

# ***59 MEDICAL WING***

## ***Air Education and Training Command***

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**Wilford Hall Medical Center  
Lackland AFB, Texas**

**Maximizing Your Vestibular  
Evaluation**



**Capt April Myers  
E-mail: [april.myers@lackland.af.mil](mailto:april.myers@lackland.af.mil)  
DSN Phone: 554-6645**

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# Overview



- **Introduction**
- **Patient Case History**
- **Test Battery Recommendations**
- **Report Writing**
- **WHMC Protocol**
- **Case study**
- **Conclusions**



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# Introduction



- **Not every facility has the luxury of sophisticated equipment for vestibular evaluations...**
- **So how can you make the most of what you have?**



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# Patient Case History



## Questionnaires

- Quick and easy way to obtain some information before you begin testing
- Thorough history is important
- Critical Decision Analysis



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# Patient Case History



- **Was there an initial vertigo attack?**
- **If yes...**
  - Duration – minutes, hours, days +
  - Precipitating activity
  - Frequency if multiple attacks
  - Associated symptoms
    - Hearing loss   ▪ Tinnitus-hyperacusis
    - Vision changes   ▪ Headaches
    - Loss of consciousness   ▪ Weakness/numbness



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# Patient Case History



- **Are symptoms or attacks provoked or worsened by...**
  - **Motion**
  - **Vision**
  - **Head Posture**
  - **Body Position**



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# Patient Case History



- **BPPV is the most common cause of vertigo**
- **#1 cause of dizziness in people 60 years and older**
- **Literature supports 30-50% BPPV patients will have a concomitant vestibulopathy in the involved ear**
- **There is no test that provides a definitive diagnosis of BPPV**
- **It is a clinician's DX based on rotary-torsional nystagmus observations created by particular positioning that provokes the symptoms**



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# Testing Battery



## ■ Diagnostic Testing

- Audiometry
- Immitance
- OAE's
- ABR
- ECOG
- VEMP
- Vertebral Artery Test
- Positioning Tests
- VNG/ENG
- Autorotation Tests
- Dynamic Visual Acuity
- Postural Stability Testing



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# Vertebral Artery Test



- Rules out possibility of basilar arterial stroke
- Pt should preferably be sitting, push their head forward, turn their head comfortably to one side and pitch their head back
- Positive findings for vertebral compression may include: persistent dizziness, double vision, nausea or slurred speech



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# Postural Stability Tests



- **Gans Sensory Organization Performance Test (\$250)**
- **Evaluates ability to utilize and integrate sensory input for postural control**
  - **Vestibular**
  - **Visual**
  - **Somatosensory**



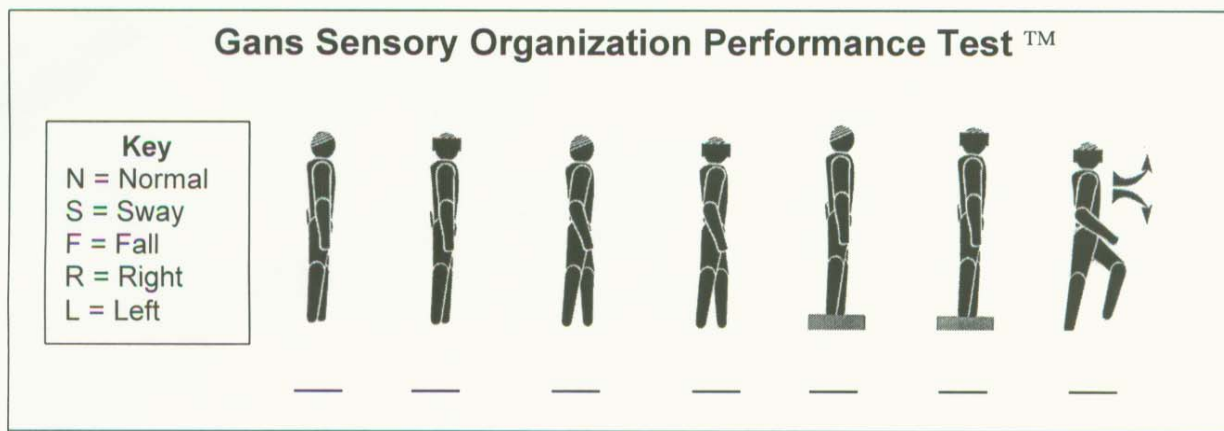
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# Postural Stability Tests



## Conditions

- (1) Standing eyes open
- (2) Standing eyes closed
- (3) Walking eyes open
- (4) Walking eyes closed
- (5) Standing on foam eyes open
- (6) Standing on foam eyes closed
- (7) Stepping Fukuda



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# Postural Stability Tests

## Vestibular Patterns



<p><b>Key</b>          N = Normal          S = Sway          F = Fall          R = Right          L = Left</p>								Abnormal – Vestibular
	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>F</u>	<u>R</u>	
<p><b>Key</b>          N = Normal          S = Sway          F = Fall          R = Right          L = Left</p>								Abnormal – Vestibular
	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>F</u>	<u>N</u>	



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# Postural Stability Tests

## Multifactorial Patterns



These patients may show variation of pattern with a few common variations

<p><b>Key</b> N = Normal S = Sway F = Fall R = Right L = Left</p>									Abnormal – CNS – Multifactorial
<p><b>Key</b> N = Normal S = Sway F = Fall R = Right L = Left</p>									Abnormal – CNS – Multifactorial



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# Video-oculography (VOG)



- Recording eye movement through the use of digital video cameras (uses infrared cameras)
- Preferred goggle type is one with dichotic filters placed inside the goggles (computer algorithms then analyze the position of the eyes individually)
- \$1,000-3,000 (1 camera system) up to \$24,000-\$30,000 (2 camera system)



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# High Freq Head Shake



- Identifies abnormalities in otherwise normal ENGs
- Requires only 20 seconds
- No special equipment
- Excellent Vestibular Rehab candidates



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# Roll Test



- Pt rolls onto side from sitting position
- Roll test provokes nystagmus that otherwise would not be elicited by Modified Hallpike
  - Patients with horizontal canal BPPV only show nystagmus with 90 degree angle



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# Modified Hallpike



- **(1) Patient in supine position, head tilted backward to a comfortable degree and then gently moved to a 45 degree to one side**
- **(2) Pt sits on table, turns head to side with clinician behind supporting pt's back and neck. Clinician sits down as pt lays supine, head barely off table supported by clinician's hands**



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# Side Lying



- Works well for patients who cannot bend at waist
- Pt is turned on their side with with head turned away from test ear (initial position of Semont Liberatory Maneuver)



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# VNG



- **What should the VNG tell you?**
  - **Is there a lesion or dysfunction?**
  - **Is it peripheral or central?**
  - **Which ear?**
  - **What kind of a dysfunction?**
  - **What is the best management strategy?**

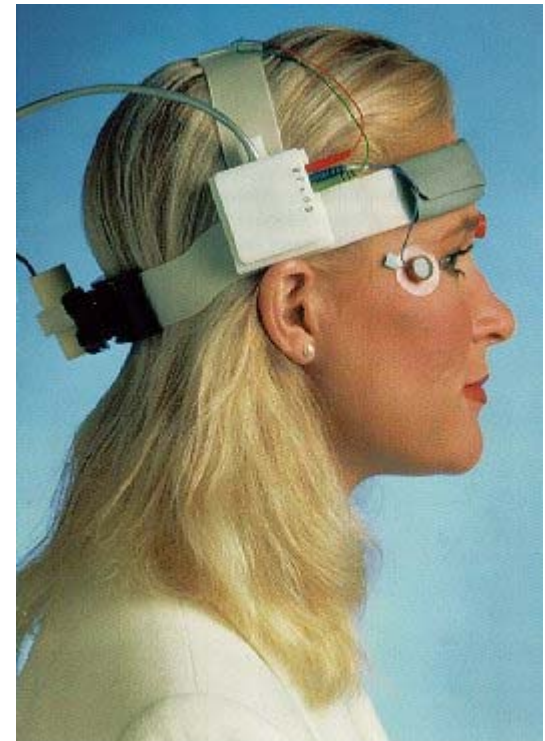


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# Vestibular Autorotation Testing



- Similar to Rotary Chair
- Tests VOR function at frequencies of normal horizontal and vertical head movement 2-6Hz
- \$6,000-\$14,000





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# Dynamic Visual Acuity



- Software is easily loaded
- Assesses impairment in pt's ability to perceive objects accurately while actively moving head
- Good test of oscillopsia
- Pt can be tested standing or walking
- \$195





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# Interpretation



**According to Dr. Richard Gans, an interpretation should:**

- 1. Identify or exclude lesion**
- 2. Differentiate peripheral vs. central**
- 3. Isolate involved ear**
- 4. Describe nature of lesion**



# Interpretation



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- **According to Dr. Richard Gans, a report should:**
  1. **Clearly explain what the findings mean**
  2. **Provide referring physicians with direction**
  3. **Synthesize available information into a coherent summary**
  4. **Suggest Management Strategies**



# WHMC Protocol



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- Hx
- Audiometry/Immittance/OAEs
- ENT
- Platform Posturography
- VNG
- Rotary Chair



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# Case Study



- **41 yo female reports episodes of vertigo lasting 2-3 hours (1-2 x month). Room spins and pt has loss of bowel/bladder function followed by confusion and migraines**
- **Pt being seen by Neurology (Neg test for seizure disorder)**
- **Pt takes Meclazine for vertigo**



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# Test Results



- **Posturography**
- **Rotary Chair**
- **VNG**
- **Audio**
- **ENT**
- **Dx**



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# Summary



- **Introduction**
- **Patient Case History**
- **Test Battery Recommendations**
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# Conclusion



- You don't have to have every piece of equipment available to perform a thorough vestibular assessment



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# Questions



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# Critical Decision Analysis



## ■ DX Results

### ■ Positive - VRT

(Vestibular Rehabilitation Therapy)

- BPPV-PC/HC
- Uncompensated vestibulopathy unilateral/bilateral
- Multifactorial disequilibrium

### ■ Positive – Medical Tx

- Meniere's – active stage
- Fistula
- Autoimmune disease
- Retrocochlear
- CNS – Neurological
- Cervicospinal
- Neuromuscular
- Orthopedic
- Vascular



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# Clinical Pathways



- **Diagnostic Vestibular Screening**
  - **Allows us to participate in early identification of vestibular disorders with limited equipment or expense**
  - **Includes: history and symptoms, test of postural stability, and viewing of eye movement with infrared goggles during Dix-Hallpike, high frequency headshake, gaze and positional sub-tests**



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# FOAM



- **Easy and effective means to evaluate postural stability**
- **An inexpensive way to evaluate sensory organization**
- **\$175**