

## Evaluation

Oculomotor & VOR


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### Gaze evoked nystagmus

Low intensity left beat nystagmus increases with eccentric and upward gaze.

For vestibular patients, the nystagmus-fast phase beats toward the stronger normal ear (away from the affected ear)





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## Head Thrust Test/Head Impulse Test



The Head Impulse Test (HIT) is a clinical test of vestibular function in which a VOR slow phase is generated.

(Halmagyi et al. 1988, 1990b)



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## Head Thrust Test/Head Impulse Test

This maneuver tests the angular VOR by applying low amplitude (10-25°), high-acceleration (3,000-6,000°/s<sup>2</sup>) and velocity (150-300°/s) head rotations, along the horizontal or vertical coplanar SCC pairs, while instructing the patient to maintain visual fixation straight ahead at a particular point, e.g., the examiner's nose.



(Halmagyi et al. 1988, 1990b)



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## Head Thrust Test/Head Impulse Test

Acute Stage - corrective saccade



Head Thrust to the left  
(affected ear) produces a  
corrective saccade.

(Halmagyi et al. 1988, 1990b)



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## Head Thrust Test/Head Impulse Test



(Halmagyi et al. 1988, 1990b)



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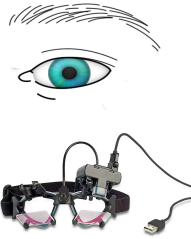
## Video Head Impulse Test (vHIT)

The human eye cannot see everything.

There are two types of 'catch up' saccade

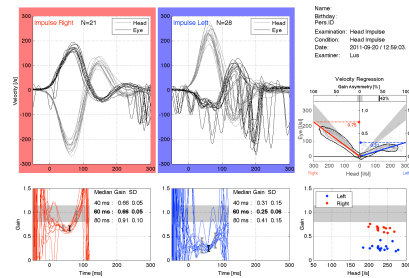
Saccades that happen **after** the head had been moved. We can see these eye movements, these are known as **overt saccades**

Saccades that happen **during** the head movement. These are known as **covert saccades**. Even the most experienced clinician cannot see these as they happen so quickly.



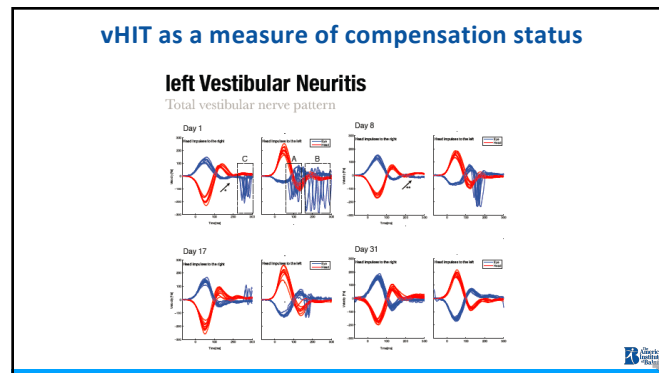
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## Acute Stage - vHIT



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### Oscillopsia

Oscillopsia is blurred vision which may occur with or without head movement

Oscillopsia	Peripheral Vestibular	CNS
Acute Stage	+ Without head movement + With head movement	+ Without head movement + With head movement
Sub-acute/Chronic Stage	- Without head movement + With head movement	+ Without head movement + With head movement

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## Dynamic Visual Acuity (DVA)

Provides a functional measure of VOR

Several tests of DVA have been developed that measure the presence of oscillopsia

(Bhansali et al., 1993; Herdman et al., 1998; Longridge & Mallison, 1984; Lee et al., 1997; Hillman et al., 1999; Herdman et al., 2001)



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## Dynamic Visual Acuity (DVA) – Using a Snellen Chart

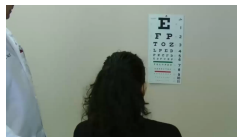
**Step 1**  
Instruct patient to read smallest line for Baseline measure.



**Step 2**  
Instruct patient to turn head in horizontal plane at 2 cycles per second (active assisted) and read smallest line during head movement.



**Step 3**  
Instruct patient to move head in vertical plane at 2 cycles per second (active assisted) and read smallest line during head movement.

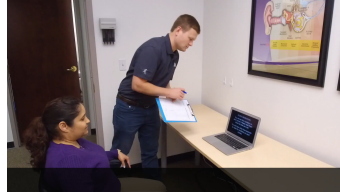


A difference from greater than or equal to 2 lines is positive for oscillopsia in the Respective plane of movement.



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Original NASA research (1999), numbers are presented on computer screen. Subjects are tested standing and walking on a treadmill at 3.5 mph. Too fast for impaired subjects.



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Assisting in the diagnosis of non-compensated high frequency vestibulopathy which manifests as a VOR-based oscillopsia.

To provide pre- and post-VRT scores to demonstrate treatment efficacy.

Download CDVAT research articles at [dizzy.com/research/publications](http://dizzy.com/research/publications).

## AIB COMPUTERIZED DYNAMIC VISUAL ACUITY TEST<sup>SM</sup>

Name: Sample Clinic: \_\_\_\_\_

Referral: IND Date: \_\_\_\_\_

Age: \_\_\_\_\_ Sex: \_\_\_\_\_ Eye: \_\_\_\_\_

Test Date: \_\_\_\_\_ Test Method: \_\_\_\_\_

Test Date	Visual Acuity	Visual Field	Visual Memory
11/23/94	20/40	20/40	20/40
12/12/94	20/40	20/40	20/40
1/26/95	20/40	20/40	20/40
2/10/95	20/40	20/40	20/40
4/27/95	20/40	20/40	20/40
5/12/95	20/40	20/40	20/40
6/27/95	20/40	20/40	20/40
7/27/95	20/40	20/40	20/40
8/27/95	20/40	20/40	20/40
9/27/95	20/40	20/40	20/40
10/27/95	20/40	20/40	20/40
11/27/95	20/40	20/40	20/40
12/27/95	20/40	20/40	20/40
1/27/96	20/40	20/40	20/40
2/27/96	20/40	20/40	20/40
3/27/96	20/40	20/40	20/40
4/27/96	20/40	20/40	20/40
5/27/96	20/40	20/40	20/40
6/27/96	20/40	20/40	20/40
7/27/96	20/40	20/40	20/40
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12/27/96	20/40	20/40	20/40
1/27/97	20/40	20/40	20/40
2/27/97	20/40	20/40	20/40
3/27/97	20/40	20/40	20/40
4/27/97	20/40	20/40	20/40
5/27/97	20/40	20/40	20/40
6/27/97	20/40	20/40	20/40
7/27/97	20/40	20/40	20/40
8/27/97	20/40	20/40	20/40
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3/27/00	20/40	20/40	20/40
4/27/00	20/40	20/40	20/40
5/27/00	20/40	20/40	20/40
6/27/00	20/40	20/40	20/40
7/27/00	20/40	20/40	20/40
8/27/00	20/40	20/40	20/40
9/27/00	20/40	20/40	20/40
10/27/00	20/40	20/40	20/40
11/27/00	20/40	20/40	20/40
12/27/00	20/40	20/40	20/40
1/27/01	20/40		

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## Post-Headshake Nystagmus

The presence of post head shake nystagmus is a strong clinical indicator of non-compensation. Fast phase is AWAY from the affected ear.

30 year old male - 9 months post acoustic neuroma surgery - non-compensated.



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## Post-Headshake Nystagmus

### Without a video goggle

Patient is seated with 30 degrees of cervical flexion.

With eyes closed, patient shakes their head in horizontal plane at approximately 2 cycles per second for at least 20 seconds.

After 20 seconds, patient stops shaking their head and keeps their eyes closed.

Therapist passively opens one eye just below the brow to assess for nystagmus.



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## Optokinetic Test

Fill the patient's visual field by at least 80%. Look for symmetrical optokinetic reflex in each direction.

When reduced in the direction of the motion, this indicates a non-compensated condition and affected ear.



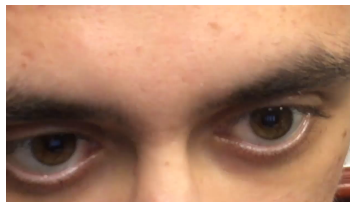
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## Optokinetic Test

Optokinetic stimulus moving to the left

Testing the left ear

Normal response




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### Optokinetic Test

Optokinetic stimulus moving to the right

Testing the right ear

Abnormal response





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### Motion Sensitivity Index


Identify patient baseline- Motion Sensitivity Index (MSI)

Life history of motion intolerance, migraine, etc.

Four conditions - all performed to right and left for 20 seconds each. Patient has eyes closed at end of rotation

Vision	No vision	Conflicted vision, i.e., finger or thumb in visual field while turning	Conflicted vision with head rotation, i.e., finger or thumb in visual field to the right, head rotated to right, patient rotates left
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## Motion Sensitivity Index Variables & Measurements

Measure intensity 1-10

Measure duration of after-motion in seconds

Rotations per time, i.e., 3/20 (Intensity = 3; Duration = 20 seconds)- identify most problematic direction and visual condition

Looking for Vestibular Recruitment - one direction would be more intense and longer duration than the other

Goal- to reduce intensity and reduce duration



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## Advanced Technologies Oculomotor Assessment



The CDVAT can be run on multiple desktops or a laptop unit for portability in clinic or patient bedside. The test will evaluate the presence of oculomotor with horizontal and vertical saccadic head movement. There is a built-in 2 cps metronome to ensure accuracy of head movement. The test may be used for diagnostic evaluation and as a pre and post Vestibular Rehabilitation Therapy outcome measure.

VHT allows for a more accurate assessment of a subacute vestibulopathies by identifying covert saccades undetectable without the use of technology. The test may be used for diagnostic evaluation and as a pre and post Vestibular Rehabilitation Therapy outcome measure.



ISEN goggles is a portable, affordable alternative tool for the assessment of oculomotor function.



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