

# VIIP 2017 Clinical Update

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# Disclosure Information

*88<sup>th</sup> Annual Scientific Meeting*

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I have no financial relationships to disclose.

I will not discuss off-label use and/or investigational use  
in my presentation.



# Spaceflight Associated Neuro-ocular Syndrome (SANS)





# BACKGROUND

- 50 ISS expedition missions have been completed (since 2000)
- Sentinel case occurred in 2005
  - Optic disc edema and cotton wool spot
- Surveillance/medical data collection is ongoing and has evolved
  - Began *some* “VIIP” related testing in 2008 (w/ Exp 18)
  - Inconsistent testing until Feb 2010 (Exp 23) when standardized medical monitoring (i.e., “Eye MED B”) came into effect
- Initial eye/vision testing capability on ISS
  - Ophthalmoscope (astro-physicians only)
  - Paper VA chart
  - Amsler grid
- Eye testing was done pre- and post-flight





# Medical Surveillance







# Surveillance & Medical Data Collection

## Terrestrially

- 3T MRI – Special “NASA Astronaut” protocol 12-18 months prior to launch
- Visual Threshold Perimetry
- Cycloplegic Refraction

## Terrestrially & On-Orbit

- Vision Exam
  - Distant Vision Acuity (Acuity Pro on laptop)
  - Near Vision Acuity (handheld card)
  - Amsler grid
- Ocular Ultrasound
- Fundoscopy
- Optical Coherence Tomography (OCT)
- Tonometry (when clinically indicated)





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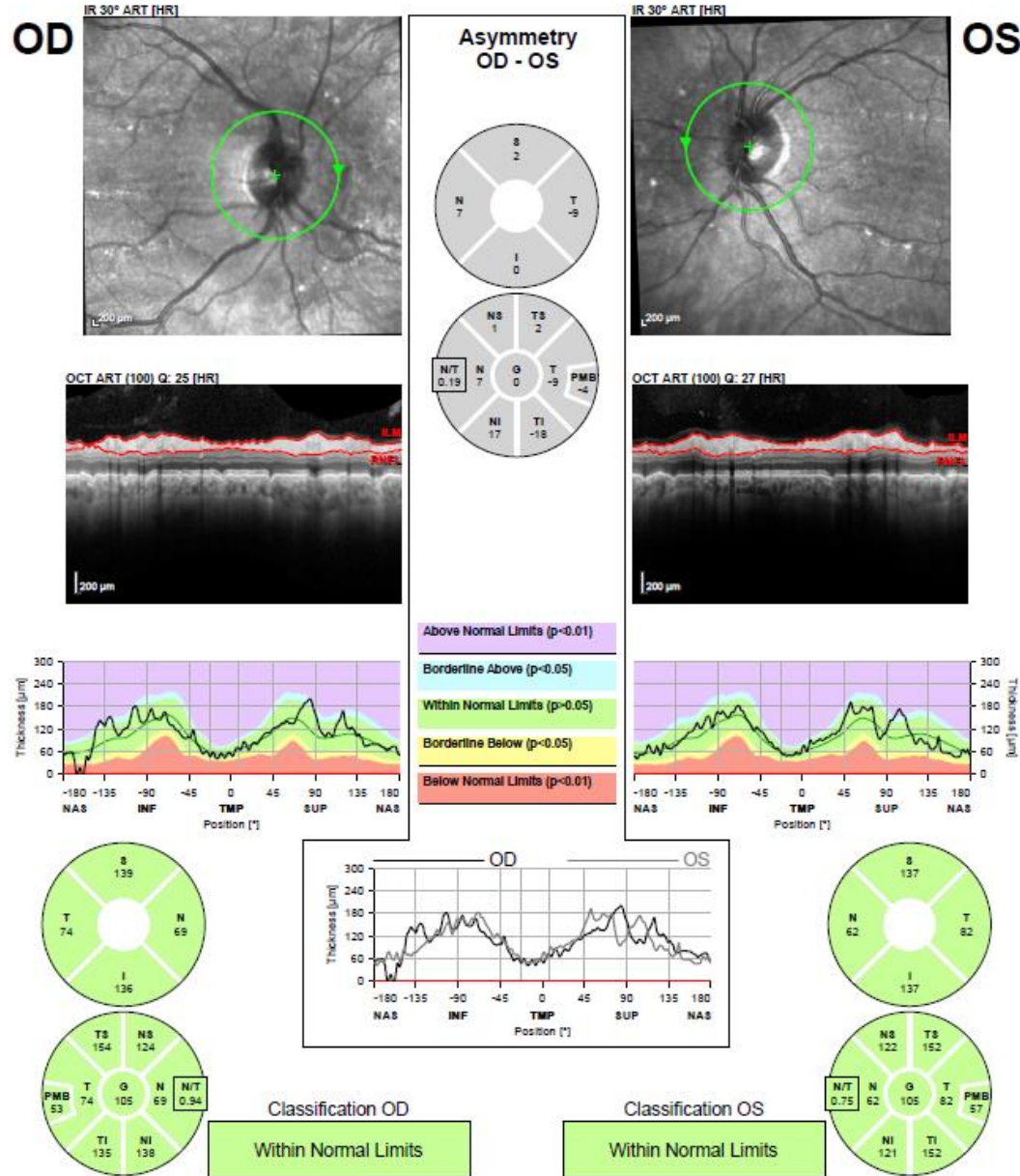
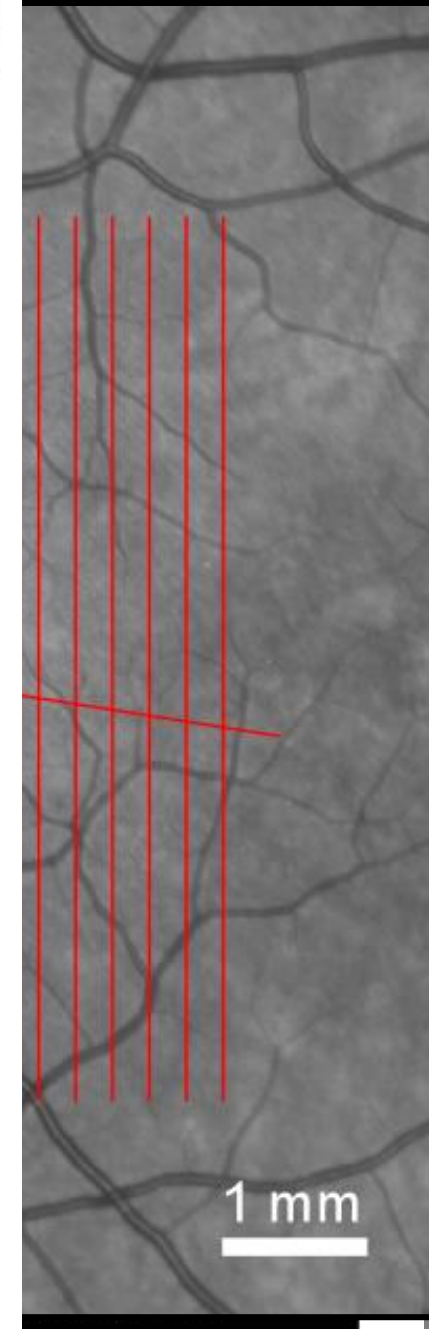
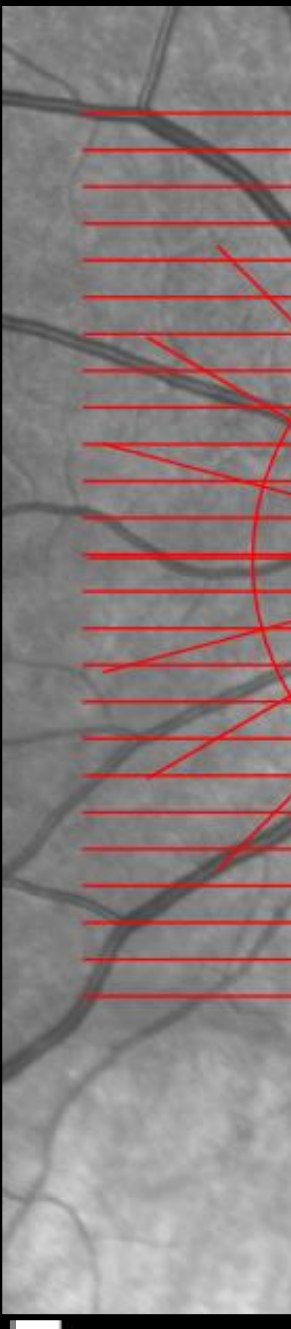






Diagnosis: —

Comment: —



## MRI REPORT TEMPLATE

### THIS SECTION IS FOR JSC USE ONLY

Order Number: [Click here to enter text.](#)

Purpose of Exam: [Choose an item.](#) Mission: [Click here to enter text.](#) Exam Session: [Choose an item.](#)

Annual Year: [Choose an item.](#)

Indications: [Click here to enter text.](#)

Ordering Provider: [Click here to enter text.](#)

Crewmember Name: [Click here to enter text.](#) DOB: [Click here to enter text.](#)

Gender: [Click here to enter text.](#)

Date of Exam: [Click here to enter a date.](#)

Interpreting Physician: [Choose an item.](#) Exam Location: [Choose an item.](#)

Activity Type: [Choose an item.](#)

### Orbit

	Right Eye	Left Eye
Optic Nerve Sheath Diameter	Numeric Entry Diameter (cm)	Numeric Entry Diameter (cm)
	Numeric Entry Percentile	Numeric Entry Percentile
Disc Elevation	<a href="#">Choose an item.</a>	<a href="#">Choose an item.</a>
Globe Flattening	<a href="#">Choose an item.</a>	<a href="#">Choose an item.</a>
ON Tortuosity	<a href="#">Choose an item.</a>	<a href="#">Choose an item.</a>
Incidental Pathology Findings	Comment	

### Brain

	Measurement	Comment
Sella configuration	<a href="#">Choose an item.</a>	Description (Dome, Stalk, Herniation, etc.)
Other CSF space (ventricles, sulci, cisterns)	<a href="#">Choose an item.</a>	<a href="#">Click here to enter text.</a>
Dural Sinuses	Combined Stenosis Score	Description (configuration, side dominance, etc.)
Incidental Pathology Findings, Includes UBOs	Comment:	
Other Deviations and Normal Variants	Comment:	

Impression - Rating: [Choose an item.](#)

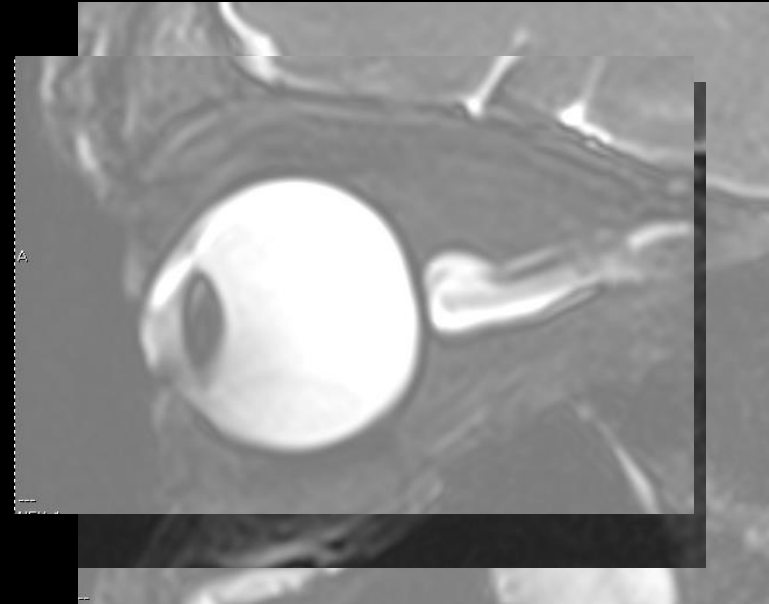
Impression - Comment: [Click here to enter text.](#)

Procedure(s): [Click here to enter text.](#)

Treatment Plan: [Click here to enter text.](#)

Summary of Exam: [Click here to enter text.](#)

# MRI



MRI prior to flight

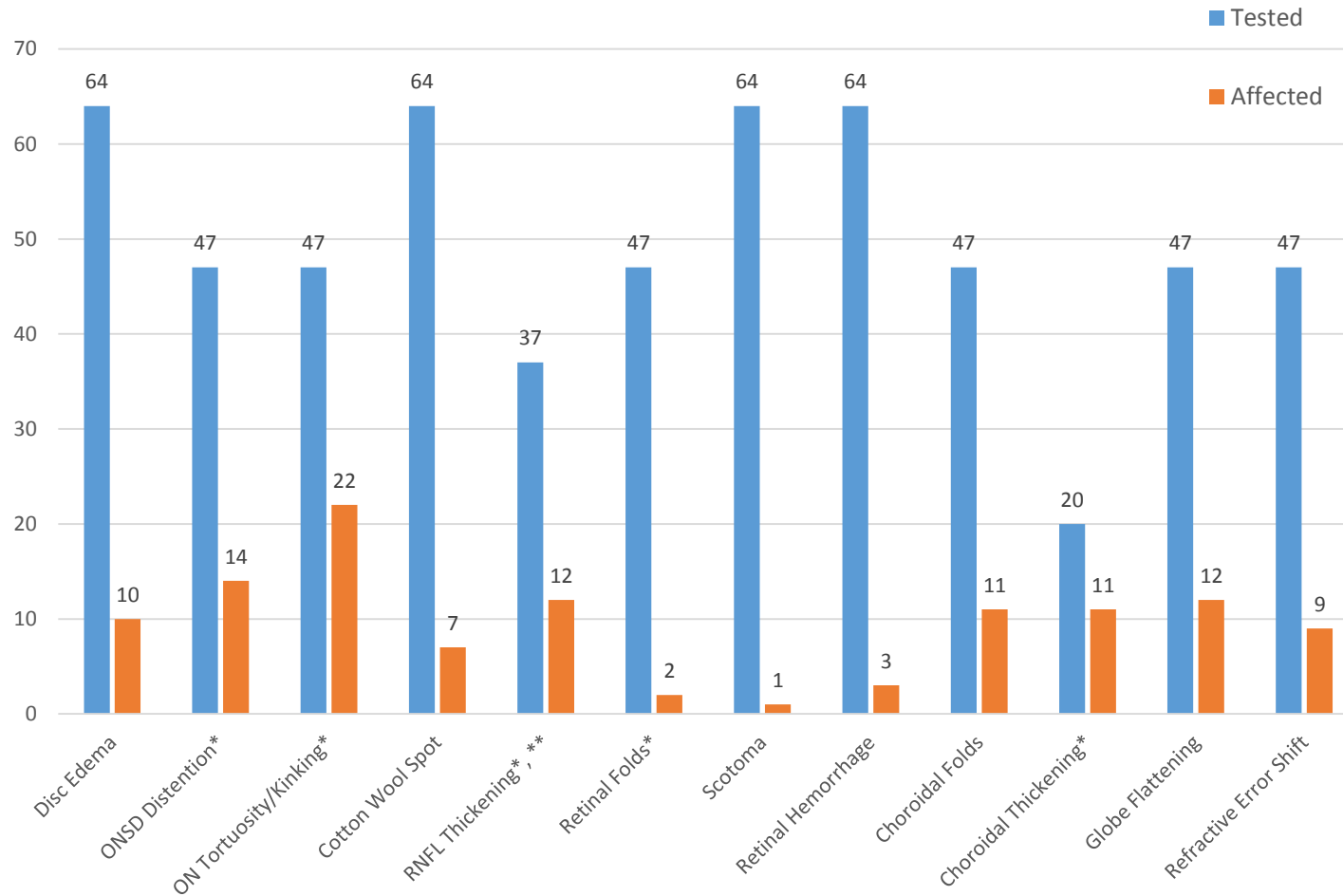
MRI 6 days after  
landing

MRI 1 yr post  
flight



# USOS Individuals With Findings: Expeditions 1-48

40 Individuals have one or more of these findings



Disc Edema = Modified Frisen Scale Grade 1 or greater at first postflight eye exam (fundoscopy)

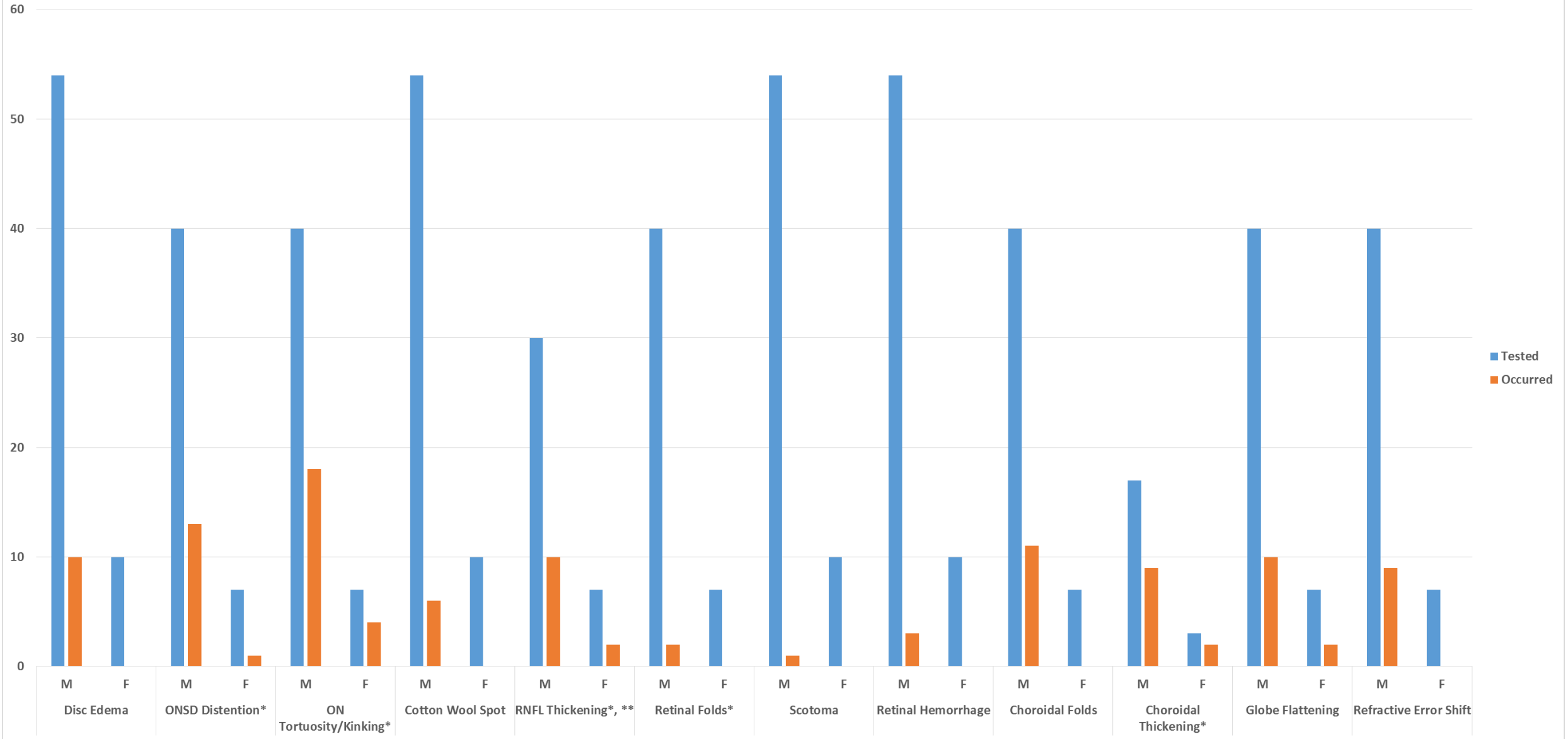
Globe Flattening = significantly changed compared to preflight (MRI)

Choroidal Folds = New or worsened compared to preflight (OCT)

\*Preliminary data, precise definition to be determined

\*\*Does not include disc edema cases

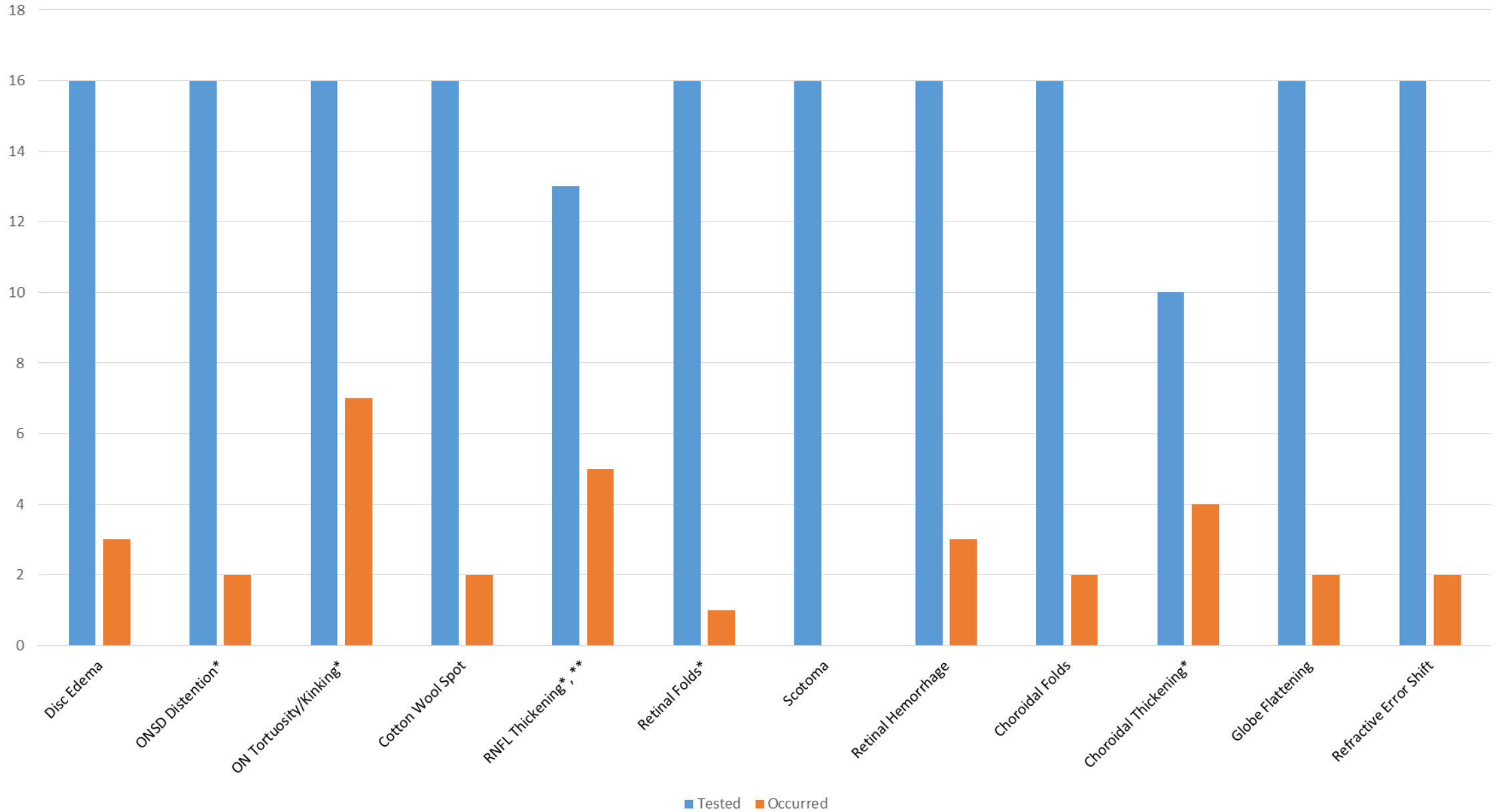
USOS Individuals w/ VIIP Findings by Gender:  
Expeditions 1-48







# USOS Spaceflight Naive Individuals w/ VIIP Findings: Expeditions 1-48





# WHY IS THIS HAPPENING?

- Hypothesis #1
  - Increased intracranial pressure
- Hypothesis #2
  - This is a local eye problem
- Hypothesis #3
  - Slight reduction in IOP and slight increase in ICP
- Hypothesis #4
  - Folate-dependent 1-carbon metabolic pathway may be altered
- Hypothesis #5
  - Venous congestion along with unrelieved high-normal ICP

