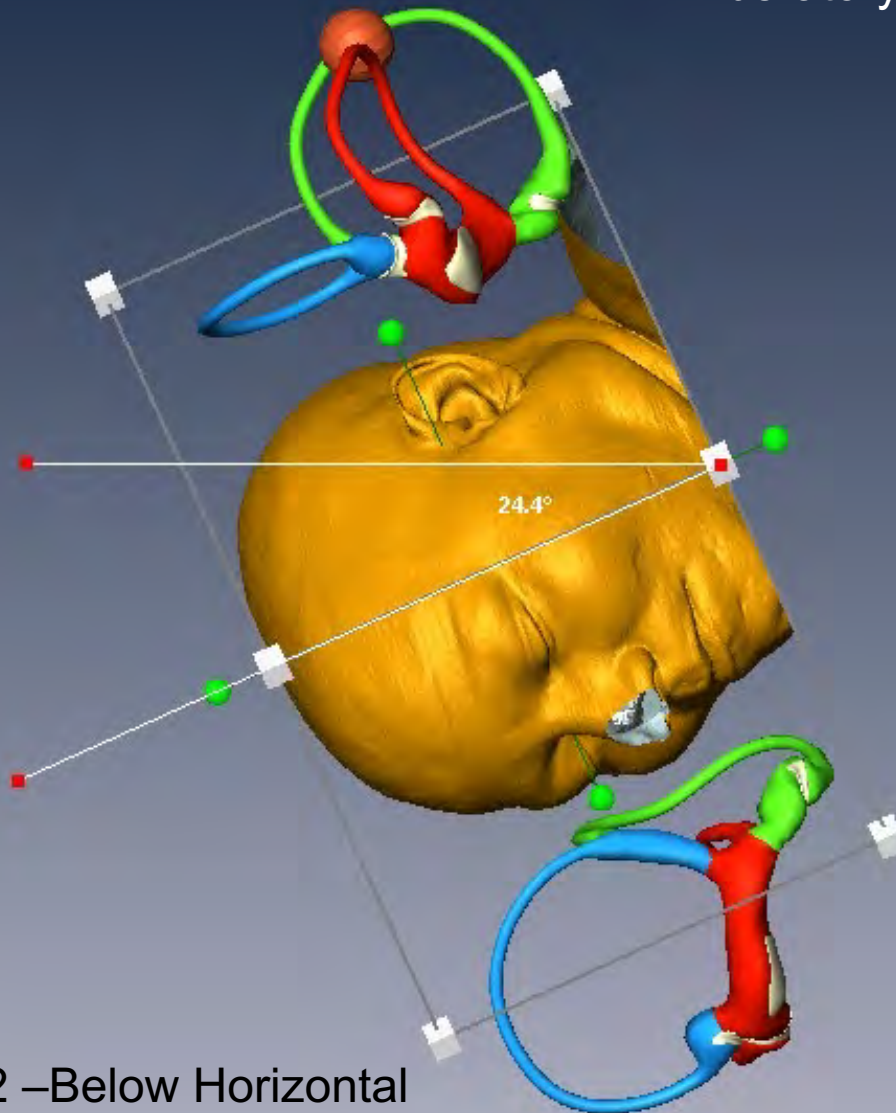


Position 1

Liberatory Maneuver

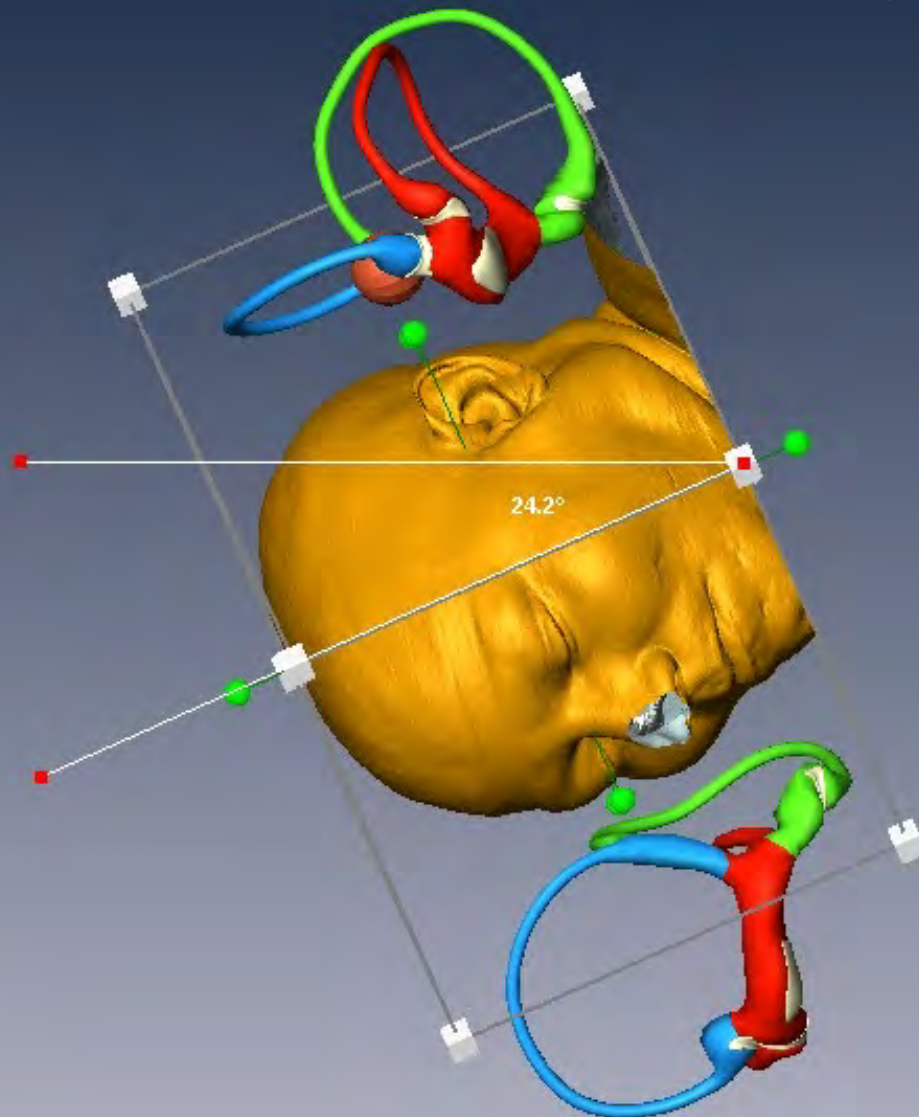


Liberatory Maneuver



Position 2 –Below Horizontal
Greater Than 40° Total Angle Below Horizontal in
Positions 1 + 2 to Insure Progression of Otolith Mass

Liberatory Maneuver

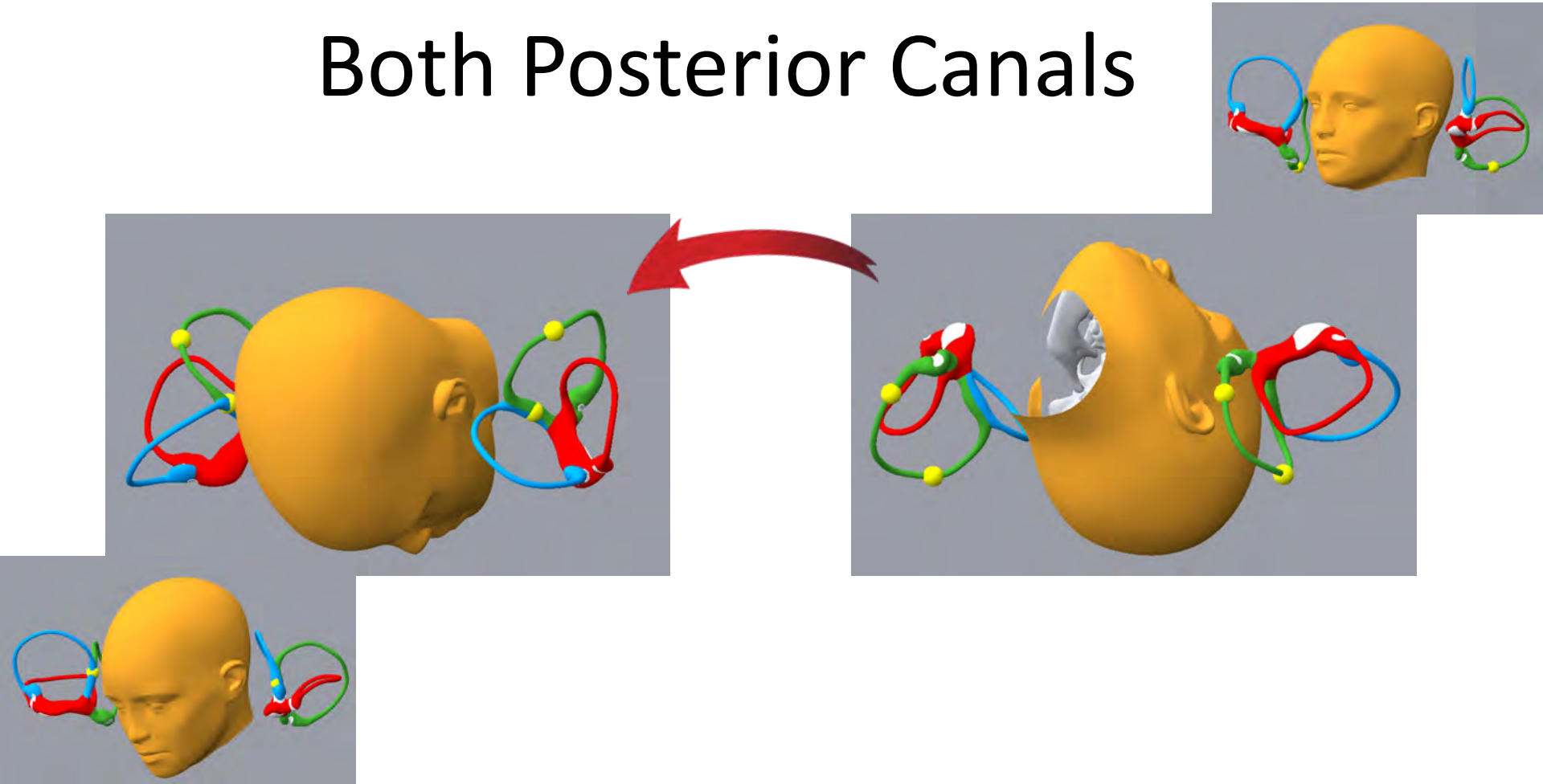


Liberatory Maneuver



Position 3

Rapid Sit-up Maneuver treats Both Posterior Canals



Treatment of Posterior Canal BPPV

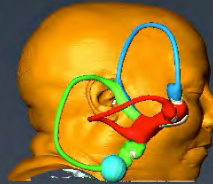
360° Toes Over Head Rotation



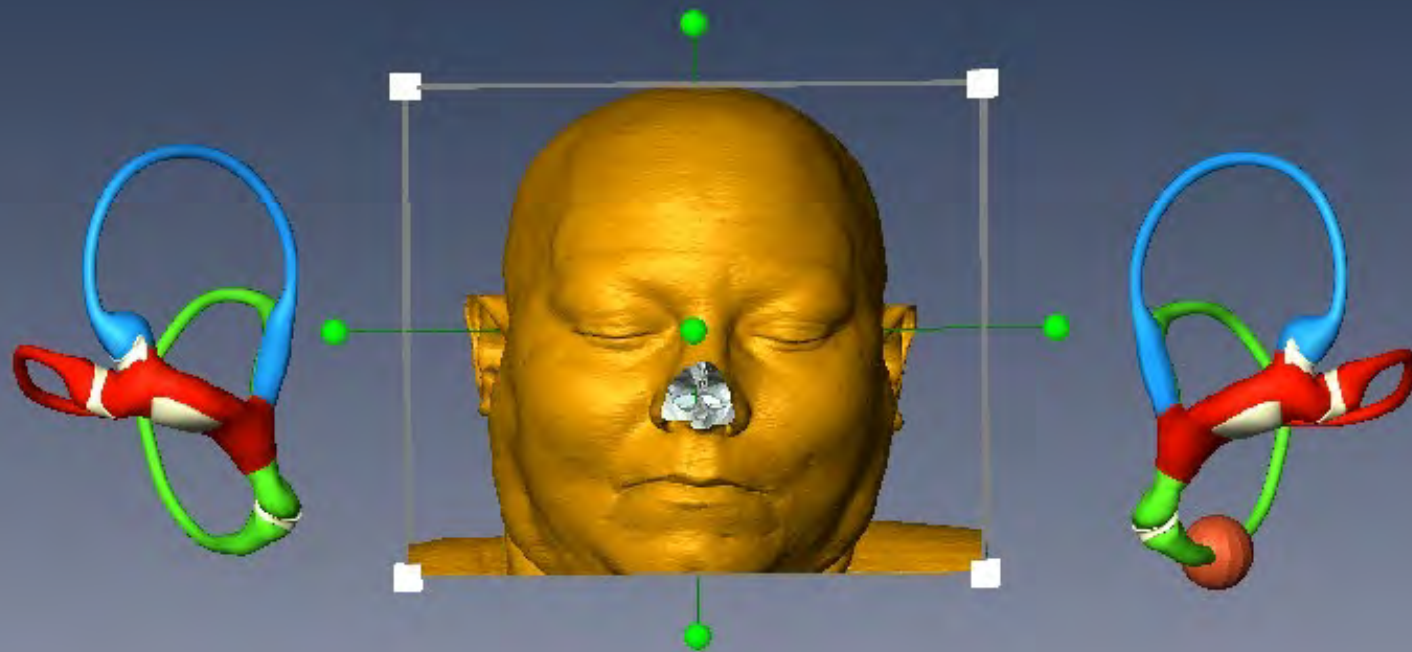
Lempert T, et al. Three hundred sixty degree rotation of the posterior semicircular canal for treatment of benign positional vertigo: a placebo-controlled trial. *Neurology* 1997;49:729-33.

Treatment of Posterior Canal BPPV

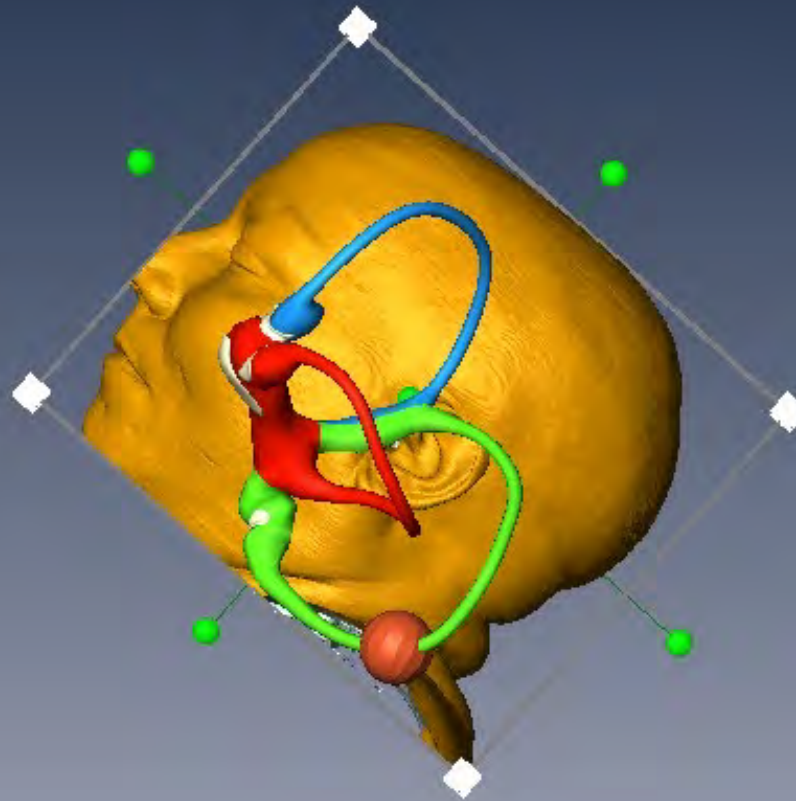
360° Toes Over Head Rotation



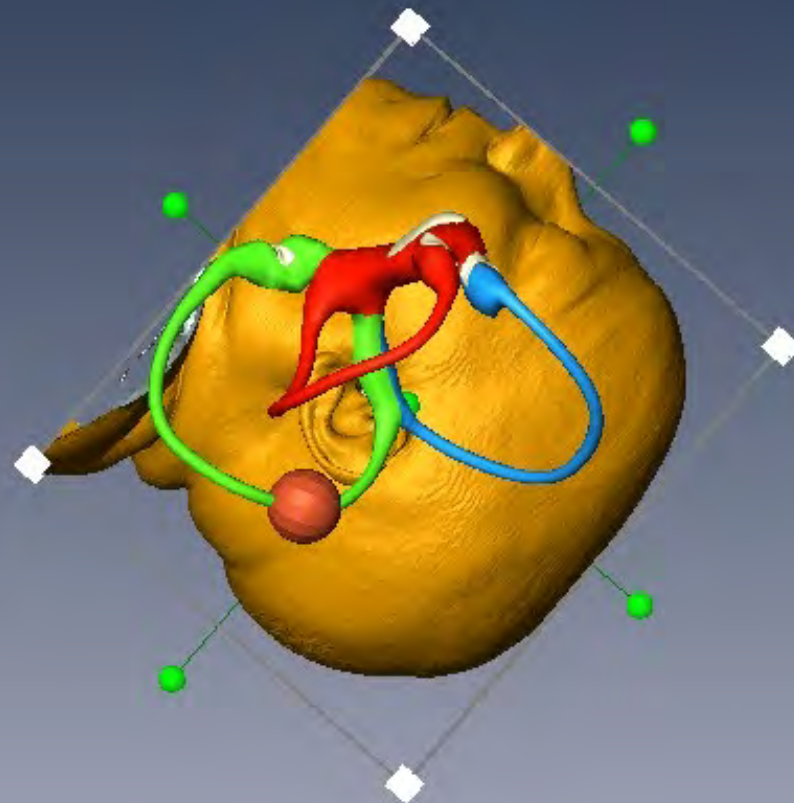
360° Toes Over Head Rotation



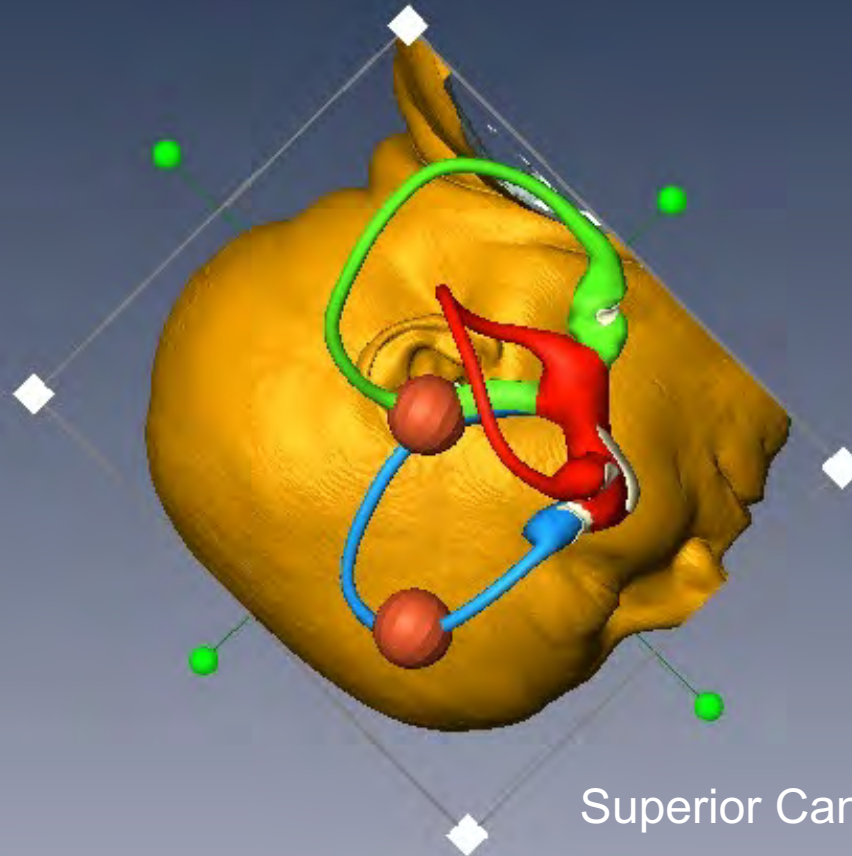
360° Toes Over Head Rotation



360° Toes Over Head Rotation

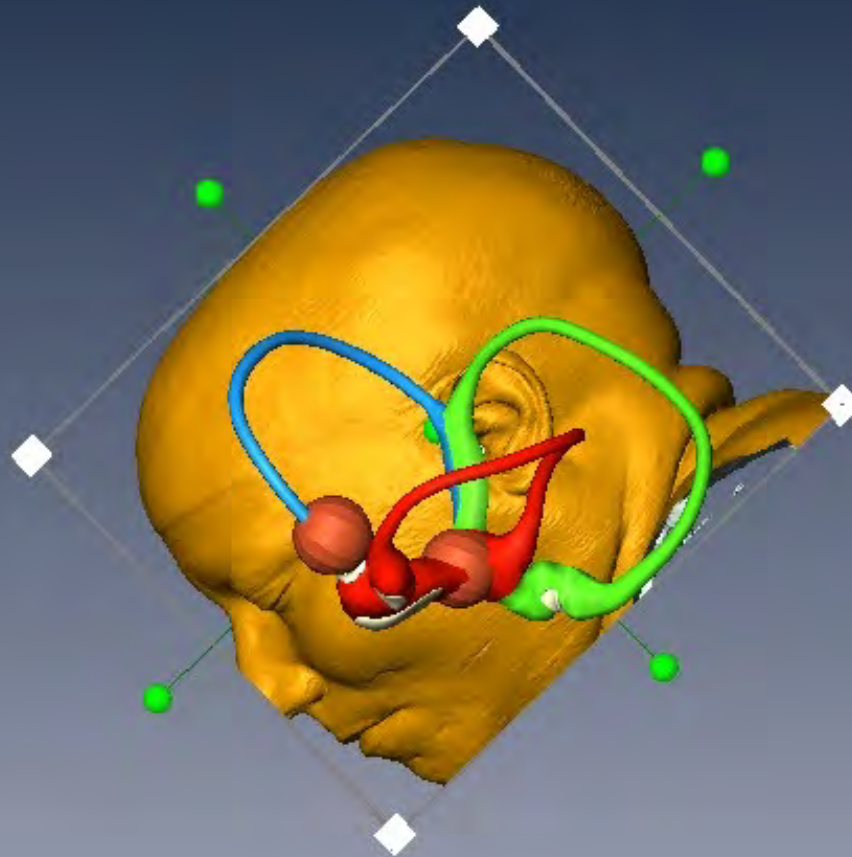


360° Toes Over Head Rotation



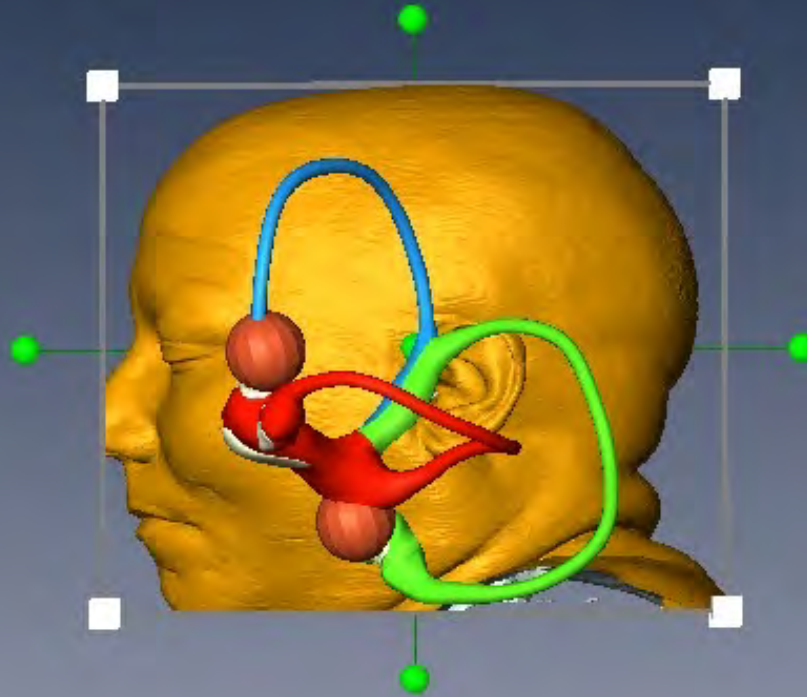
Superior Canal Conversion

360° Toes Over Head Rotation



Superior Canal Conversion

360° Toes Over Head Rotation



Superior Canal Conversion

Treatment of Lateral Canalithiasis

Treatment of Lateral Canalithiasis

- Log Roll away from the affected side 69%
- Sleeping with the affected ear up (Vannucci-Asprella,Asprella)
- Short-Cut log roll (Gufoni / Apianni) 61%
- 180 ° Quick Roll (Jinrong Li)
- Lateral Modified Brandt –Daroff exercises(Teixido)
- LOG ROLL is the best understood

Sham (35%)

Kim JS, Oh SY, et al. (2012) Randomized clinical trial for geotropic horizontal canal benign paroxysmal positional vertigo. Neurology 79(7):700–707 31.

Log Roll Maneuver

Left Lateral Canalithiasis



Log Roll Maneuver-Wrong Direction

Left Lateral Canalithiasis



Treatment of Lateral Canalithiasis

- Sleeping with the affected side up (Asprella)



Treatment of Lateral Canalithiasis- Gufoni Maneuver for Large Patients



YouTube DRMTCI

Treatment of Lateral Canalithiasis- Gufoni Maneuver



BPPVViewer.com

YouTube DRMTCI

Treatment of Lateral Canalithiasis with Modified Brandt-Daroff Exercises



Treatment of Lateral Canalithiasis with 180° Quick Roll away

Jinrang Li et al , Quick repositioning
maneuver for lateral semicircular
canal benign paroxysmal positional
vertigo Journal of Otology
[Volume 10, Issue 3](#), September 2015



Treatment of Anterior Canalithiasis

Treatment of Anterior Canalithiasis

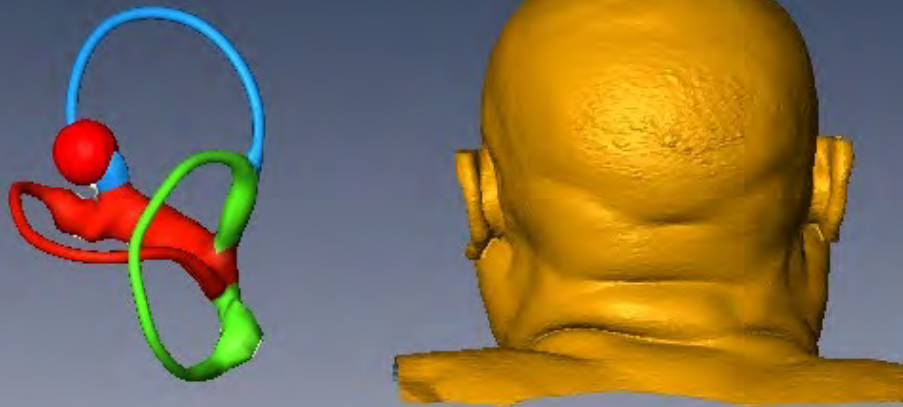
- Standard Epley Maneuver*
- Reversed Epley Maneuver(Baloh)*
- Short CRP(Teixido)*
- Prolonged Forced Position Procedure (PFPP)
- Rapid PFPP (Yacovino / Casani - just 3 min each position)
- Short Yacovino maneuver
- 360° rotation
- Deep Brandt-Daroff exercises (Teixido)

* must know side

Treatment of Anterior Canalithiasis

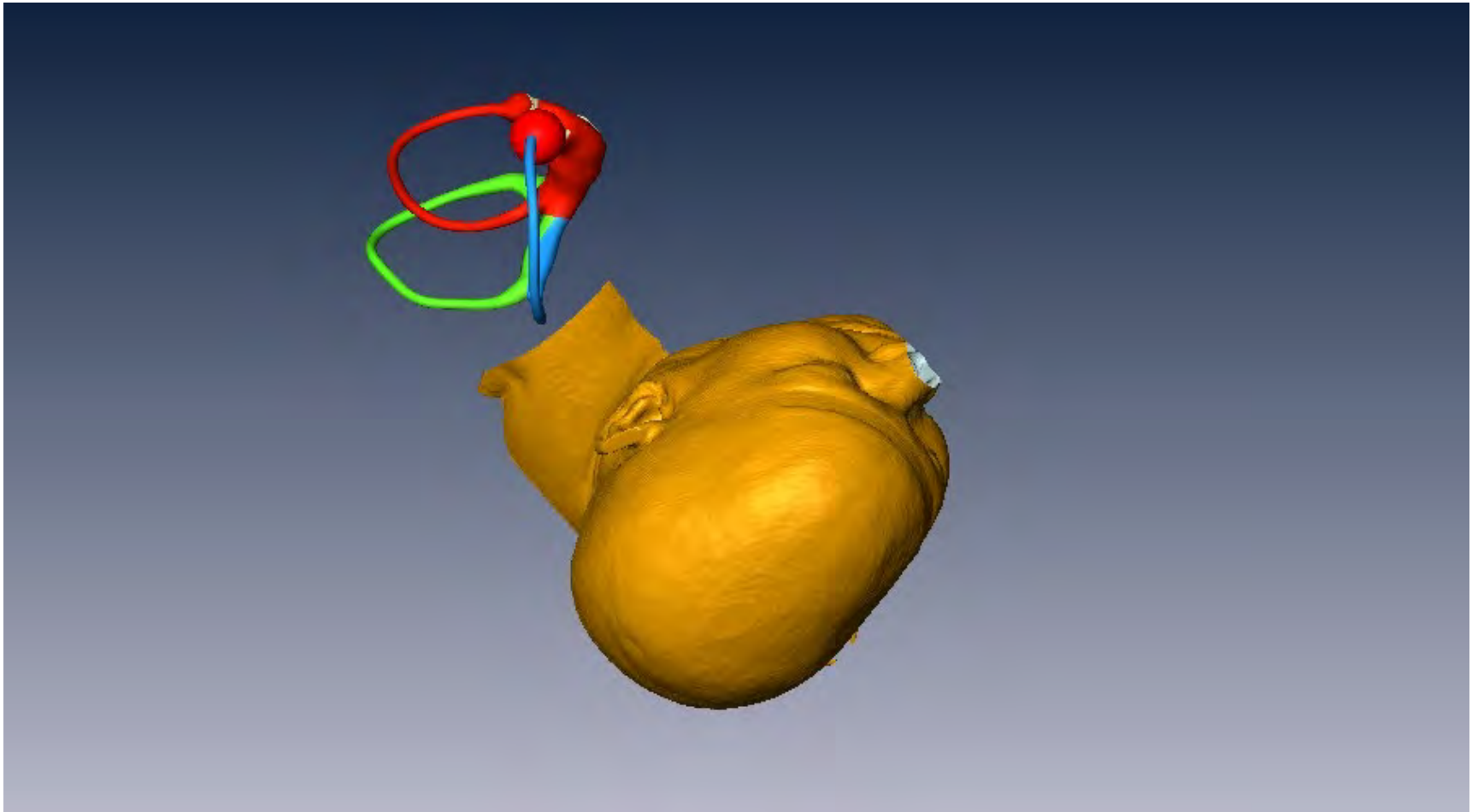
Reversed Epley

Start with affected side up- then roll away.



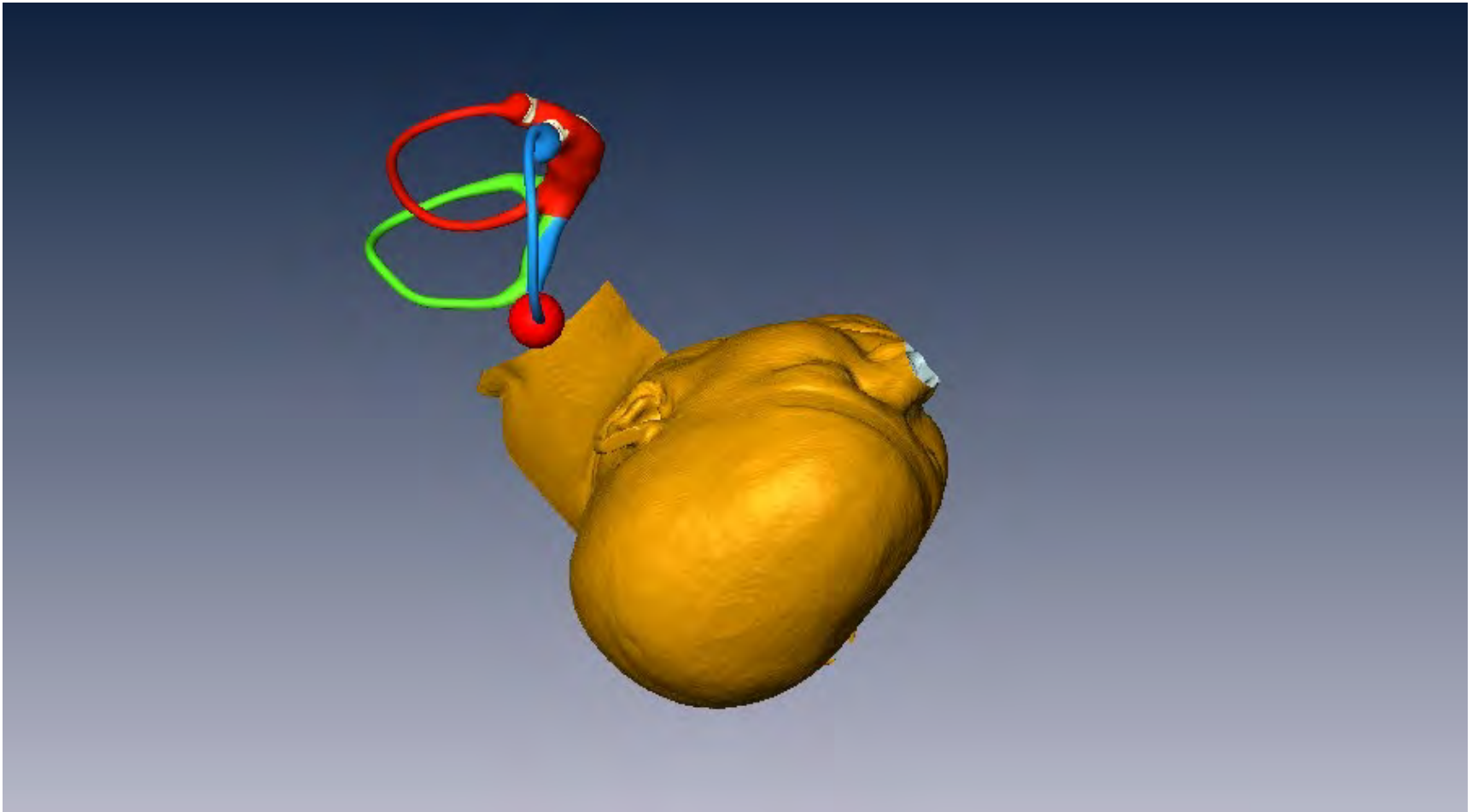
Treatment of Anterior Canalithiasis

Reversed Epley

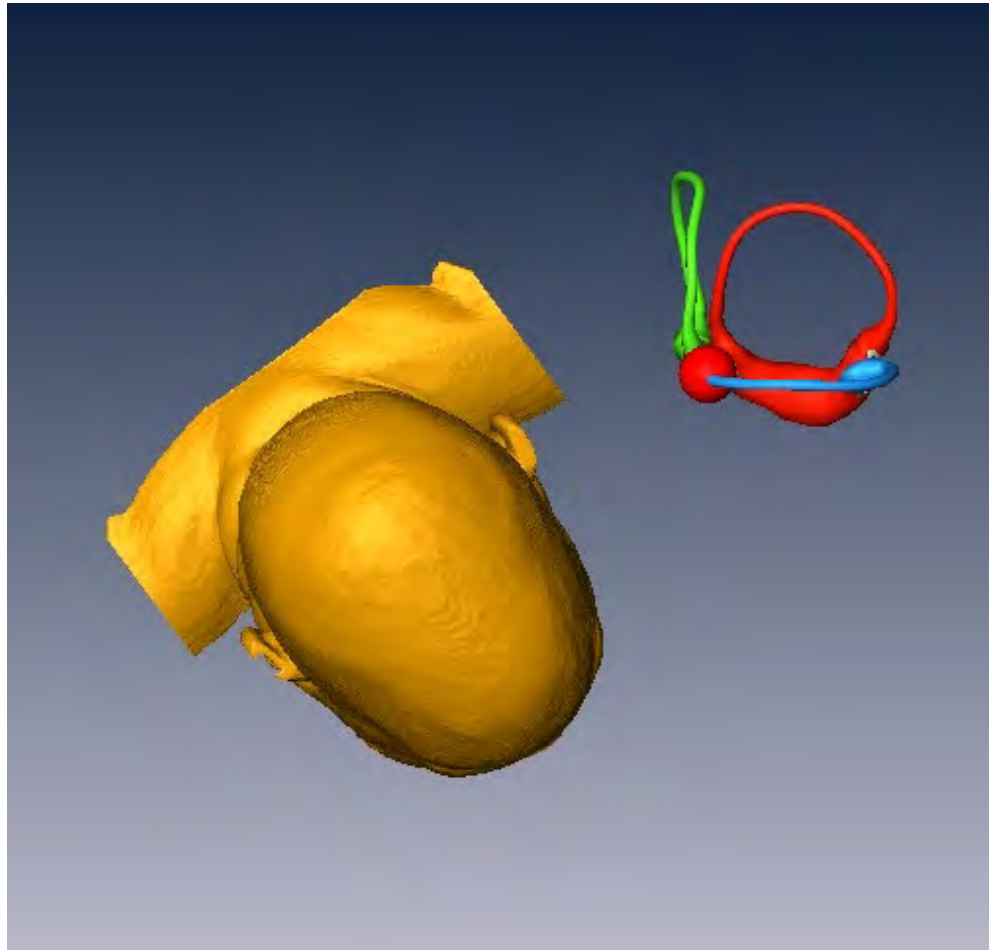


Treatment of Anterior Canalithiasis

Reversed Epley

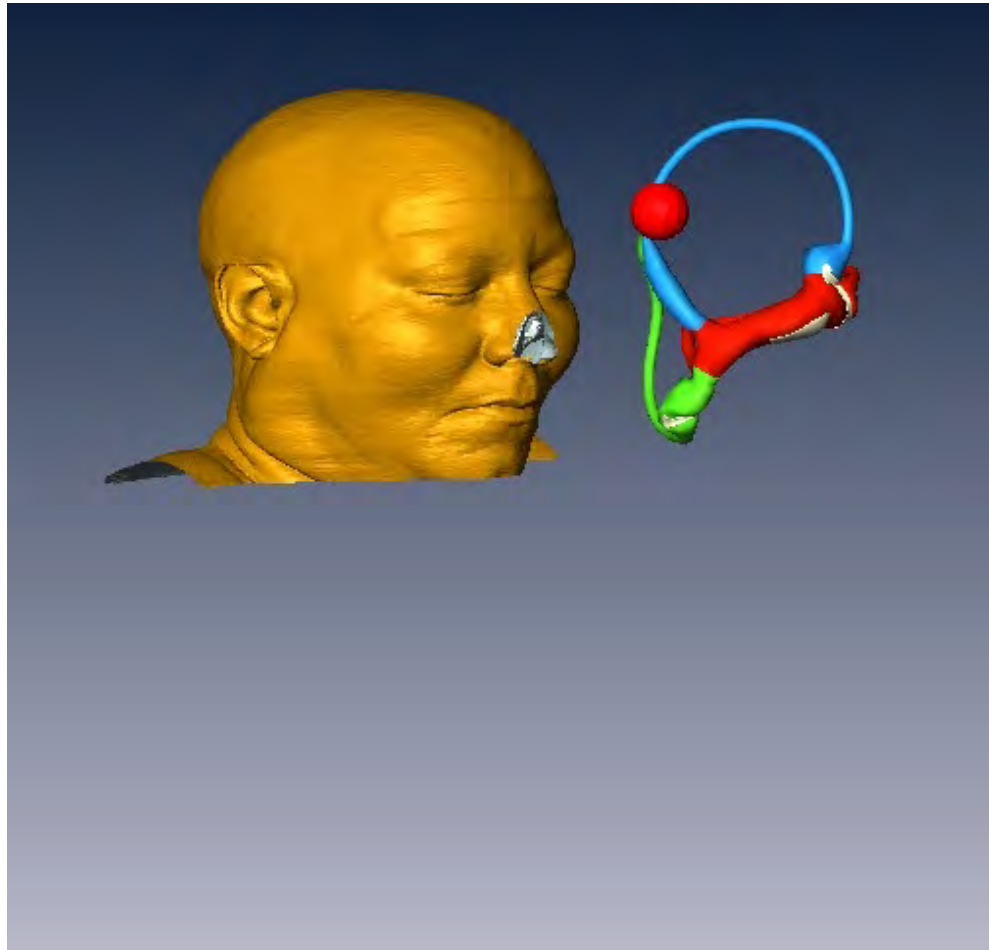


Treatment of Anterior Canalithiasis Reversed Epley



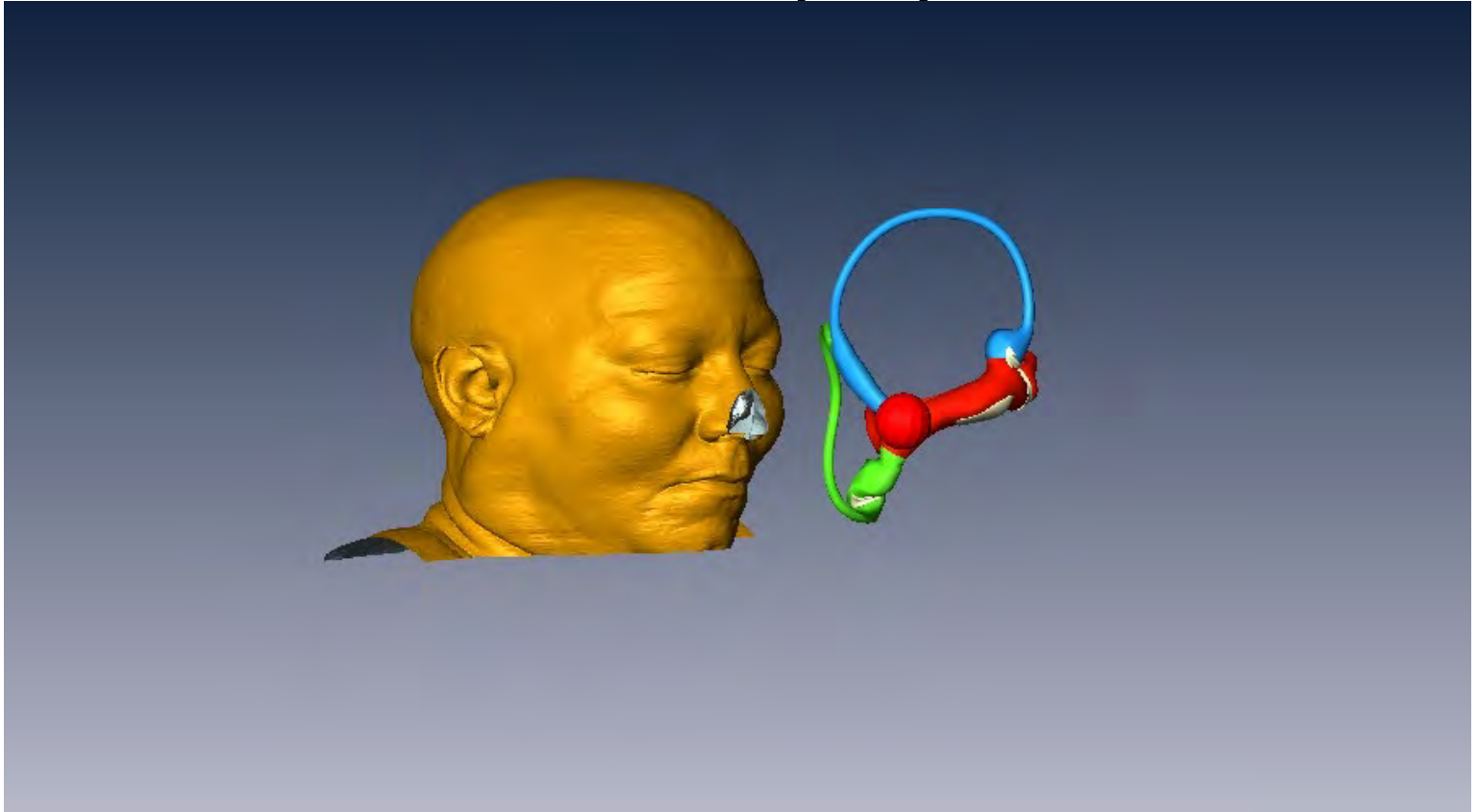
Treatment of Anterior Canalithiasis

Reversed Epley



Treatment of Anterior Canalithiasis

Reversed Epley



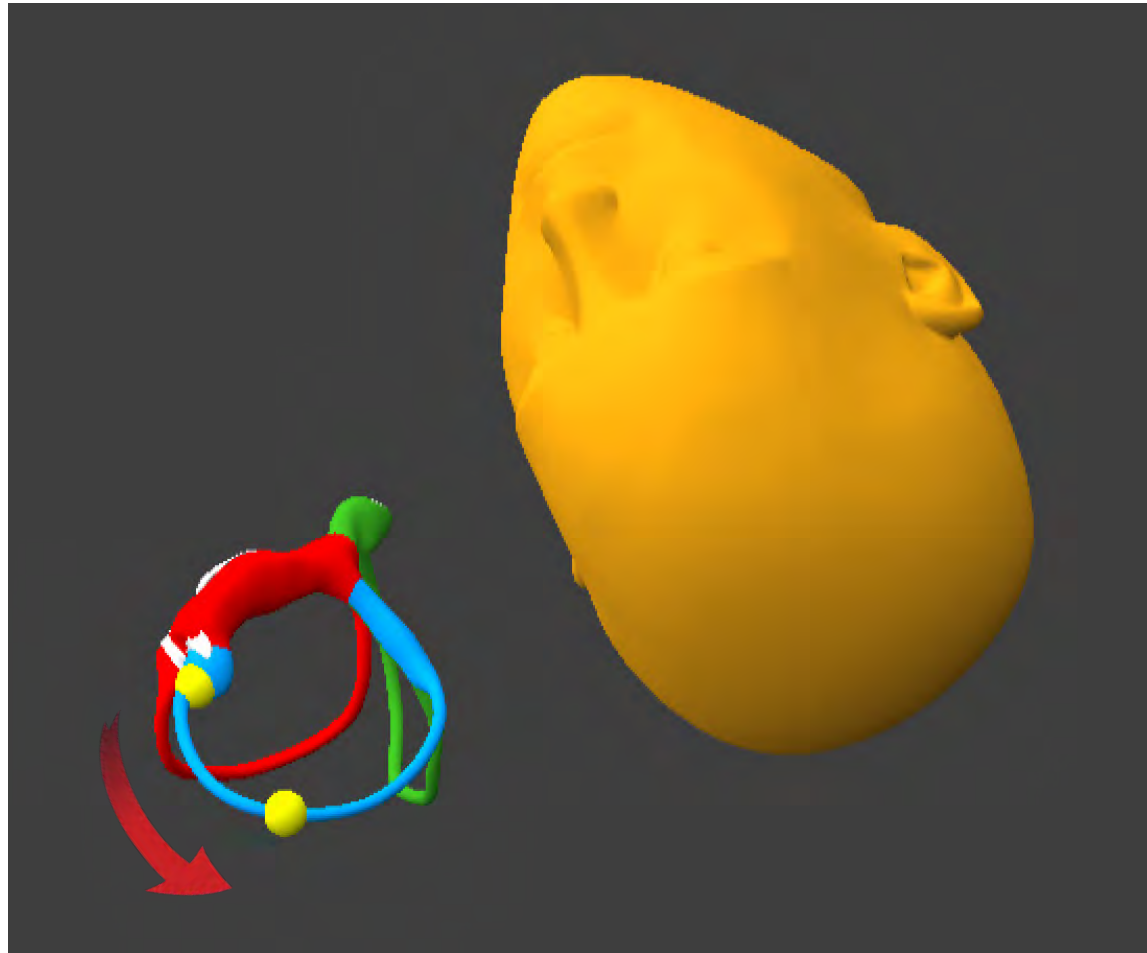
Treatment of Anterior Canal BPPV

Reversed Epley



Treatment of Anterior Canalithiasis

The Standard Epley Maneuver Works!

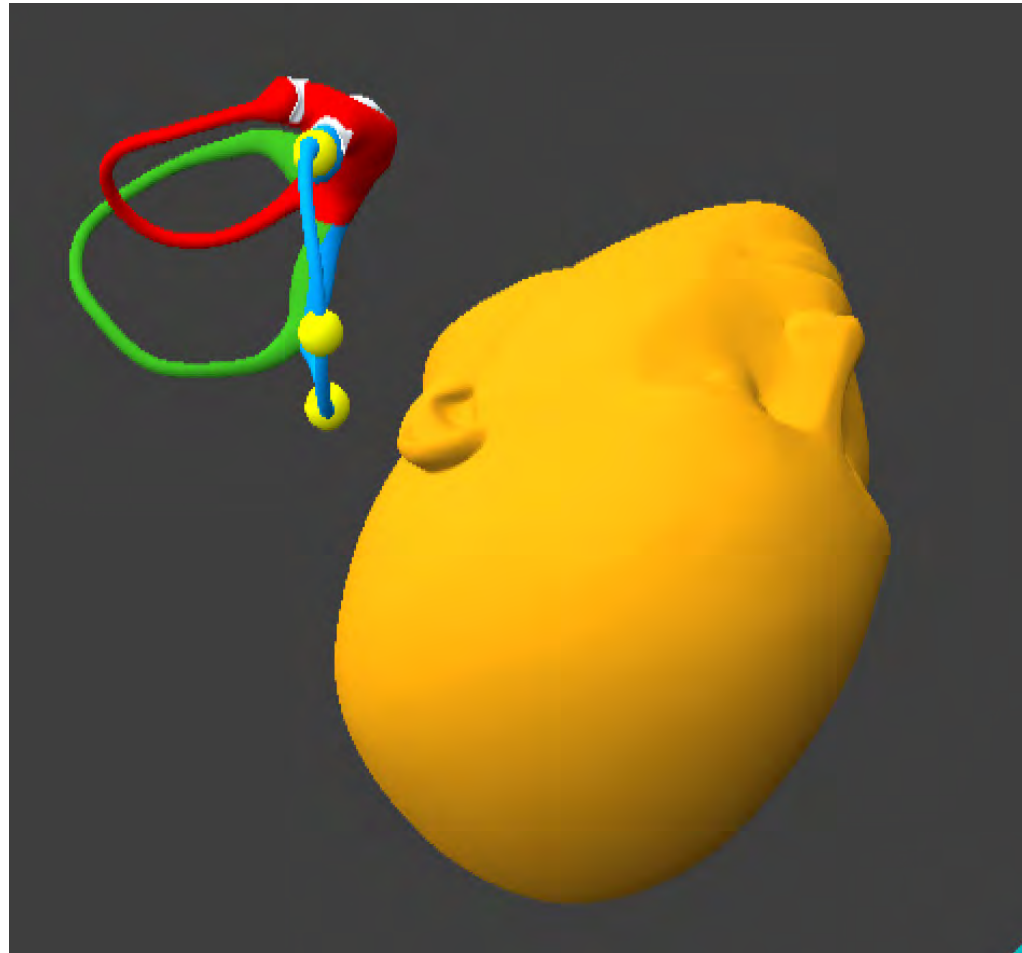


Must know
side.

Deep
head hang
necessary

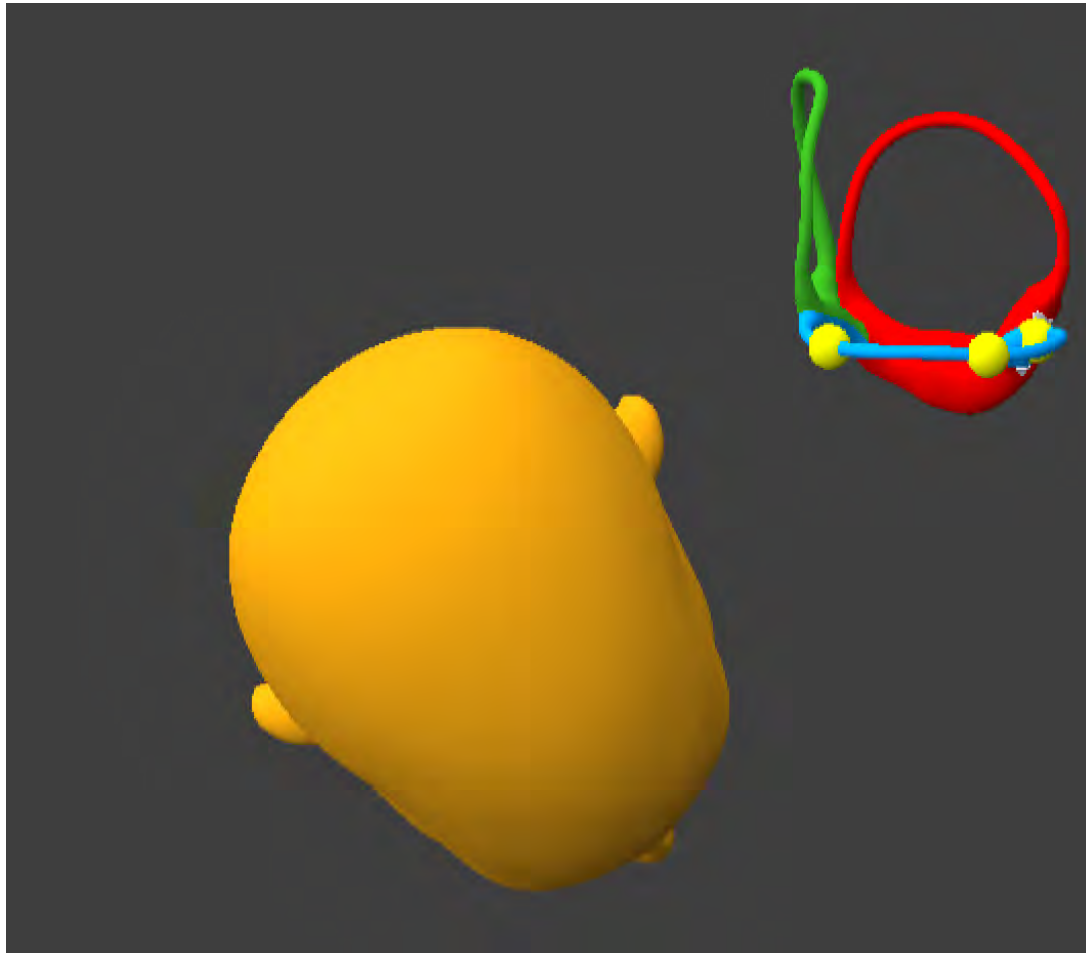
Treatment of Anterior Canalithiasis

Standard Epley Maneuver



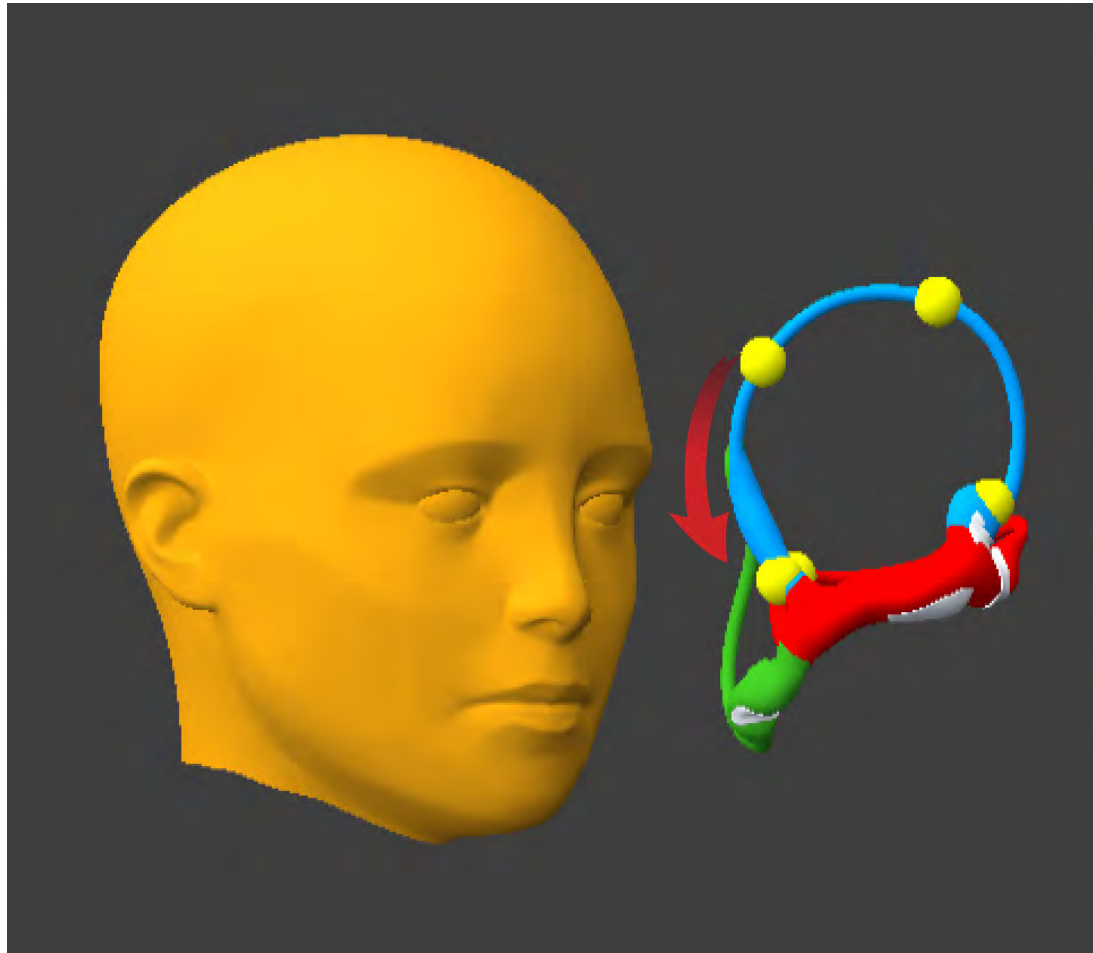
Treatment of Anterior Canalithiasis

Standard Epley Maneuver



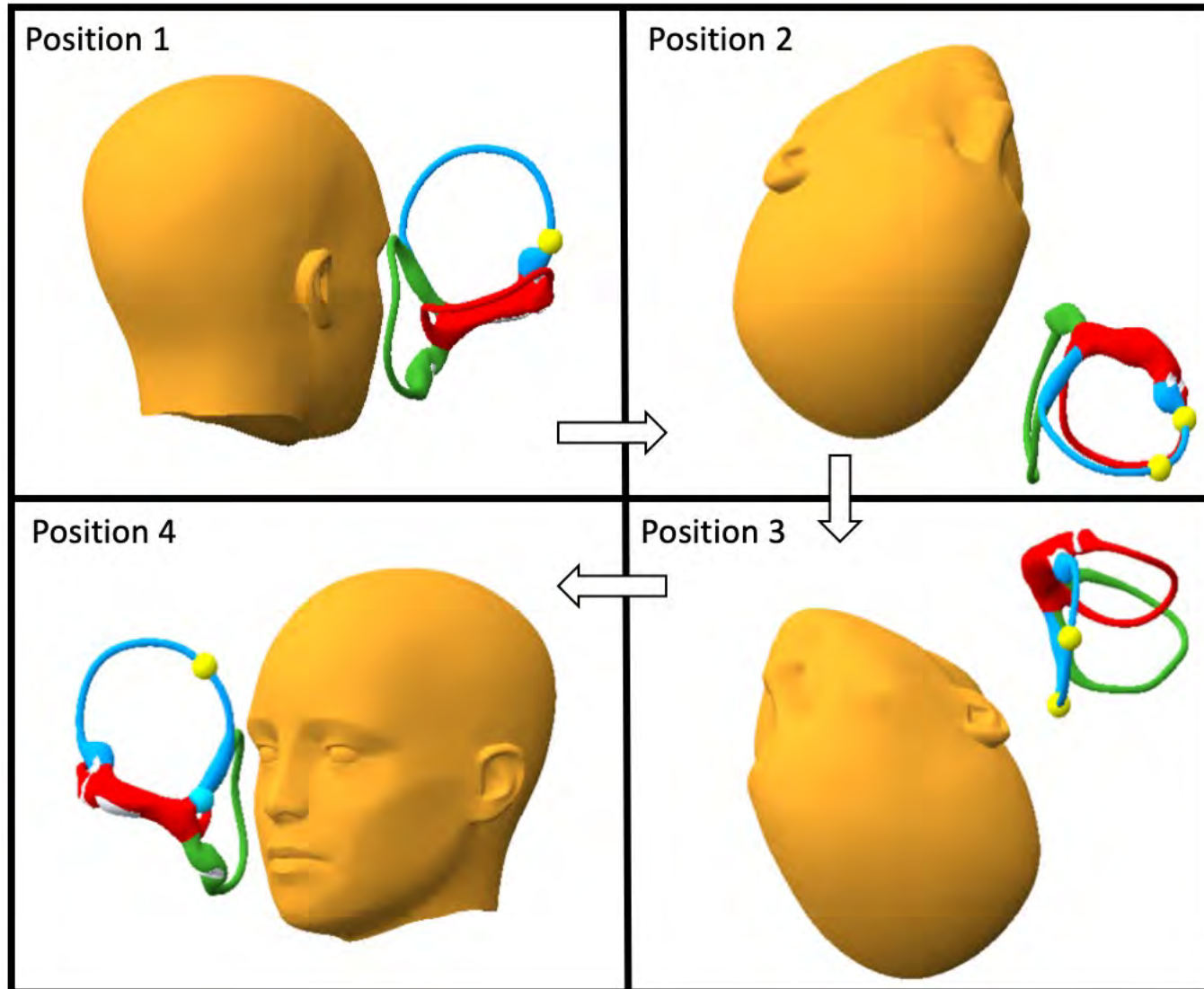
Treatment of Anterior Canalithiasis

Standard Epley Maneuver



Treatment of Anterior Canalithiasis

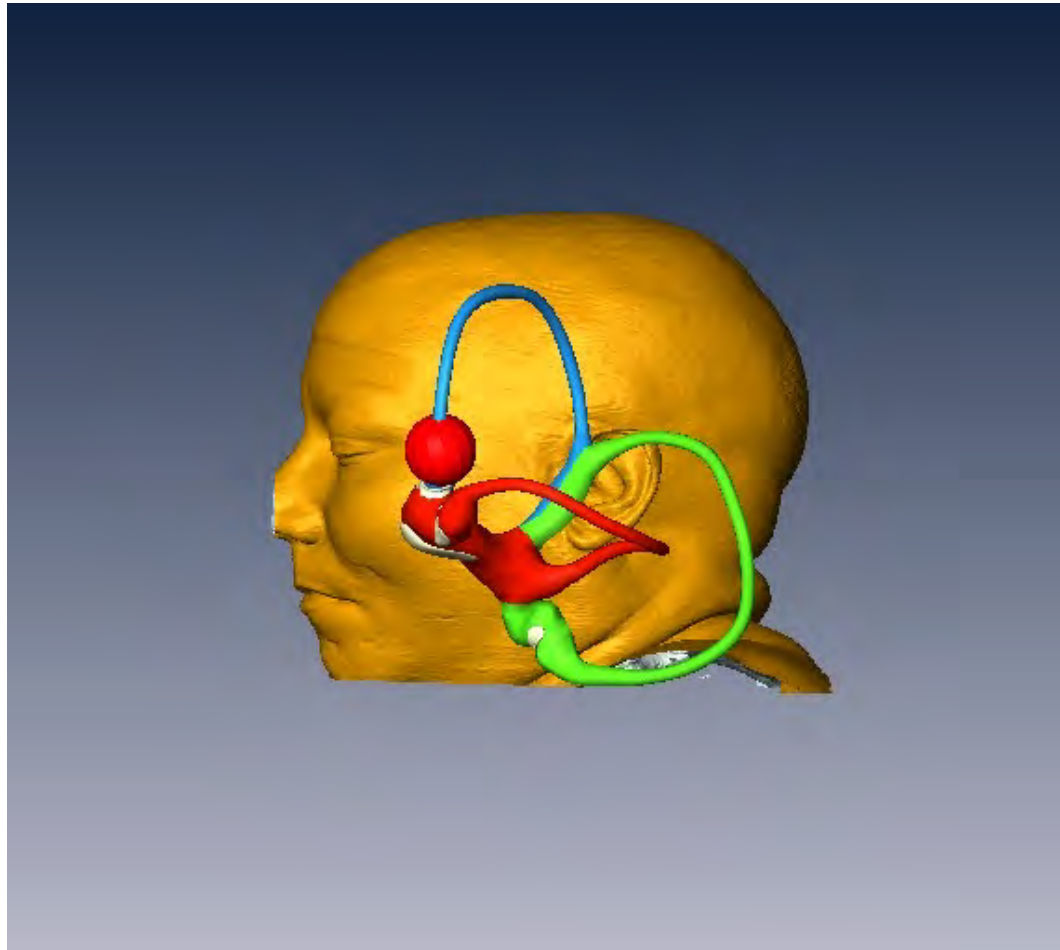
Short CRP Maneuver



D'Albora, Teixido, et al. Short CRP for Anterior Canalithiasis: a New Maneuver Based on Simulation with a Biomechanical Model, *Frontiers in Neurology*, 2020

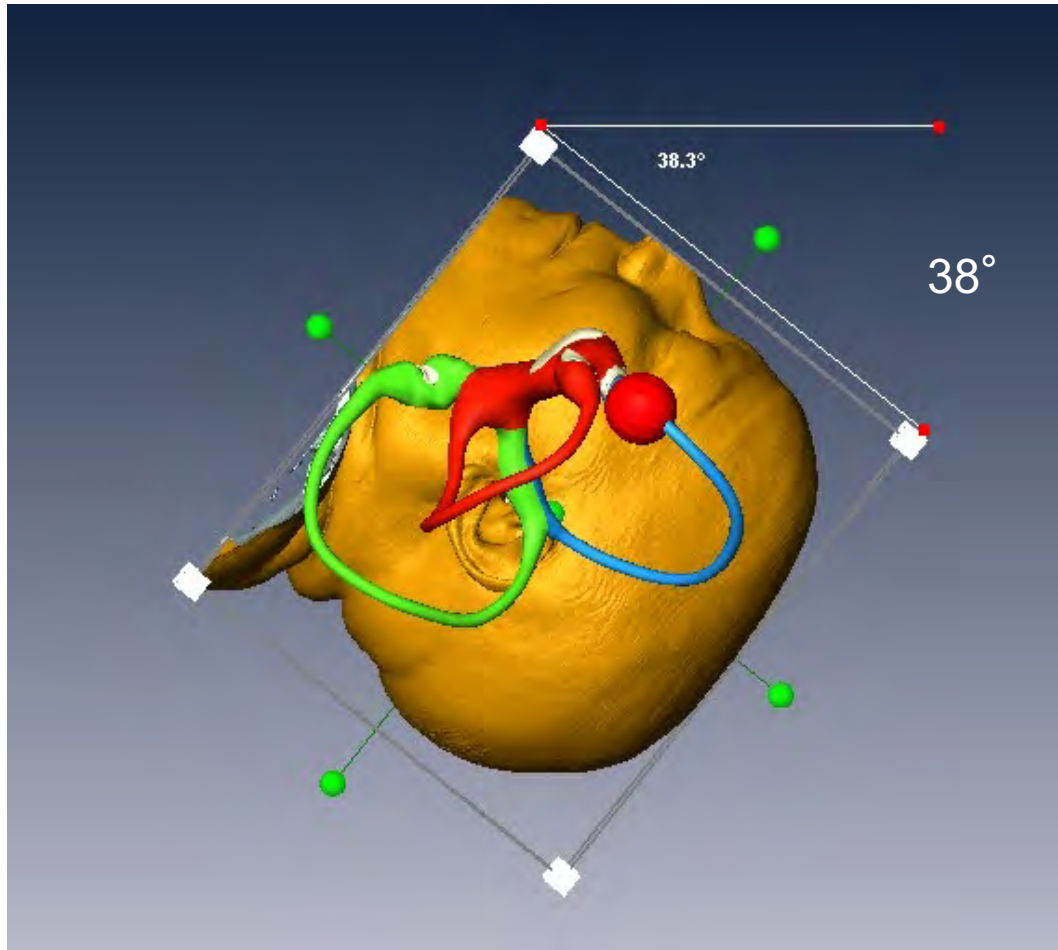
Treatment of Anterior Canalithiasis

Prolonged Forced Position Procedure



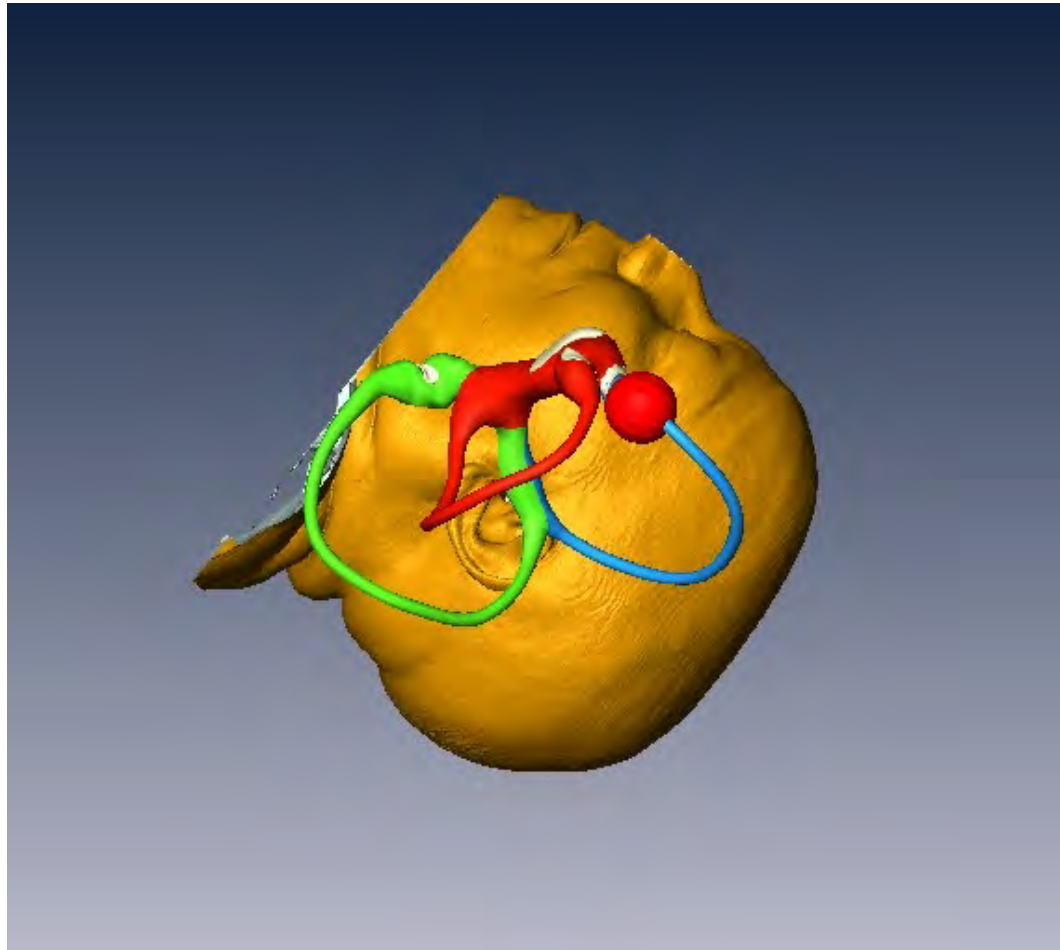
Treatment of Anterior Canalithiasis

Prolonged Forced Position Procedure



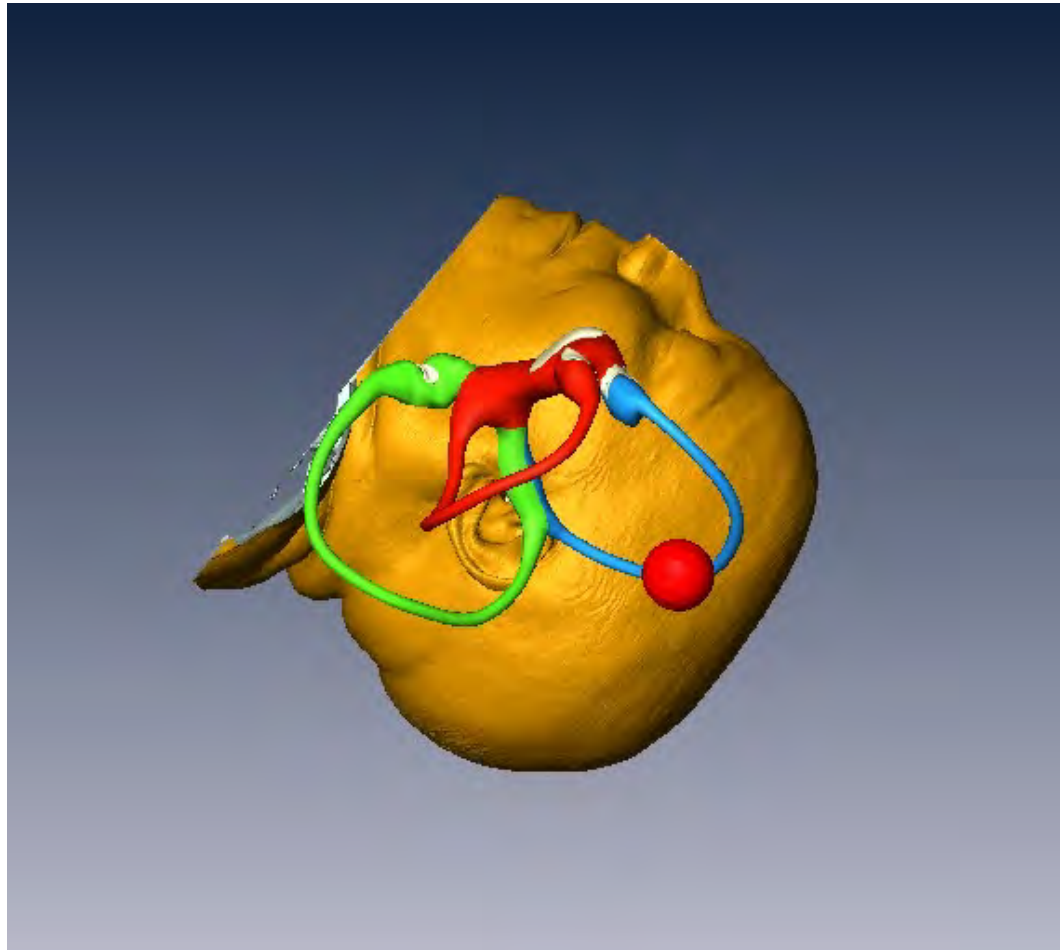
Treatment of Anterior Canalithiasis

Prolonged Forced Position Procedure



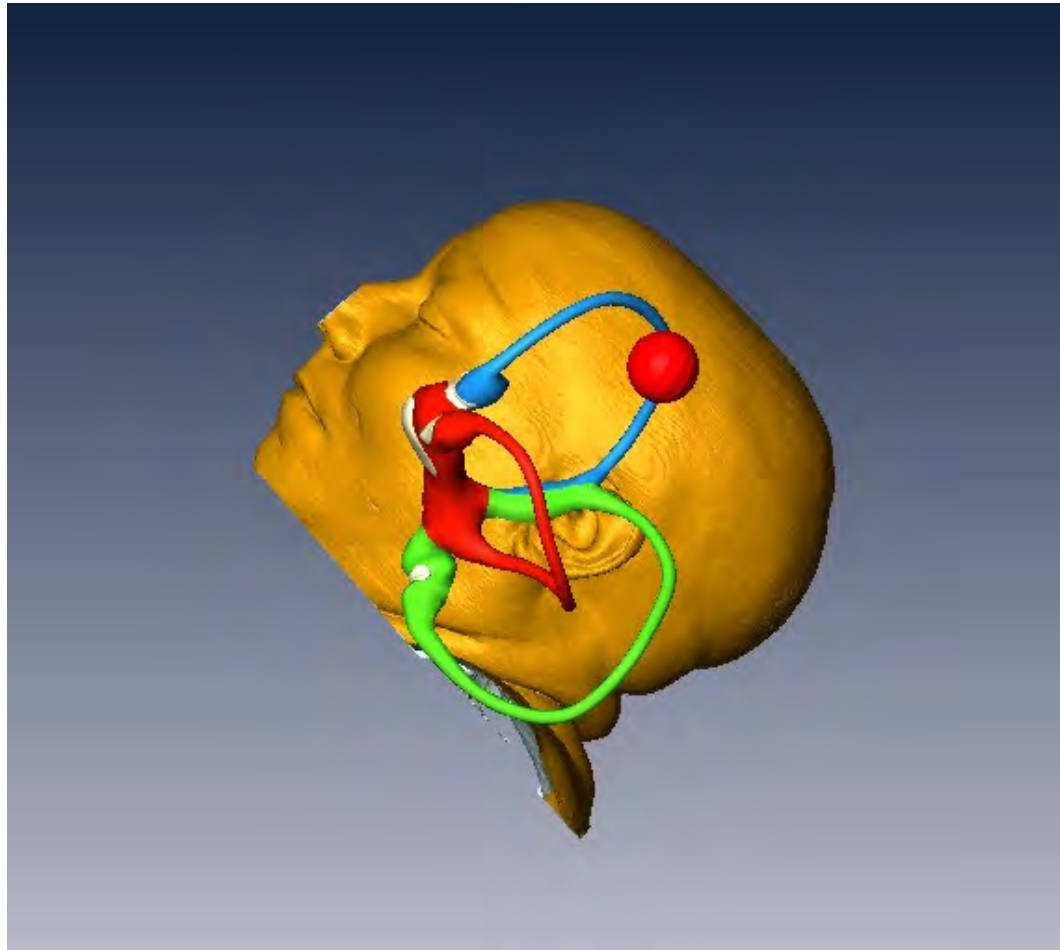
Treatment of Anterior Canalithiasis

Prolonged Forced Position Procedure



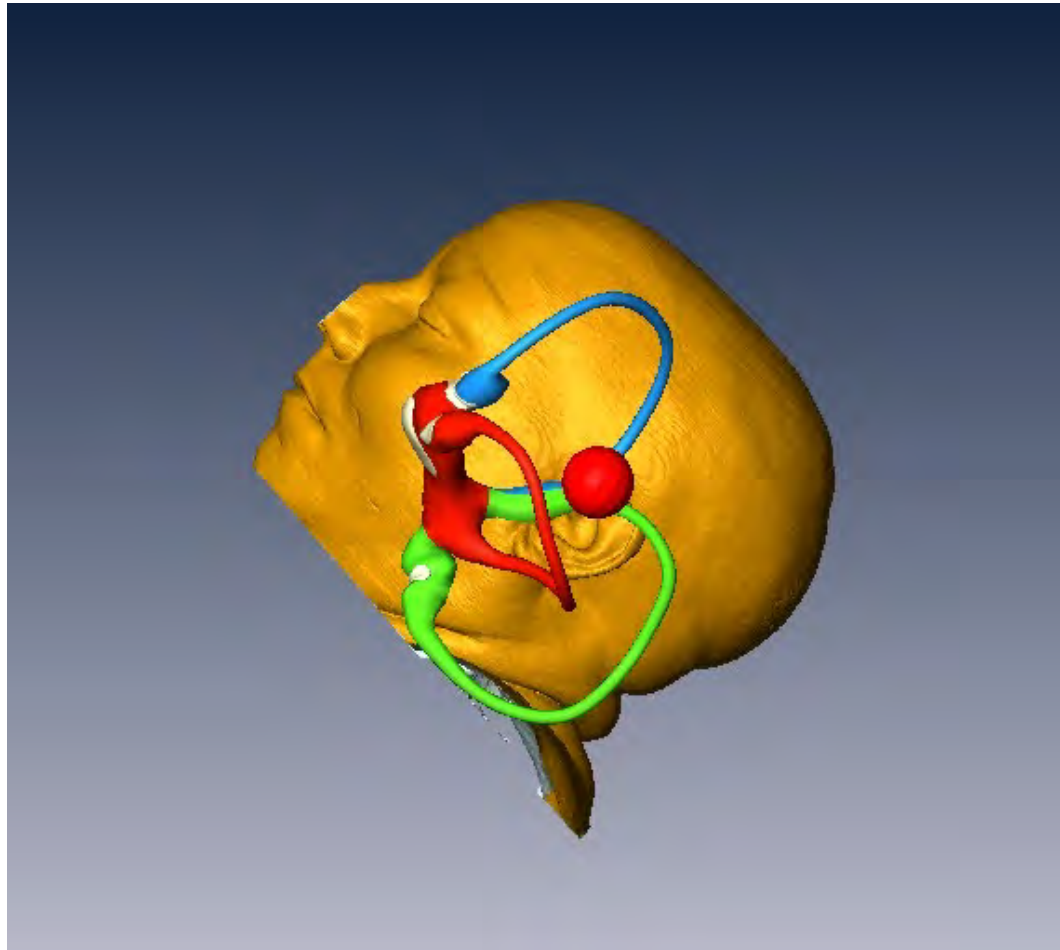
Treatment of Anterior Canalithiasis

Prolonged Forced Position Procedure



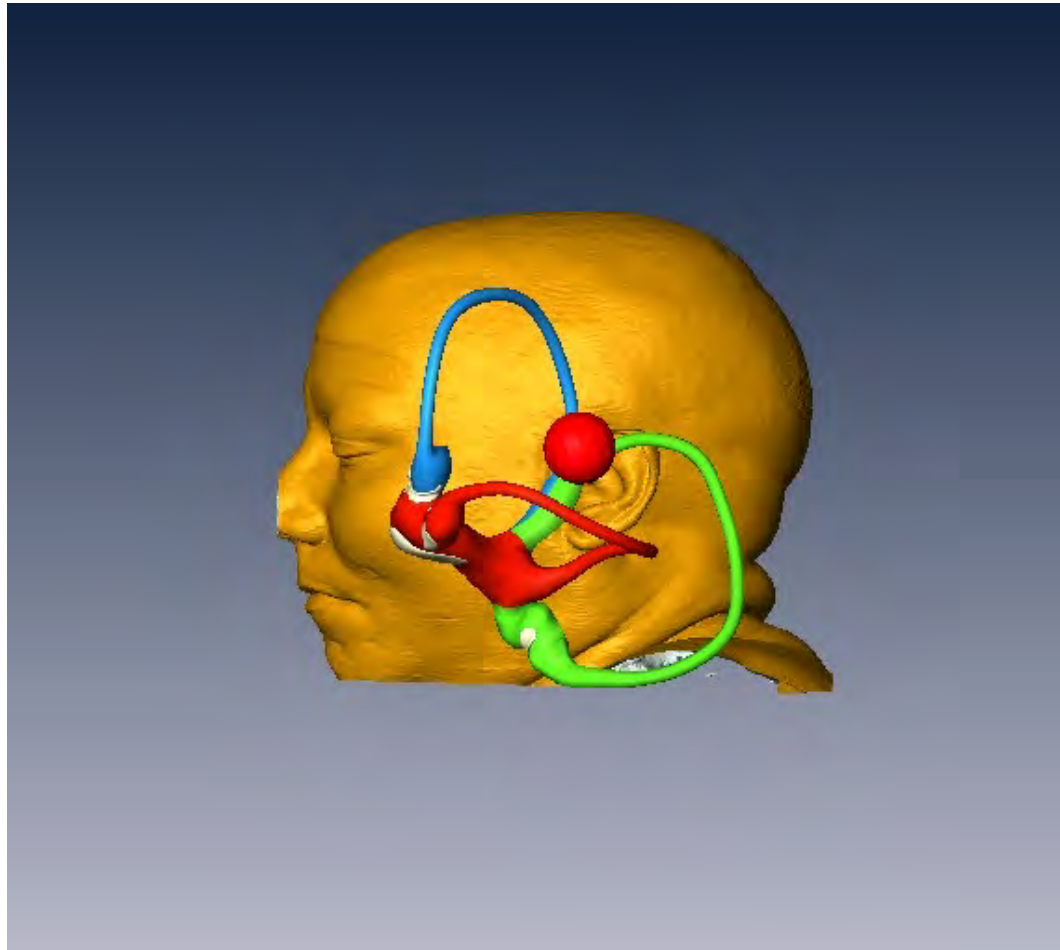
Treatment of Anterior Canalithiasis

Prolonged Forced Position Procedure



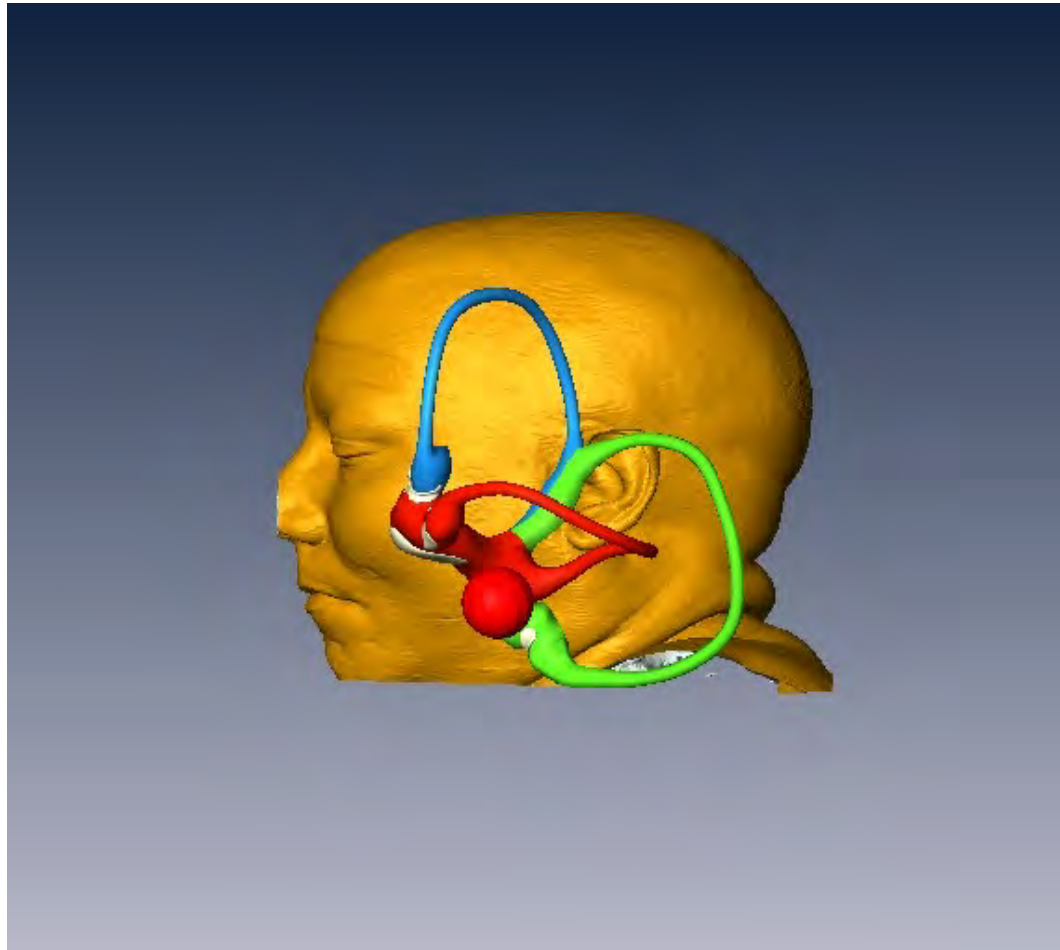
Treatment of Anterior Canalithiasis

Prolonged Forced Position Procedure



Treatment of Anterior Canalithiasis

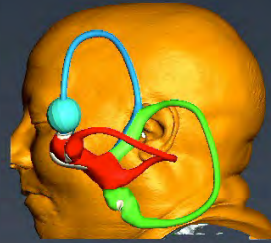
Prolonged Forced Position Procedure



Treatment of Anterior Canalithiasis

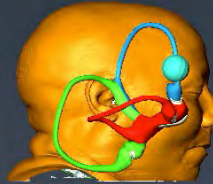
Shortened Forced Position Procedure

*3 min each position. Short **Yacovino** Works for both sides.*



Treatment of Anterior Canalithiasis

360° Head over Toes Rotation



Treatment of Anterior Canalithiasis

DEEP Brandt-Daroff Exercises



Treatment of Lateral Cupulolithiasis

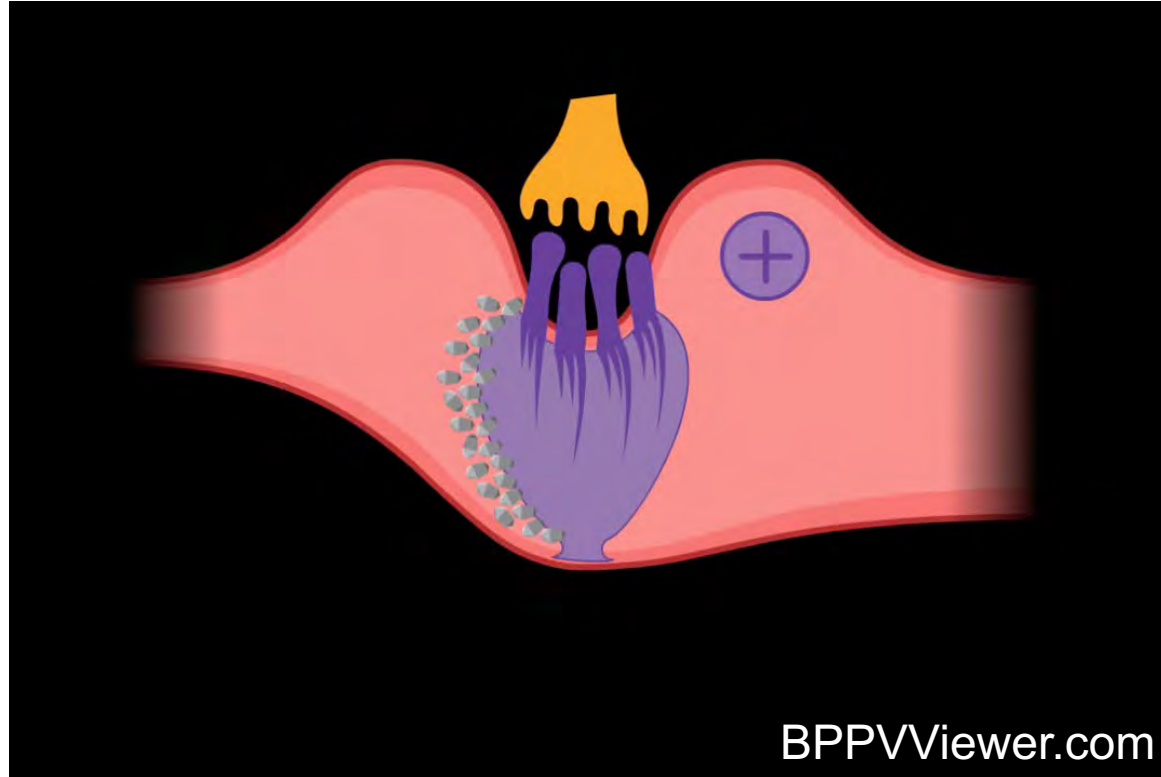
- Gufoni/Appiani maneuver
- Head-tilt hopping exercise
 - [Eur Arch Otorhinolaryngol](#). 2014 Dec;271(12):3155-60.
- Side Lying Vibration
- Side Lying Semont L-R-L-R....
- Headshake + Brandt-Daroff
- Cupulolith repositioning maneuver
 - [Kim et al, Auris Nasus Larynx Volume 39, Issue 2](#), April 2012
- Zuma Maneuver

Head Tilt Hopping Exercise for Lateral Cupulolithiasis



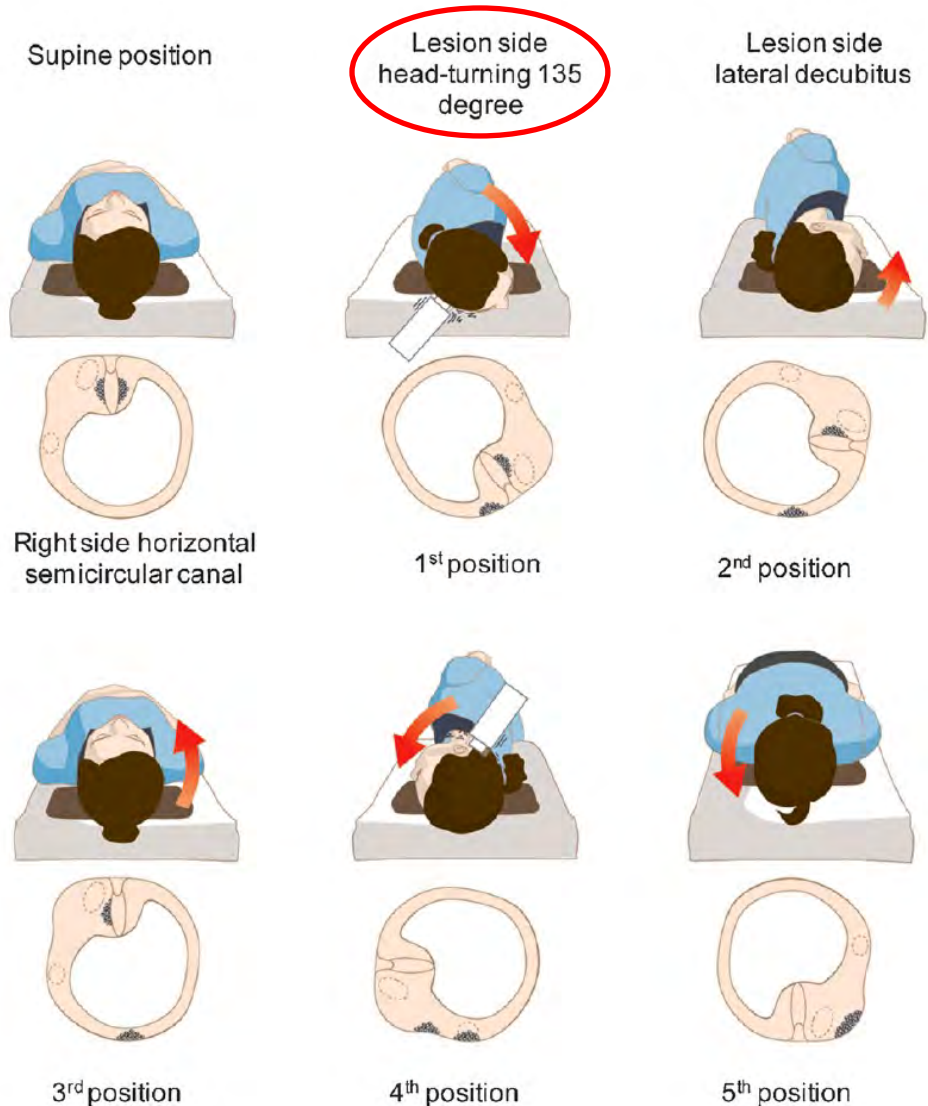
- 20 hops on each side
- 5 times daily

Treatment of all Cupulolithiasis

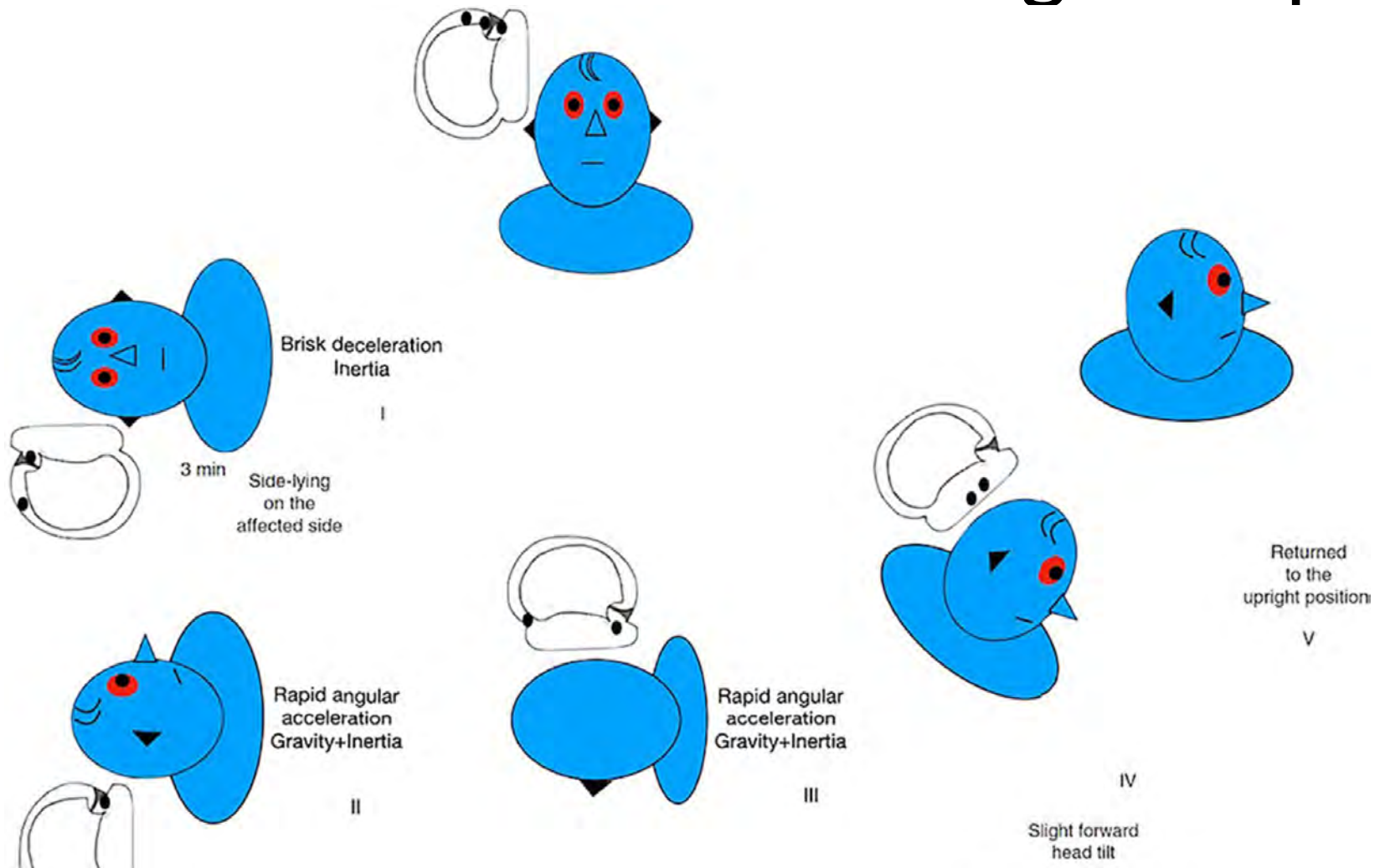


Head shake in the plane of the canal *or* head vibration followed by any of these treatments or by Brandt-Daroff exercises

Cupulolith Repositioning Maneuver



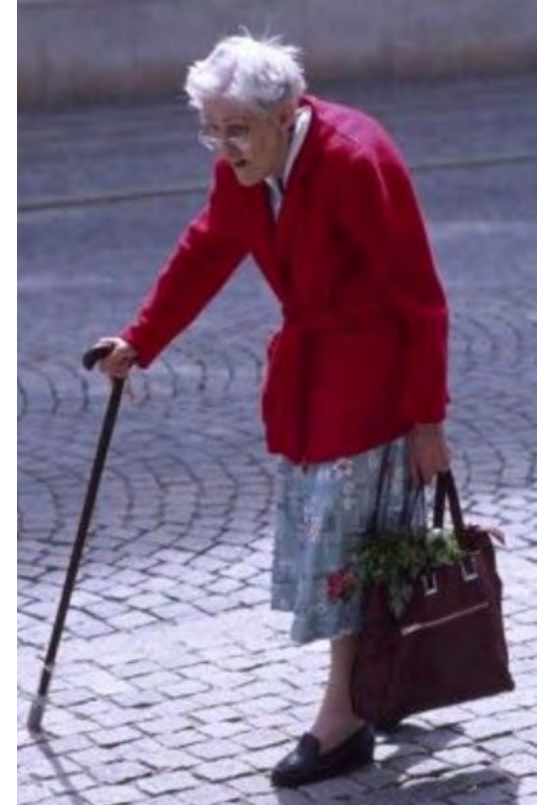
Zuma Maneuver for all Ageotropic



Zuma e Maia F. New treatment strategy for apogeotropic horizontal canal benign paroxysmal positional vertigo. *Audiol Res.* (2016) 6:163. doi: 10.4081/audiores.2016.163

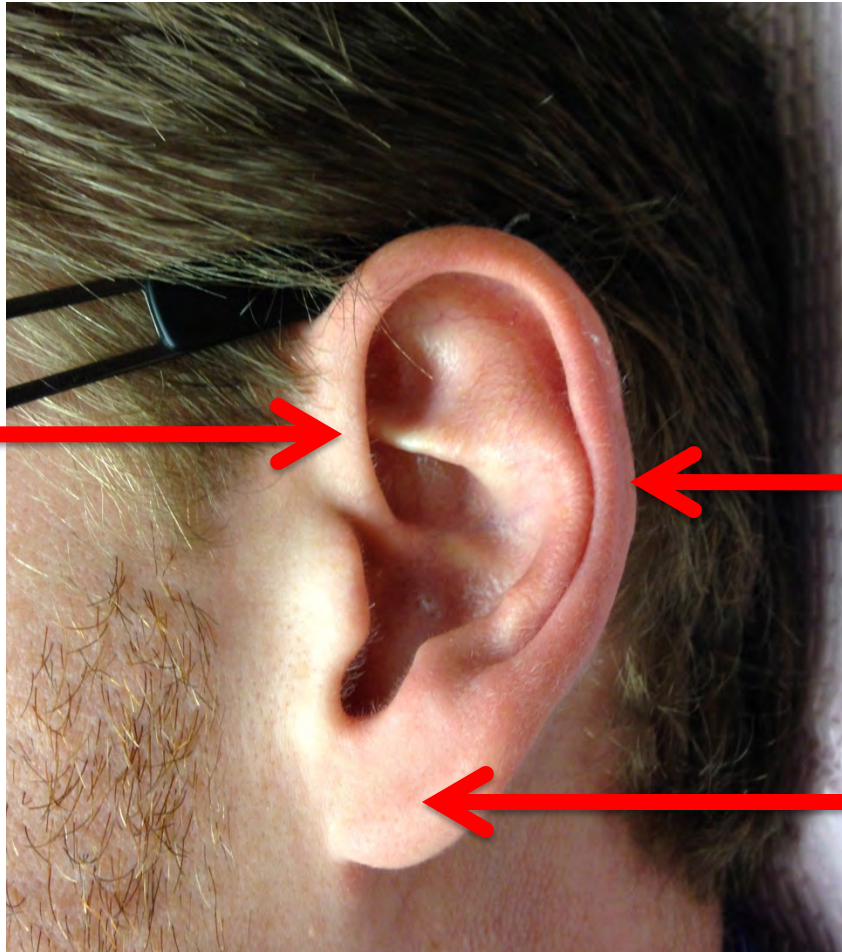
The most difficult patients

- Multi-canal
- Persistently recurrent disease
 - home maintenance
- Limited mobility
- BPPV without nystagmus
- Symptom avoiders
- Extreme symptom intensity
- Cupulolithiasis
- Many need maintenance therapy
- Need for surgery is rare



A Simple Model for Posterior Canalithiasis

Model for Posterior Canalithiasis

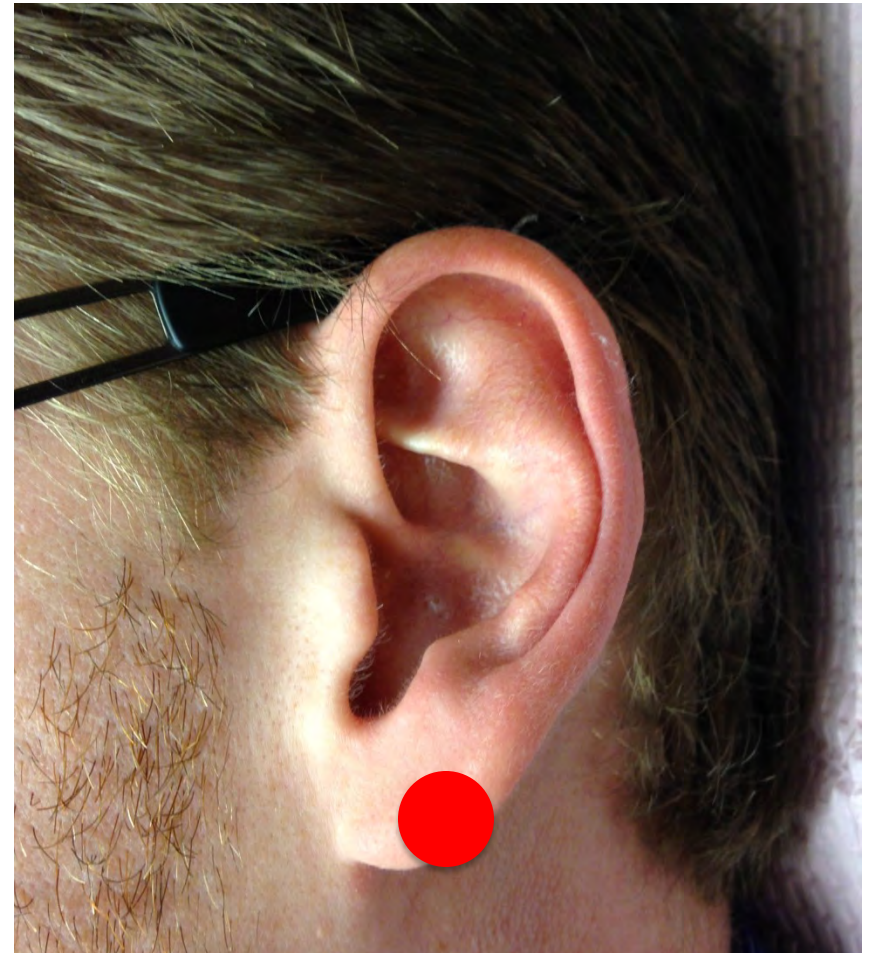
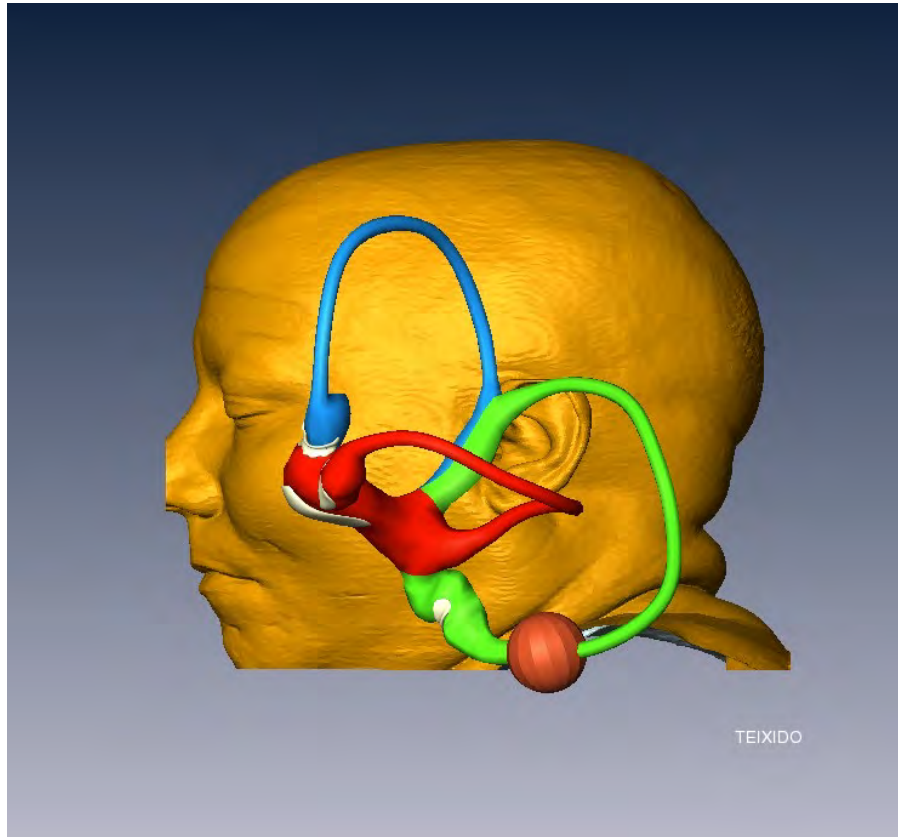


Common crus

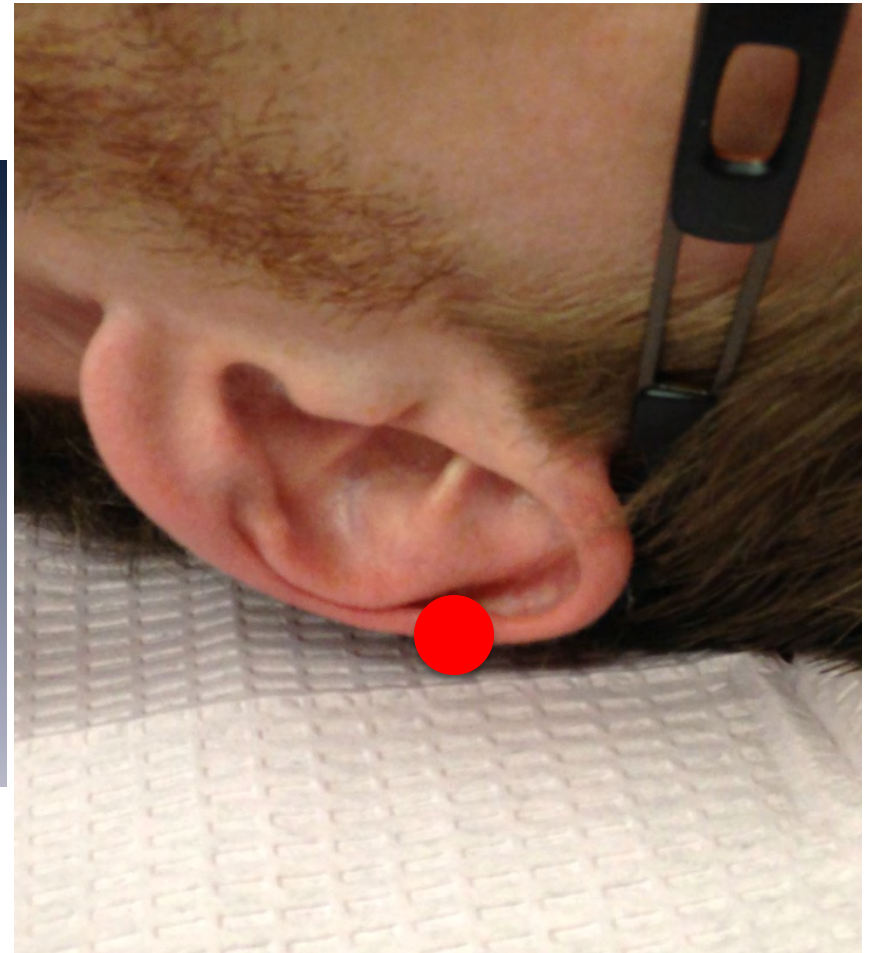
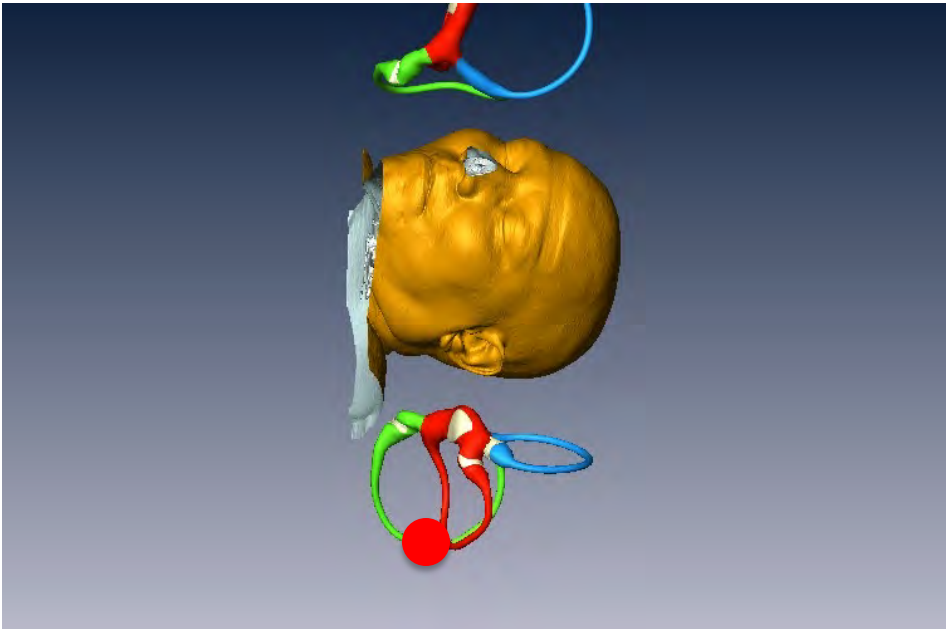
Long arm

Ampulla

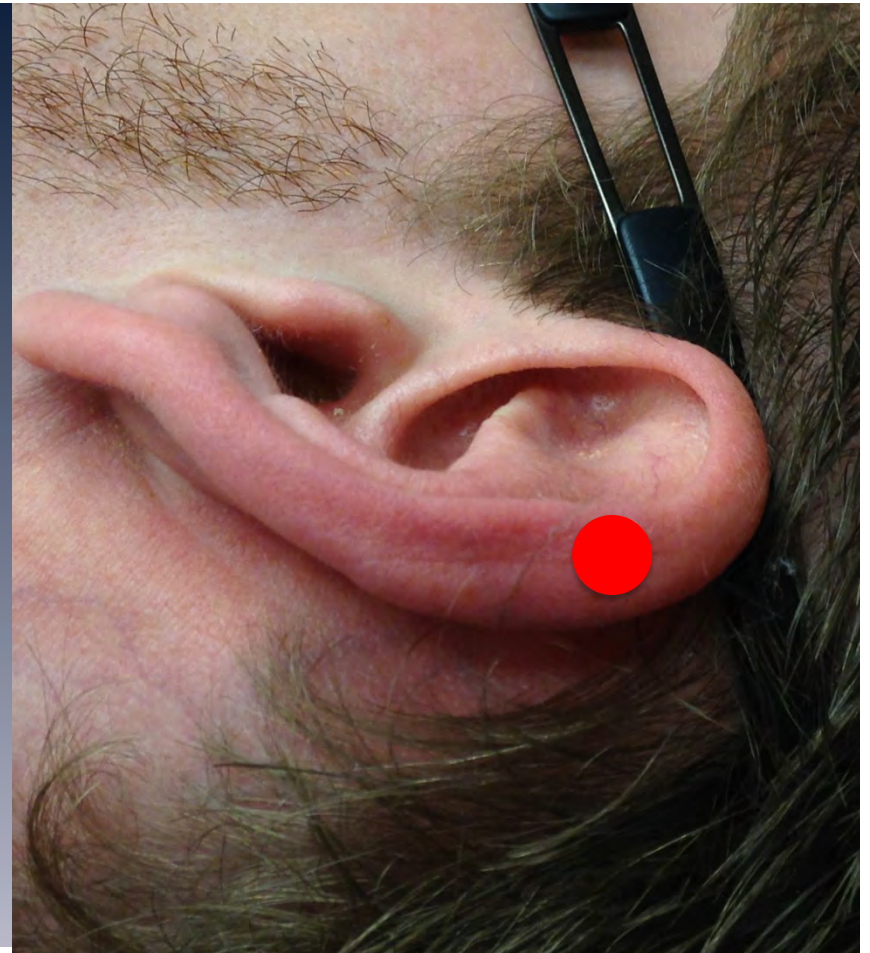
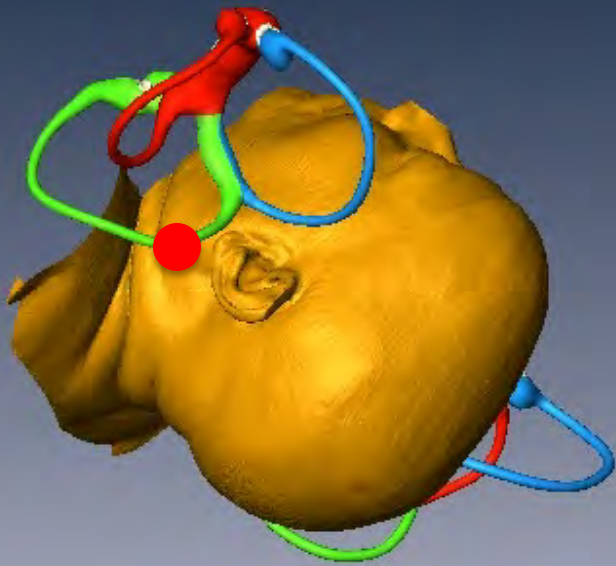
Epley – Upright position



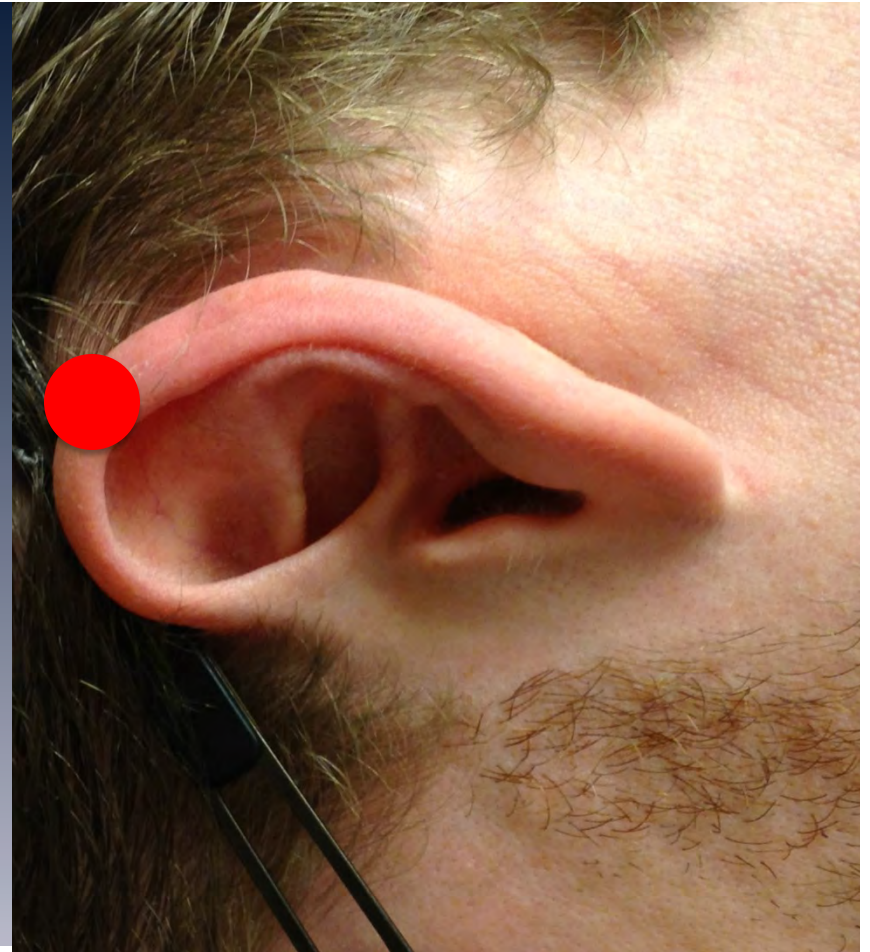
Epley – Position 1



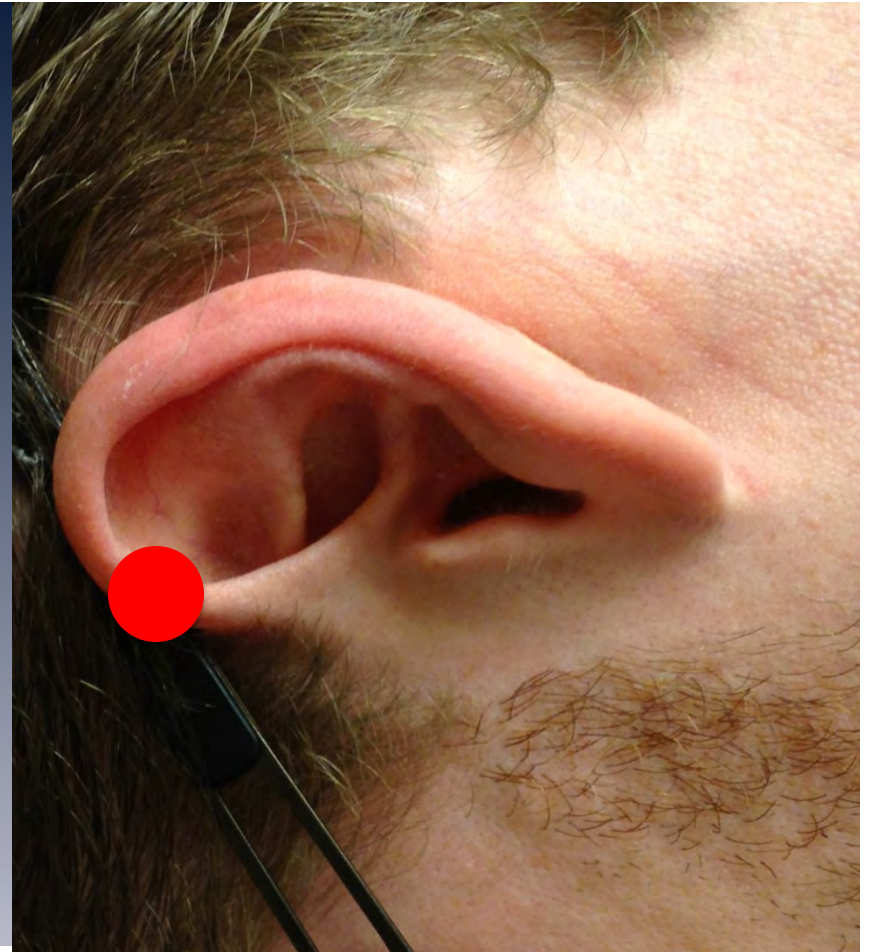
Epley – Position 2



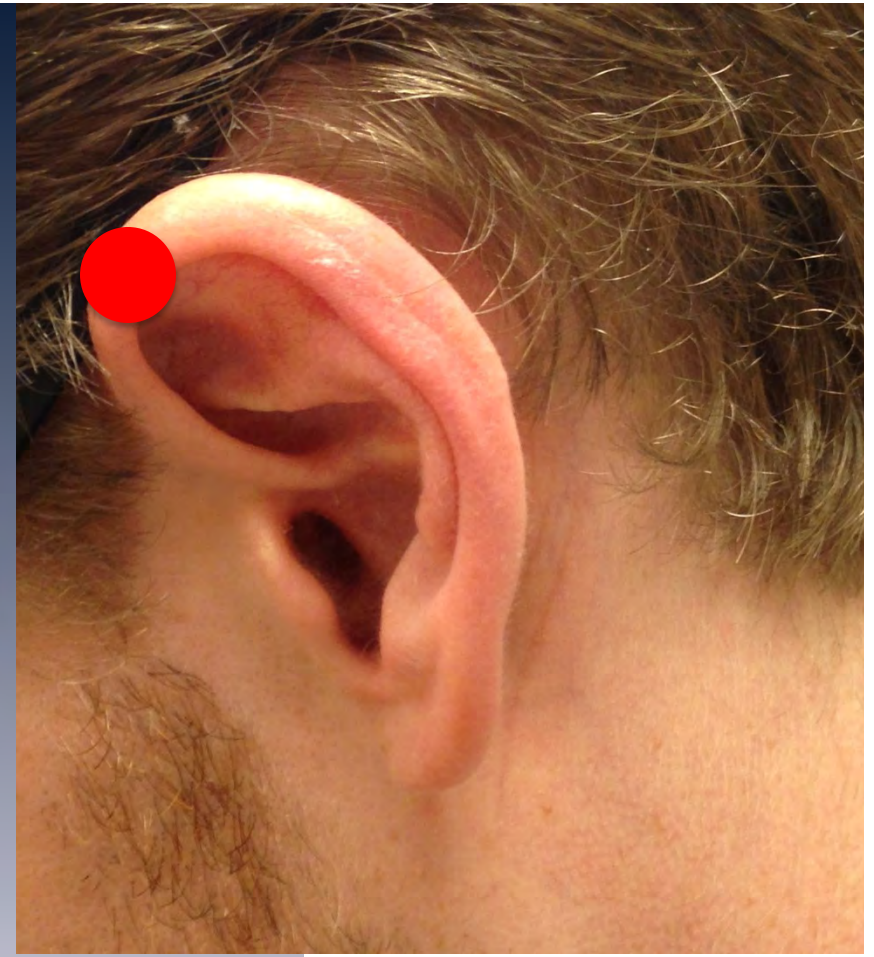
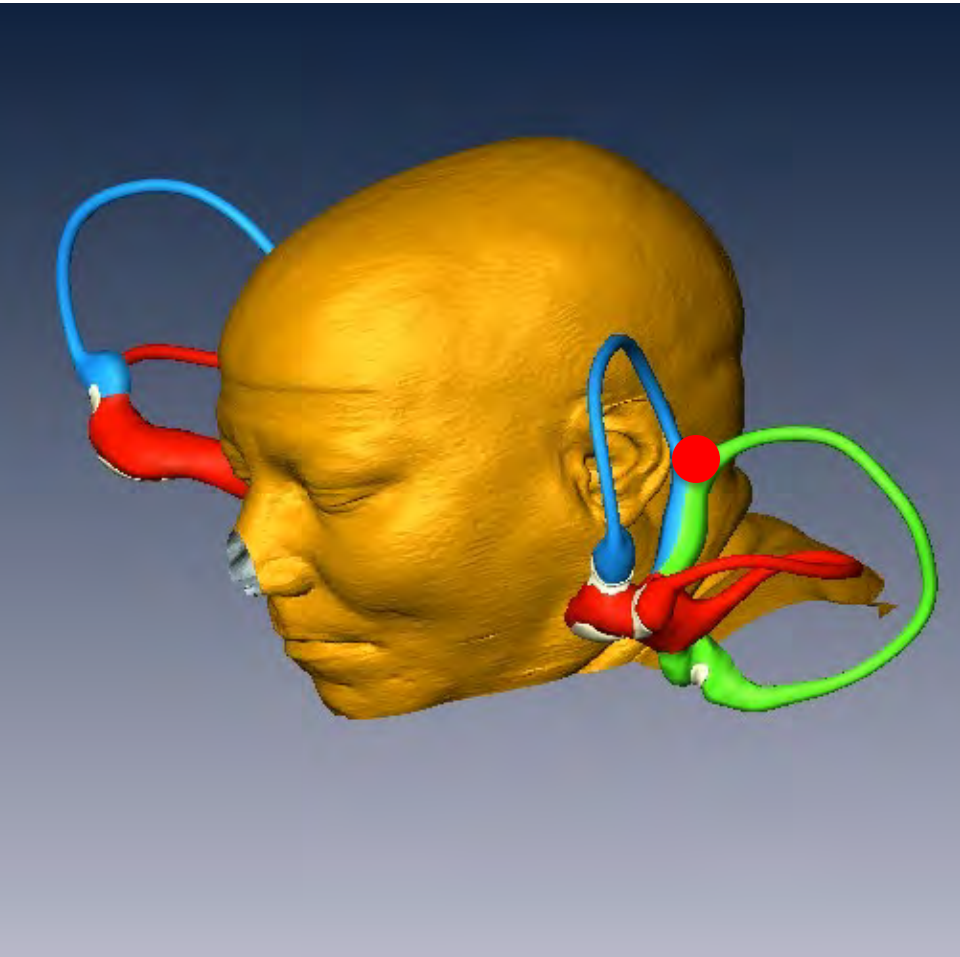
Epley – Position 3



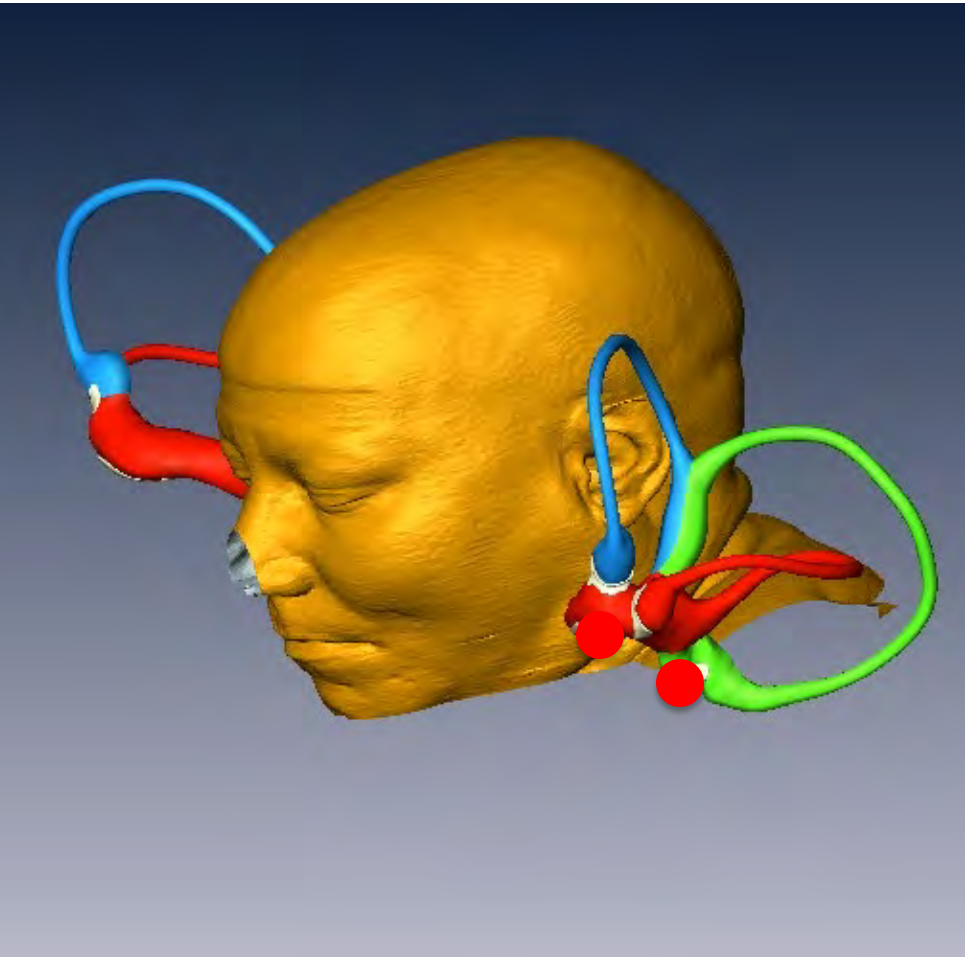
Epley – Position 3



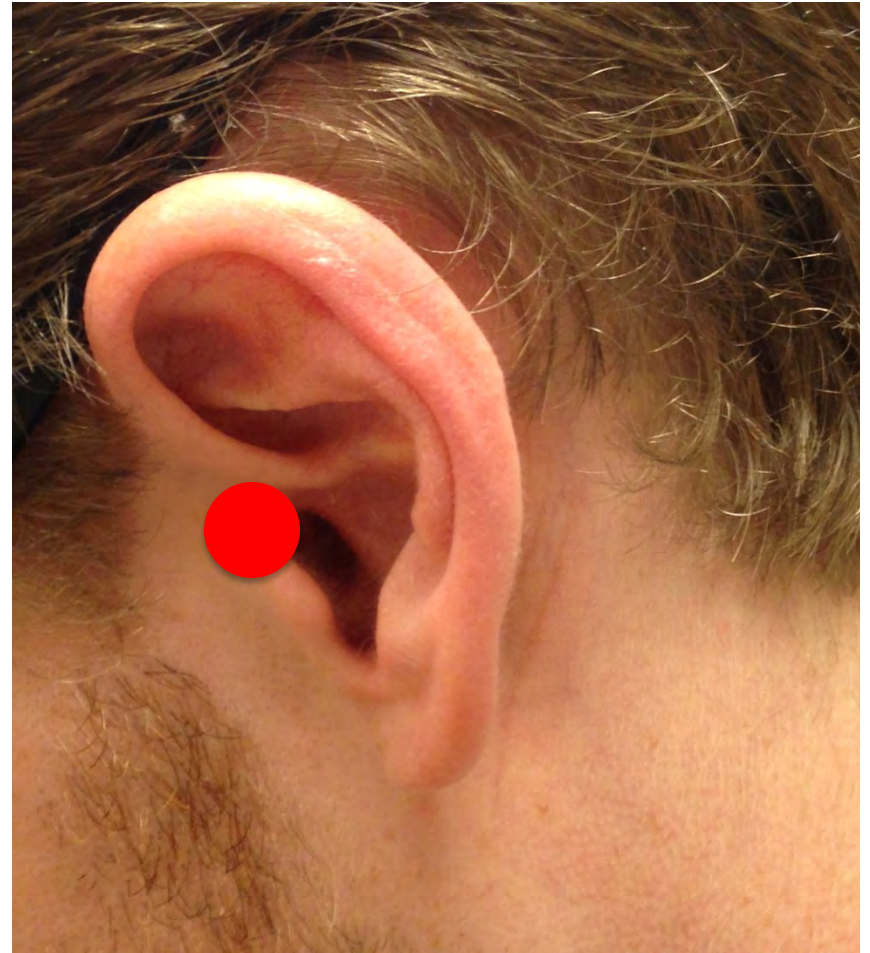
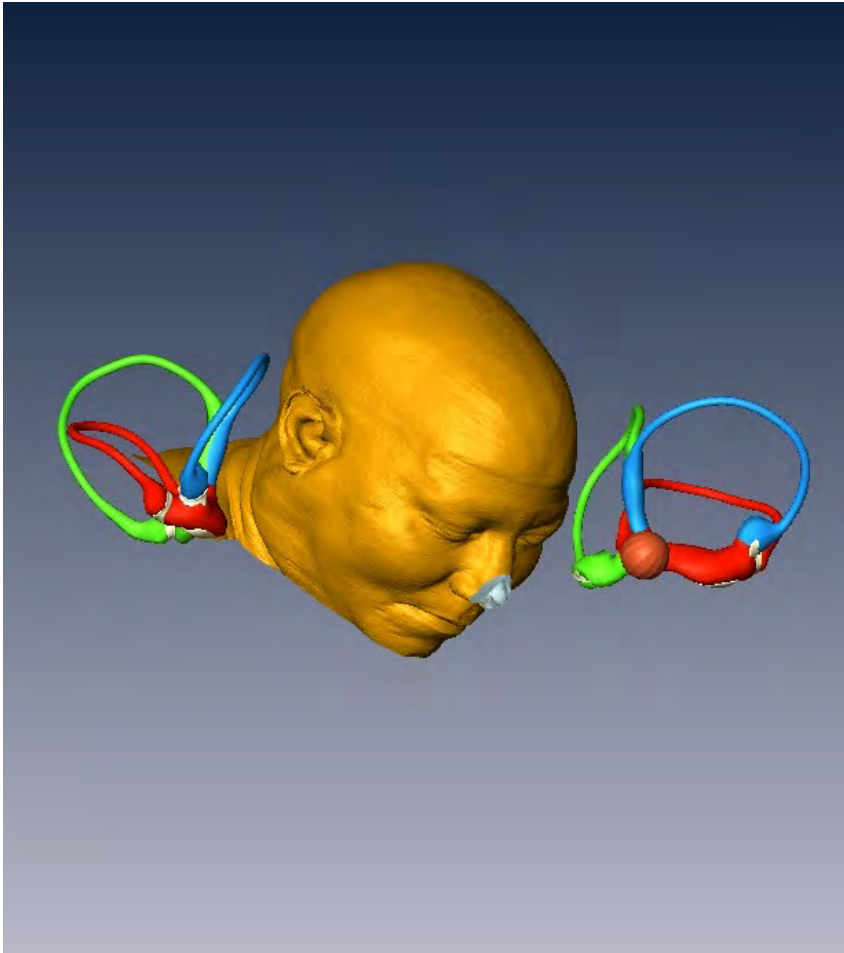
Epley – Position 4



Epley – Completion



Epley - Completion



Quiz - Question 1

- A patient in the right Dix-Hallpike position has geotropic rotary and upbeating nystagmus
- You notice a strong left-beating lateral component as well

Pt. moves to
Right DH
position first



Audio OFF

WHAT CANALS ARE INVOLVED?

HOW WOULD YOU TREAT THIS PATIENT?

Quiz- Answer 1

- Right posterior canalithiasis and Probable R Lateral cupulolithiasis
- Reasonable assumption based on ipsilateral posterior canalithiasis
- Test the hypothesis
 - Time course prolonged
 - Direction-ageotropic
 - Supine roll to determine side/ find null point
- Treat with CRP then Brandt-Daroff preceded by head shake

Quiz – Question 2

(True or False)

- To perform a successful “Log Roll” Repositioning Maneuver for lateral canal BPPV, we need to know which side is affected.

Quiz – Answer 2

TRUE

Quiz – Question 3

(True or False)

- In the case of bilateral lateral canalithiasis, the stimuli from each side may cancel out and produce no nystagmus.

Quiz – Answer 3

FALSE

The intensity of the nystagmus will be additive!

Quiz – Question 4

- Are Brandt-Daroff exercises effective for the treatment of:

–Posterior canalithiasis?

YES

–Anterior canalithiasis?

YES, deep

–Lateral canalithiasis?

YES, lateral
position

–Cupulolithiasis?

Yes, with vibration

or headshake

Quiz – Question 5

- Is the CRP effective for the treatment of:
 - Posterior canalithiasis? **YES**
 - Anterior canalithiasis? **YES,** deep
 - Lateral canalithiasis? **YES,** with extra 90
 - Cupulolithiasis? **No**

Quiz – Question 6

Which treatment offers the fastest complete relief for patients with BPPV?

- Home exercises
- In office repositioning
- In office repositioning followed by home exercises
- Habituation therapy

Quiz – Question 7

What is the easiest way to read eye movements in patients with otolith disease?

- Remember COWS and the polarity of the cristae
- Remember the extraocular muscles that respond to each crista pair
- Remember that the eyes drift in the direction of the otolith movement

Thanks

Delaware Biotechnology Institute:

Kanik Sem

Karl V. Steiner

Patrick Coller

Robert Forstrom

Doug O' Neal

Praveen Thiagarajan

Christiana Care Health Systems:

Brian Little

Temporal Bone Foundation:

Rindy Northrop

Fellows

Brian Kung

Peter Seymour

Omar Sabra

Sabbir Khan

Owen Woods

Henri Traboulsi

This project was supported by NIH Grant Number
2 P20 RR016472-04 under the INBRE Program of the National Center for
Research Resources.

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