



# Vestibular Rehabilitation SIG

Fall 2009

## In this issue:

- 1 Message from the Chair
- 2 Join Us at CSM San Diego
- 2 Neurology Section Programming
- 4 Neurology Section Pre-Cons
- 5 Vestibular SIG T-Shirts
- 5 Bárány Society Meeting
- 5 Migraine-Related Dizziness
- 8 Basic Books
- 8 VR SIG Service Award
- 8 VR SIG Article Award
- 9 Oculomotor Mechanisms
- 10 New VR SIG Officers

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# Message from the Chair

**By Susan L. Whitney,  
PT, DPT, PhD, NCS, ATC, FAPTA  
VR SIG Chair**

Your vestibular team recently said a BIG "thank you" to our outgoing nominating committee chair, Dr. Pat Winkler. I had a pleasure of serving with Pat for over a year and was very impressed with her ability to solve problems and recruit new talent. Pat has a wealth of clinical knowledge and experience that we put to good use for the Vestibular SIG. She will be missed but has already agreed to continue to help with our efforts to improve vestibular physical therapy.

As we say goodbye officially to one person, another joins us. The Vestibular SIG would like to welcome Becky Olson-Kellogg, PT, DPT, GCS as our new member of the nominating committee. Kenda Fuller, PT, NCS takes over as the Chair of the Nominating Committee. We are also happy to announce that Michelle Gutierrez was elected Secretary again and is continuing with us on the Board. Thank you also to Michelle for her previous years of service and look forward to working with her.

APTA continues to work to try to have physical therapists be able to use the new CPT code for canalith repositioning. At this time, it has been suggested to continue to bill for neuromuscular re-education. Please check to make sure that your payers will pay for NRM. Not all will because NRM is reimbursed at a higher rate than therapeutic exercise and some other CPT codes.

We are looking forward to a very exciting CSM in San Diego. There already appears to be excellent programming related to vestibular on the schedule thanks to the work of Julie Tilson, PT, DPT, NCS. She has been hard at work.

At our business meeting, we will be giving away some wonderful vestibular textbooks, an infrared goggle system from Micro Medical, and a full set of VHI exercises to some lucky person(s). Please try to come- we want you to learn but also have some fun with us. It is also our chance to find out what you would like us to do to help you in your practice.

Thanks to Laura Morris, PT, NCS we have been trying to load exciting articles that might be of interest to you. If possible, we try to create a link to the PDF of the paper. Sometimes key articles are not available online for free, but if we think that they are really valuable, we will at least link you to the abstract. We hope that this helps you.

Diane Wrisley, PT, PhD, NCS and I are leading a group of people to compile and offer a Neurology Section sponsored advanced vestibular course. It is an all star group of people. Nancy Fell solicited names in May. Twelve physical therapists are on the committee moving the efforts forward. People were chosen because of experience (a little or a lot), interest, geography, gender, and aptitude. It was not an easy decision to pick this group of talented people.

The plan for this advanced vestibular course is that it will be first given next fall. The advanced vestibular planning group has started meeting and will soon work in small groups to develop the content. The course will include didactic instruction plus a significant amount of case based learning with videos of eye movements, as appropriate. We will be providing the course in different regions of the country, so if you cannot make it to one, you may be able to come to another location. The programming will be evidence based. We are hoping that the course will be very worthwhile for those who are looking for more advanced skills. There most likely will be three instructors each time the course is offered in each location. The Section is also planning on offering an advanced stroke course. The planning process for the course is designed to have more experienced physical therapists mentor younger physical therapists.

We are just about ready to send off some of the vestibular fact sheets to the APTA Department of Practice for review. We hope to have some available for you at CSM for you to view.

Please let us know if you have any ideas that you would like us to work on in the future.

# Join Us at Combined Sections in San Diego

**Julie Tilson, PT, DPT, NCS**  
 tilson@usc.edu  
 Vestibular SIG Vice Chair

It is time to start thinking about CSM 2010 in sunny San Diego! Make your plans now and don't miss these exciting Vestibular SIG programs Feb. 19-20.

First there's **Cervicogenic Dizziness: Perspectives on Evaluation and Treatment** with Rob Landel, PT, DPT, OCS and Dianne Wrisley, PT, PhD, NCS. Internationally recognized experts, Doctors Landel and Wrisley will share their expertise and perspectives on evaluating and treating patients with dizziness and disequilibrium associated with impairments of the cervical spine. Join us at our business meeting (open to all) and learn to:

- Identify patients with complaints of dizziness and/or disequilibrium associated with cervical spine dysfunction
- Evaluate and use objective measures for persons with cervicogenic dizziness
- Describe effective treatment techniques for persons with cervicogenic dizziness

- Discuss the current relevant literature regarding manifestations of cervical impairments on postural and oculomotor control and complaints of dizziness

Next is **Developing an Ideal Dizziness and Balance Program** – A Roundtable Discussion with 5 expert panelists:

- Janet Callahan, PT, MS, NCS of Massachusetts General Hospital, South Hamilton, Mass.
- Kenda Fuller, PT, NCS of South Valley Physical Therapy, Denver, Colo.
- Collin Grove, PT, MS, NCS of University of Wisconsin Hospital and Clinics, Middleton, Wis.
- Janene Holmberg, PT, NCS of IHC Hearing and Balance Center, Salt Lake City, Utah
- Sapan Palkhiwala, PT, DPT of Complete Balance Solutions Institute for Rehabilitation, Laguna Hills, Calif.

Join our expert panel for a small group discussion about the ins and outs of developing the best possible Dizziness and Balance program in your facility.

We will update the website as soon as we know exact dates and times for these great learning and networking opportunities. See you there!

## Neurology Section Programming at CSM

### TUESDAY February 16

8:00AM to 4:00PM Preconference Course A

Neurologic Practice Essentials: Clinical Decision Making as a Foundation for Expert Practice

Speakers: Kathleen M. Gill-Body, DPT, MS, NCS; Patricia L. Scheets, PT, DPT, NCS; Cynthia M. Zablony, MS, DPT

12:30PM to 5:15PM Preconference Course B

Gaming Augmented Physical Therapy: Beyond the Wii

Speakers: Judith E. Deutsch, PT, PhD; Sheryl Flynn, PhD PT; Belinda Lange, PT, PhD

### WEDNESDAY February 17

8:00AM to 5:15PM Preconference Course A

Neurologic Practice Essentials: Clinical Decision Making as a Foundation for Expert Practice

Speakers: Kathleen M. Gill-Body, DPT, MS, NCS; Patricia L. Scheets, PT, DPT, NCS; Cynthia M. Zablony, MS, DPT

8:00 AM to 5:00 PM Preconference Course B

Gaming Augmented Physical Therapy: Beyond the Wii

Speakers: Judith E. Deutsch, PT, PhD; Sheryl Flynn, PhD PT; Belinda Lange, PT, PhD

7:00 PM to 8:30 PM

Opening Ceremonies and American Board of Physical Therapy Specialists (ABPTS) recognition of Clinical Specialists

### THURSDAY February 18

6:45AM to 7:45 AM

First Time at CSM? Welcome to First Timers' Breakfast

8:00AM to 10:00 AM

Multisection Programming: Concussion and Mild Traumatic Brain Injury: Update 2010

Kevin Guskiewicz PhD, ATC, Susan Whitney PT, PhD, ATC, Dr. Robert Cantu, MD and Christopher Nowinski (former athlete)

10:30AM to 12:15PM

Sensory Dysfunction Following Stroke: Incidence, Significance, Examination and Intervention

Speaker: Jane E. Sullivan, PT, DHS

10:30AM to 12:15PM

Implementing a neuroplasticity-principled rehabilitation model across disease severity in Parkinson's Disease

Speakers: Valerie A. Carter, DPT; Becky G. Farley, PT, PhD

10:30AM to 1:30PM

Evidence Based Medicine: Multiple Sclerosis Drugs and Exercise Implications

Speakers: Mary Jane Myslinski, PT, MA, EdM, EdD; Steven Kantor, DPT

10:30AM to 12:15PM

The Role of Biomechanics in the Management of Upper and Lower Extremity Dysfunction: Emerging Interventions for Individuals with Neurological Involvement

Speaker: Margaret Finley, PT, PhD; Judith M. Burnfield, PT, PhD; Stephanie Combs, PT, PhD, NCS

12:30PM to 2:00PM

Balance and Falls SIG Meeting and Educational Session:

Balance Assessment in Different Practice Settings: Can and Should We Use the Same Measures

Moderator: Leslie Allison, PT, PhD;

Panel Members: Melissa S. Fong, PT, DPT, NCS and Tammie Johnson, MS, DPT.

12:30PM to 2:00PM

Brain Injury SIG Meeting and Educational Session: Vestibular disorders after Head Trauma: Cutting Edge Diagnosis and Management: The Team Approach

Kim R. Gottshall, PhD, PT, ATC; Michael E. Hoffer, MD; Steve D. Pluth, PhD

2:30PM to 4:30PM

Clinical Excellence Awardee: Treating the Acute Stroke Patient: Making treatment decisions utilizing best practice guidelines from available evidence

Speaker: Diane Nichols, PT

2:30PM to 4:30PM

Clinical Excellence Awardee: Treating the Acute Stroke Patient: Making treatment decisions utilizing best practice guidelines from available evidence

Speaker: Diane Nichols, PT

2:30PM to 4:30PM

Use of computer gaming as an adjunct during outpatient stroke rehabilitation to obtain repetitive task-specific upper extremity practice

Speakers: Ann K. Reinthal, PT, PhD, NCS; Mary Milidonis, PT, PhD; Marcy Stalvey PT, MS, NCS; Susan Linder, PT, MHS, NCS; Kathy Szirony, PT

2:30PM to 3:30PM

Want to learn more about the Neurology Section? Interested in professional development? Come to "Action Potential"

Speakers: Lee Dibble, PT, PhD, ATC; Terry Ellis, PT, Ph.D. Elizabeth Rasch, PT, PhD

2:30 PM - 6:30 PM

Balance at a High Level: Vestibular Training for the Amputee. Sponsored by Federal Physical Therapy, co-Sponsored by Orthopaedics.

This course provides the current evidence regarding vestibular screening and return to participation guidelines for amputees who have sustained a mild traumatic brain injury (mTBI). The presenter will discuss the physiology of the vestibular system to include basic understanding and common language, pathophysiology of vestibular disorders seen in operational setting, fundamentals of vestibular rehabilitation, and samples of vestibular rehabilitation techniques Upon completion of this course, you'll be able to: 1) Identify otologic symptoms associated with dizziness. 2) Identify symptoms of vestibular abnormality. 3) Choose optimal tests used to diagnose a vestibular abnormality in amputees. 4) Explain the theory of vestibular recovery. 5) Develop interventions for vestibular therapy in amputees. 6) Choose optimal treatment interventions based on outcome measures and clinical research.

Speaker: Kim R Gottshall, PT, PhD, ATC

4:30PM to 6:30PM

Exhibit Hall Break

### FRIDAY February 19

7:00AM to 8:30 AM

Neurologic Clinical Specialists' Breakfast: How Can You Become a Change Agent for Reasonable Reimbursement for Neurologic Clinical Services?

Speakers: Cynthia M. Zabloutny, MS, DPT; Susan L. Whitney, PT, PhD

8:00AM to 11:00AM

Neuro-Oncology for the Physical Therapist: Rehabilitation Considerations in Adults with Primary and Metastatic Central Nervous System Malignancies

Speakers: Willie Ching, PT, NCS; Melissa Luhmann, PT

8:00AM to 11:00AM

Stepping Forward with Gait Rehabilitation

Speakers: Sara Mulroy, PT, PhD; Rebecca Craik, PT, PhD;

8:00AM to 11:00AM

Research Platform I: Balance and Falls in Multiple Patient Populations

11:00AM to 1:00PM

Neurology Posters

11:00AM to 1:00PM

Exhibit Hall Break

1:00PM to 3:45PM

A Learning Module for Neurorehabilitation Curriculum: Walking Recovery, Locomotor Training, and Incomplete Spinal Cord

Injury

Speakers: Andrea Behrman, PhD; Sue A. Sisto, PT, MA, Ph.D.; Elizabeth Ardolino, PT, MS; D. Michele Basso, Ed.D., PT; Linda Behar-Hornstein, PhD

1:00PM to 3:45PM

An instrumented step beyond gait speed: Mechanisms of Gait Dysfunction and Recovery Post-stroke

Speakers:Carolynn Patten, Ph.D.; Marilynn Wyatt, MA, PT; Ilse Jonkers, Ph.D., PT; Steve Kautz, Ph.D

1:00PM to 2:00PM

Getting Published in JNPT: A Chat with the Editor and Editorial Board

Speaker: Edelle C. Field-Fote, PT, PhD

4:00PM to 5:30PM

Vestibular SIG Meeting and Educational Session: Cervicogenic

Dizziness: Perspectives on Evaluation and Treatment

Speakers: Rob Landel, DPT, OCS; Diane M. Wrisley, PhD, PT, NCS

4:00PM to 5:30PM

Degenerative Diseases SIG Meeting and Educational Session:

An intensive whole body deficit-targeted exercise approach for people with Parkinson's disease – LSVT® BIG

Speaker: Becky G. Farley, PT, PhD

6:00PM to 9:00PM

Myelin Melter: Neurology Section Reception and Business Meeting

### SATURDAY February 20

8:00AM to 10:00AM

Practice Issues Forum: Exploring Opportunities for Life Long Learning in a Doctoring Profession

Speakers: Genevieve Zipp, PT, EdD; Valerie Teglia, PT, DPT, NCS; Kathryn Mitchell, PT, DPT, NCS; Heather Hayes, PT

8:00AM to 11:00AM

Research Platform II: Motor Learning and Training

8:00AM to 11:00AM

Functional Electrical Stimulation for Persons with Neurologic Gait Dysfunction: Theories to Practice

Speakers: Keith McBride, PT, PhD; Kari Dunning, PT, PhD; Candy Tefertiller, MPT, ATP, NCS; Suzanne L. Tinsley, PT, PhD

8:00AM to 11:00AM

Innovations in Technology for PT: Wii and Beyond

Speakers: Robert "Bob" Latz, PT, DPT, GCFF; Steven Wilkinson, PT, PhD; Judith E. Deutsch, PT, PhD

11:00AM to 1:00AM

Exhibit Hall Break

1:00PM to 3:00PM

Neurology Section SIG Round Table Discussions:

Balance and Falls SIG: Fall Risk Assessment and Measures Used for Fall Risk: Are They the Same as Measuring Balance?

Moderators: Linda Csiza, PT, DSc, NCS; Mary Hudson-McKinney, PT, MS, DPT, NCS

Brain Injury SIG: Prediction and Management of Postconcussive syndrome

Moderators: Michelle Peterson, DPT, NCS

Degenerative Diseases SIG: Community-Based Health Promotion Exercise Programs for Individuals with Neurodegenerative Diseases

Moderators: Anne Kloos, PT, NCS, PhD; Deb Kegelmeyer, DPT, MS, GCS

Spinal Cord SIG: Rehabilitation of Patients with SCI: An International Perspective

Moderators: Joy A. Bruce, MSPT, ABD, NCS

Stroke SIG: Assessing gait speed in all types of settings  
 Moderators: Susan Ryerson, PT, DSc; Kay Wing, PT DPT  
 NCS GCS  
 Vestibular SIG: Developing an Ideal Dizziness and Balance Program  
 Moderators: Sapan Palkhiwala, PT, DPT; Colin Grove PT, MS, NCS; Janene Holmberg, PT, NCS; Janet Callahan, PT, MS, NCS; Kenda S. Fuller, B.S. PT, N.C.S.  
 1:00PM to 2:45PM

New Technologies in Stroke Research: What are the immediate clinical applications?  
 Speakers: Julius P. Dewald, PT, PhD; Michael D. Ellis, PT, DPT; David Brown, PT, PhD; Joseph Hidler, PhD  
 1:00PM to 2:30PM  
 A Model to Facilitate Student Clinical Decision-Making for the Patient/Client With a Neuromuscular Condition  
 Cheryl Burditt Footer, PT, PhD; Marcia B. Smith, PT, PhD;  
*Continued on Page 10*

## Neurology Section Pre-Cons at CSM!

Starting October 1, the website will have registration and programming info. Please put the following in the brochure to guide folks to register. Visit [www.apta.org/csm](http://www.apta.org/csm) to register for pre-conference courses, and to learn more about educational programming.

### Neurologic Practice Essentials: Clinical Decision Making as a Foundation for Expert Practice

Speakers: Kathleen M. Gill-Body, DPT, MS, NCS; Patricia L. Scheets, PT, DPT, NCS; Cynthia M. Zabloutny, MS, DPT  
 Two days: Tuesday February 16 8:00AM to 4:00PM and Wednesday 8:00AM to 5:15PM

	Early Bird 12/23/09	Advance 1/20/10
PT Section Member	\$325	\$375
PTA Section Member	\$300	\$350
APTA PT Non-Section Member	\$375	\$425
APTA PTA Non-Section Member	\$350	\$400
Non Member	\$425	\$475
Section Student Member	\$275	\$300
APTA Student Member	\$300	\$325
Student Non Member	\$325	\$350

#### Description:

Novices develop clinical competence and evolve into expert practitioners by making decisions that involved the complementary processes of systematic analysis and intuition.

This 2-day course was developed with the overall objective of strengthening skills for all therapists seeking to advance their neurologic physical therapist practice.

Participants will utilize current frameworks for clinical decision making to assist them in analyzing neurologic patient cases in the areas of balance and falls, brain injury, Guillain-Barre syndrome, Parkinsons disease, spinal cord injury, stroke, and vestibular dysfunction.

Participants will apply current evidence and clinical guidelines in making patient management decisions particularly in the areas of evaluation, prognosis, and intervention.

Given both the breadth and the depth of the course, participation may assist the physical therapist interested in sitting for the Neurologic Clinical Specialist exam.

#### Objectives:

Upon successful completion of this course, participants will:

- Complete a self-evaluation of preparedness for advanced neurologic physical therapist practice and describe strategies for individual professional growth
- Systematically apply clinical decision making frameworks to neurologic physical therapy practice including examination, screening for referral, evaluation, diagnosis, prognosis, and intervention (including treatment progression)

- Develop focused clinical questions for seeking evidence to support clinical decisions
- Accurately apply current evidence and clinical practice guidelines, in combination with patient values, to optimize prognostic and intervention decisions in a variety of neurologic patient populations
- Discuss 10 “take home messages” for elevating practice that can be implemented in the clinical environment

### Gaming Augmented Physical Therapy: Beyond the Wii

Speakers: Judith E. Deutsch, PT, PhD; Sheryl Flynn, PhD PT; Belinda Lange, PT, PhD

One and a half days: Tuesday February 16 12:30PM to 5:15PM and Wednesday 8:00 AM to 5:00 PM

	Early Bird 12/23/09	Advance 1/20/10
PT Section Member	\$275	\$325
PTA Section Member	\$250	\$300
APTA PT Non-Section Member	\$325	\$375
APTA PTA Non-Section Member	\$300	\$350
Non Member	\$350	\$400
Section Student Member	\$160	\$175
APTA Student Member	\$170	\$210
Student Non Member	\$210	\$225

#### Description:

This one and a half day workshop will examine the use of gaming to augment physical therapy.

The theoretical basis for using gaming in rehabilitation coupled with evaluation of the current evidence to support its use will be presented.

Methods for evaluating games and implementing in clinical practice will be discussed.

Experiential learning with at least four different gaming consoles will be provided.

These will consist of gaming practice and learning as well as case based analysis for implementation of games in practice.

#### Objectives:

- Summarize the theoretical rationale and evidence to support the use of gaming in physical therapy
- Analyze and select gaming consoles and specific games for their motor control requirements and feedback capabilities
- Use the Wii and Wii Fit, Play Station II, and U-Dance.
- Design a plan of care that integrates off-the shelf gaming consoles for a variety of clients
- Contrast the strengths and limitations of off-the-shelf gaming systems
- Access new information on technology development that affects rehabilitation

## Announcement - Vestibular SIG T-Shirts

Look for our T-shirts at CSM 2010. The Vestibular Rehabilitation SIG will be selling T-shirts with our very own logo. Stay tuned, we will let you know the price and get a sneak

peek before CSM.

The proceeds will assist our ever growing amount of volunteers to attend CSM.

More reason to volunteer to help the SIG.

## Think about attending the Bárány Society Meeting

The Bárány Society is inviting physical therapists to attend the biannual international vestibular meeting in Reykjavik, Iceland August 18–21, 2010. The URL for the meeting is <http://www.congress.is/barany2010>.

The official Bárány invitation from Dr. Petersen is included below:

Dear Bárány Members & Friends

It is with great enthusiasm that we invite you all to the XXVI Bárány Society Meeting in Reykjavik, August 18-21, 2010.

This is the first time the congress is held in Iceland and Reykjavik will be our venue. The organizing committee's task is to make this meeting of high scientific standard and this summer visit, including Reykjavik Festival, a time to remember.

The scientific part of the congress will offer presentation from

all aspects of vestibular and otoneurological science. Eminent speakers from all over the world and learned symposia on selected topics of interest will provide an educational feast. It has been claimed that Iceland is nature's way of showing off and it's true that one can find, in a relatively small area, multitude of sights worth exploring leisurely or with the attitude of the true adventurer.

We intend to provide for an enriching scientific as well as entertaining social programs so please joins us to do those days in August a memorable encounter with Iceland's wonders of nature.

On behalf of all involved I welcome you warmly.

Hannes Petersen

Congress organizer

# Migraine-Related Dizziness

Joseph M. Furman, M.D., Ph.D

### Introduction

Migraine-related dizziness may be the most common disorder presenting to specialty clinics for dizziness, vertigo and disequilibrium (1). The disorder has been recognized for about 25 years and advances in understanding the condition are ongoing (2). There are numerous challenges regarding the diagnosis and treatment of this condition. These challenges include the absence of a uniform nomenclature, the absence of universally accepted diagnostic criteria, the variable clinical presentation of the disorder both between patients and over time in the same patient, overlap of presentation with other causes of dizziness, an incompletely understood pathophysiology, the absence of pathognomonic findings, and the absence of proven therapeutic remedies. The role of the physical therapist in the management of patients with migraine-related dizziness is as yet uncertain. Uncontrolled literature suggests that patients with migraine-related dizziness may benefit from balance rehabilitation therapy (3). Moreover, the overlap between migraine-related dizziness and other vestibular ailments suggests that physical therapists who treat patients with balance disorders will encounter numerous patients with migraine. Physical therapists thus should be familiar with the management of such patients, the medications that may be prescribed for them, and how migraine may alter response to therapy.

The nomenclature regarding migraine-related dizziness is varied and patients may be given a diagnosis of migraine-associated dizziness, migraine-related vestibulopathy, vestibular migraine, migraine equivalent, migrainous vertigo, and benign recurrent vertigo. These terms are largely synonymous. Note that an infrequently used diagnostic term,

basilar migraine or basilar artery migraine should be avoided. The existence of migraine-related dizziness as a diagnostic entity is suggested by the comorbidity between migraine headache and dizziness. In a seminal study by Kayan and Hood in 1984 (4), 55-percent of migraineurs had vestibular symptoms compared with only 30 percent of patients with tension headache. More recently, Neuhauser et al (5) found that of 200 patients with dizziness, 38 percent had migraine compared with only 24 percent in an orthopedic control group. In a population based study, Neuhauser et al (2006) (6) found that migraine and vestibular vertigo co-occurred in 3.2 percent of patients whereas chance co-occurrence was expected in only 1percent of the population.

### Diagnosis

The diagnosis of migraine-related dizziness remain inconsistent. However, the criteria of Neuhauser et al (2), is rapidly becoming widely accepted. Note however, that the International Headache Society has not designated migraine-related dizziness as a diagnostic entity. The Neuhauser criteria are based upon the combination of a lifetime diagnosis of migraine headache based on International Headache Society criteria and a temporal association between vestibular type symptoms and migraine type symptoms. Table 1 provides a questionnaire that can be used to establish a diagnosis of migraine based on International Headache Society criteria. Table 2 provides a questionnaire method for determining a diagnosis of migraine-related dizziness based on Neuhauser criteria. Note that as with many diagnostic criteria some patients meet criteria for definite migrainous vertigo whereas others meet criteria for probable migrainous vertigo. The Neuhauser criteria almost certainly excludes some patients who actually have migraine-related dizziness and thus could be considered overly specific and inadequately sensitive.

Using these criteria, Neuhauser et al found that the lifetime prevalence of migraine-related dizziness was approximately 1 percent (7).

#### **Clinical Aspects**

Migraine-related dizziness is found much more commonly in females than males with a ratio of about 5 to 1. Interestingly, migraine headache generally predates migraine dizziness by approximately 8 years. (5, 8) The duration and frequency of attacks of migraine-related dizziness are extremely variable both between patients and in the same patient over time. In particular, attacks can last seconds, minutes, or hours and in some patients, migraine-related dizziness can be essentially constant with or without exacerbations. Moreover, in patients with episodes, episodes may occur daily or years apart. Episodes are often associated with the menstrual cycle but this association is inconsistent. Common complaints in patients with migraine-related dizziness include vertigo, imbalance, light-headedness, a swimming sensation, giddiness; heavy-headedness, rising or sinking, rocking or swaying, and motion sickness. These complaints may or may not be temporally associated with migraine headache. Dizziness symptoms may occur before, during or after headache. In many patients, episodes of dizziness will occur without headache on many occasions but may be associated with other migrainous features such as photophobia and phonophobia. Note that although a temporal association with migraine headache or migrainous symptoms is a requirement for a diagnosis of migraine-related dizziness, individual episodes of migraine-related dizziness may or may not be associated with migrainous features. Moreover, patients with migraine-related dizziness may experience typical migraine headaches without dizziness.

#### **Laboratory testing**

Laboratory testing abnormalities are often found in patients with migraine-related dizziness although no consistent pattern has been found. There is not a pathognomonic abnormality or set of abnormalities to establish a diagnosis of migraine-related dizziness definitively. A meta-analysis of 534 patients indicated a caloric reduction unilaterally in approximately 25 percent of patients, spontaneous nystagmus in 10 percent of patients, positional nystagmus in 20% of patients, a directional preponderance in 50% of patients, and abnormal postural stability in about a third of patients (2). Possibly, patients with peripheral vestibular dysfunction as a component of migraine-related dizziness have increased symptoms and a worse prognosis. This, however, is uncertain.

#### **Pathophysiology of migraine-related dizziness**

The pathophysiology of migraine-related dizziness is uncertain. A widely quoted hypothesis suggests that reciprocal connections between central trigeminal pain pathways and central vestibular structures such as the vestibular nuclei underlie this disorder (2). Undoubtedly, neurotransmitters are an important feature of the pathophysiology of migraine-related dizziness including primarily serotonin but also neuropeptide, dopamine, and calcitonin gene-related peptide. Also implicated in the pathophysiology of migraine are ion channels, particularly voltage-gated calcium channels. Note that no specific genetic defect has been found in migraine-related dizziness.

#### **Treatment of Migraine-Related Dizziness**

The treatment of patients with migraine related dizziness includes reduction of triggers, pharmacotherapy, and vestibular rehabilitation. Regarding triggers, dietary triggers are likely the most powerful. However, no studies have confirmed the usefulness of reduction of triggers for migraine-related

dizziness. Nonetheless, a reasonable suggestion for patients with migraine-related dizziness is to avoid foods and behaviors that are thought to trigger migraine headache. Foods to avoid include caffeine, chocolate, red wine or its derivatives, artificial sweeteners, and preservatives. Pharmacotherapy for migraine-related dizziness is not standardized. Medications that have been suggested for migraine-related dizziness consist of medications generally recommended for migraine headache. Medications for migraine-related dizziness, like those for migraine headache, fall into three categories and include abortive medication, prophylaxis medication, and symptomatic medication. Abortive medication includes triptans, which have not been studied systematically. A single paper regarding zolmitriptan was inconclusive (9). Rizatriptan has been suggested to decrease motion sickness in persons with migraine-related dizziness (10). Prophylaxis medications for migraine-related dizziness may include medications from one or more families including antidepressants, beta-blockers, calcium channel blockers, anticonvulsants, and carbonic anhydrase inhibitors. Symptomatic treatment for acute episodes of migraine-related dizziness that occur despite prophylaxis or abortive therapy include meclizine, promethazine, and prochlorperazine. Vestibular rehabilitation for patients with migraine-related dizziness has been suggested as a valid treatment modality (3). Vestibular rehabilitation may be especially helpful in patients who have a peripheral vestibular component or an ongoing vestibulo-ocular or vestibulo-spinal abnormality. Patients with migraine-related dizziness who undergo vestibular rehabilitation also have the benefit of interacting with a knowledgeable healthcare provider who can aid in monitoring response to pharmacotherapy.

#### **Conclusion**

In conclusion, migraine-related dizziness is a protean disorder that frequently eludes diagnosis. Physical therapists who treat patients with balance disorders need to be aware of migraine-related dizziness and more broadly how migraine can exacerbate a balance disorder. Physical therapists can successfully treat patients with migraine-related dizziness especially when treatment also includes appropriate pharmacotherapy. Moreover, physical therapists can provide essential longitudinal care that includes monitoring pharmacotherapy and suggesting appropriate medication alternatives to patients' physicians.

#### **References**

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### Table 1

#### Headache diagnostic interview for determination of migraine

Subject name: Date: Examiner:

1. Did the headaches start within 2 weeks of a head injury, trauma, or medical illness? YES/NO (If no, proceed to next question.)

2. Do you have any brain abnormality, like tumors or hydrocephalus? YES/NO (If no, proceed to next question.)

3. Do you have a headache everyday or take over-the-counter or prescription pain or headache medications (e.g., Excedrin) more than 4 days per week? YES/NO (If no, proceed to next question.)

4. Do you have an intermittent or constant headache? Constant/Intermittent (If intermittent, proceed to the next question.)

5. How long does each individual headache episode last? <2 hours/>2 hours (If >2 hours, proceed to next question.)

6. Do you have any of the following neurological symptoms immediately before or during your headache episodes:

Visual scotoma

Visual hallucination (zig-zag or wavy lines, colored lights or balls, shimmering patterns)

Weakness or numbness on one side of your body

If YES, diagnose MIGRAINE. No further questions needed. If NO, proceed with question #7

7. Do you have at least 2 of the following symptoms with your headache?

Pain is on one side of the head during a headache episode

Pain feels like throbbing or pulsing sensation

Pain limits, restricts, or interferes with routine activities

Pain is made worse by performing routine activities, such as stair climbing

NO (STOP! No diagnosis of migraine)/YES (If yes, proceed to next question)

8. Do you have at least one of the following symptoms with your headache?

Nausea or vomiting

Markedly increased sensitivity to BOTH normal room lighting AND conversational speech

(The person should report a need to turn down or off lights, close curtains or blinds, turn down or off radio or television, or need to retreat to dark, quiet room.)

If YES, then diagnose MIGRAINE/If NO, no diagnosis of migraine.

### Table 2

#### Diagnostic interview for determination of MIGRAINOUS VERTIGO

Note - that STOP during the interview means that the patient does not have typical migrainous vertigo symptoms and may require additional evaluations for the etiology of vertigo.

Subject name: Date: Examiner:

1. Does the patient have a lifetime diagnosis of migraine

according to the IHS criteria? NO (STOP)/YES (Proceed to next question.)

2. Have any of the following symptoms been experienced within the last 2 years at least twice (not necessarily related to a headache episode)?

- Vertigo, i.e. a sensation of spinning
- A feeling of abnormal motion
- Like walking on the deck of a boat
- Objects in the room seem to spin or turn around the patient
- Feeling like spinning or turning when stationary
- Sense of imbalance or nausea when moving the head
- Tendency to veer to the side when trying to walk straight

None of the above (STOP)

3. Do vestibular symptoms persist all the time (i.e. for more than 1-2 weeks) or do they come and go? If balance symptoms persist all the time, does the severity fluctuate? Intermittent or fluctuating in severity?

Constant AND nonfluctuating (STOP)

4. Has one of the following symptoms occurred at least twice at the same time as either episodic imbalance attacks or experiencing increased severity of fluctuating balance symptoms?

- Migraine headache
- Markedly increased sensitivity to either normal room lighting or conversational speech (The person should report a need to turn down or turn off lights, close curtains or blinds, turn down or turn off radio or television, or need to retreat to dark, quiet room.)
- Migrainous aura (e.g. visual scotoma, visual hallucination, weakness or numbness on one side of the body. DO NOT score positive if the "aura" symptom is dizziness).

None of the above (STOP)

5. To what degree do the balance symptoms just discussed affect the patient? That is, if not experiencing any headaches, how much would he/she still be affected by the balance symptoms?

- Balance symptoms usually interfere with daily activities or are endured with distress (Rate as moderate)
- Balance symptoms usually prohibit daily activities or are endured with extreme distress (Rate as severe)
- Balance symptoms do not usually interfere with daily activities and are endured with minimal distress (STOP)

If symptoms are either moderate or severe, diagnose patient with migrainous vertigo.

[Note that additional pathology may be responsible, in part, for the patient's vertigo.]

Proceed to the next question.

6. Is hearing loss or ringing in the ears temporally related to the balance problem?

YES: A detailed evaluation may be required to determine whether the patient has a non-migrainous co-morbid otologic

# Basic Books for Your Vestibular Rehabilitation Library

***Vestibular Rehabilitation, 3rd Edition (Contemporary Perspectives in Rehabilitation)*** by Susan J. Herdman (~\$55.00)

[http://www.amazon.com/Vestibular-Rehabilitation-3rd-Contemporary-Perspectives/dp/0803613768/ref=sr\\_1\\_1?ie=UTF8&s=books&qid=1248868186&sr=1-1](http://www.amazon.com/Vestibular-Rehabilitation-3rd-Contemporary-Perspectives/dp/0803613768/ref=sr_1_1?ie=UTF8&s=books&qid=1248868186&sr=1-1)

***Balance Function Assessment and Management*** by Gary P. Jacobson and Neil T. Shephard (~\$116.00)

[http://www.amazon.com/Balance-Function-Assessment-Management-Gary/dp/1597561002/ref=sr\\_1\\_3?ie=UTF8&s=books&qid=1251147858&sr=1-3](http://www.amazon.com/Balance-Function-Assessment-Management-Gary/dp/1597561002/ref=sr_1_3?ie=UTF8&s=books&qid=1251147858&sr=1-3)

***Vestibular Disorders A Case Study Approach*** by Joseph M. Furman and Stephen P. Cass (~\$81.00) A new version of the book will be published within the next 6 months.

[http://www.amazon.com/Vestibular-Disorders-Case-Study-Approach/dp/0195145798/ref=sr\\_1\\_5?ie=UTF8&s=books&qid=1251148052&sr=1-5](http://www.amazon.com/Vestibular-Disorders-Case-Study-Approach/dp/0195145798/ref=sr_1_5?ie=UTF8&s=books&qid=1251148052&sr=1-5)

***Vestibular Function: Evaluation and Treatment*** (Hardcover) by Alan Desmond (~ \$48.00)

[http://www.amazon.com/Vestibular-Function-Evaluation-Alan-Desmond/dp/1588901661/ref=sr\\_1\\_2?ie=UTF8&s=books&qid=1248868186&sr=1-2](http://www.amazon.com/Vestibular-Function-Evaluation-Alan-Desmond/dp/1588901661/ref=sr_1_2?ie=UTF8&s=books&qid=1248868186&sr=1-2)

## Vestibular SIG Establishing Service Award

Purpose: To acknowledge and honor a member of the Vestibular Rehabilitation SIG whose contributions to the SIG have been of exceptional value.

Eligibility Criteria - The individual must:

- Be a current member of the Vestibular Rehabilitation SIG.
- Have participated actively in the Vestibular Rehabilitation SIG and given generously and willingly of their time and effort for a minimum of three years. Or have made a substantial contribution within a shorter period of time.

- Have demonstrated valuable service to the Vestibular Rehabilitation SIG through leadership, personal influence, achievements, or frequent and sustained work towards the development and enhancement of the Section.

We plan to give out the first Vestibular Rehabilitation SIG Service Award at CSM in San Diego.

Please come to the business meeting to acknowledge someone who has worked hard to make the SIG a valuable resource!

## Vestibular SIG Best Newsletter Article Award

The Vestibular Special Interest Group of the Neurology Section will be giving a best newsletter article award. All submissions will be considered as a way of thanking you for your time and efforts to submit something to the Vestibular newsletter.

The editor(s) and the Chair will determine the winner based on the criteria (see below). The winner will be announced at the business meeting at CSM. There will be a monetary award in conjunction with a commemorative plaque and an honorary seat at the vertigo-go dinner.

The announcement of the award and criteria will be in both the newsletter and on the website and then after CSM we announce who won in both the newsletter and on the website. All submissions, whether on our website or in our newsletter, from the calendar year prior to that CSM will be considered (Jan to Dec with the decision being made early January prior to CSM in February).

**Criteria:**

- The article is written clearly and concisely.
- There is a clear theoretical basis for the paper.
- The review of literature and other introductory

statements provide evidence for the importance of the paper to physical therapy. Makes an important contribution to the understanding of clinical practice and patient care, or illuminates issues related to patient care and advances the clinical science underlying physical therapy practice and can be judged primarily on the basis of its impact on clinical practice.

- Provides information that can assist others in delivering physical therapy services.
- Contains clear descriptions of clinical procedures or approaches that can be understood by others, and contains supportive rationales for, and experiences with, the procedure or approaches used. Elements in the paper are described with sufficient clarity to permit replication by others.

The newsletter editors and the website editor will decide the top three articles and then the SIG executive committee will make the final decision.

So please consider submitting your articles to the Vestibular SIG.

**American Physical Therapy Association**  
**Combined Sections Meeting**  
**February 17-20**



# Oculomotor mechanisms utilized in daily life

**By Michael C. Schubert, PhD, PT**  
**Assistant Professor, Otolaryngology Head and Neck**  
**Surgery, Johns Hopkins Medicine**

The oculomotor control systems work together to enable our ability to focus on targets of interest during daily activities. Influences such as target and head position, velocity, or frequency are variables the brain uses to determine which oculomotor system is recruited for gaze stability.

The smooth pursuit, saccade, and vestibulo-ocular motor systems each have ranges at which they function most efficiently. Each system also has limitations at which point it becomes ineffective. For most activities of daily life, overlap occurs across contributions from multiple oculomotor mechanisms for the purpose of stabilizing gaze.

Best visual acuity is obtained when images are projected on the fovea of the retina. The fovea occupies a small area of the visual field but is the point of sharpest visual acuity. Image motion away from the fovea by as little as one degree can cause substantial decreases in visual acuity. The purpose of this article is to review the different oculomotor mechanisms responsible for acquiring visual targets of interest in our daily life.

Smooth pursuit enables us with an ability to follow a moving object, making sure to keep the moving image on the fovea of the retina. Smooth pursuit eye movements are even, continual eye rotations.

This system is typically recruited while the head is still, and the target is moving at speeds less than 60deg/sec and within 1 Hz. Individuals trained with pursuit tasks can approach velocities to 100°/sec, though their performance is worse at these higher speeds (Meyer et al 1985). Of course, the distance the eyes are from the moving target of interest affects the brains' percept of velocity (i.e. seated in the terminal, your smooth pursuit system allows you to observe the landing of a commercial aircraft, though its speed is ~ 155mph).

The latency to initiate a smooth pursuit eye movement is about 125 milliseconds and their accelerations range from 40 to 200 deg/sec<sup>2</sup> (Carl and Gellman 1987; Baloh et al. 1988). For target velocities outside of this optimal range of smooth pursuit function, the eyes will fall behind the target velocity, and the brain must use a different oculomotor system to keep the target on the fovea.

Smooth pursuit is very sensitive to identify pathology within the multiple central nervous system pathways used for its generation; however it is not good for localizing where that pathology may be.

When a target is moving outside the operating ranges of the smooth pursuit system (and the head is still), the saccade system is engaged to assist the brains' ability to keep the target on the fovea.

This is done by superimposing rapid, jerk eye rotations. Saccades are also very accurate. The primary goal of the saccade is to reposition a visual target of interest onto the fovea with a single rapid eye motion (Leigh and Zee, 1999). They often occur in coordination with smooth pursuit for target velocities greater than 60 deg/sec.

Saccades have a unique relationship between their amplitude and velocity known as the main sequence: larger amplitudes require faster velocities, though this becomes non-linear for very large amplitudes. Saccadic eye velocities range from 250 to 600 deg/sec. Saccades are typically identified by their

exceptionally rapid accelerations that range from 12000 – 40000 deg/sec<sup>2</sup> (Baloh et al. 1975).

The latency to initiate a visually guided saccade is ~ 200 milliseconds (Baloh et al. 1975). Saccade testing is not as sensitive as smooth pursuit for identifying CNS pathology. However, formal saccade testing with different paradigms (i.e. random vs. predictable) can help differentiate brainstem versus cerebellar involvement.

The vestibulo-ocular reflex (VOR) is responsible for sensing motion of the head and maintains stability of images on the fovea of the retina during that motion. When functioning normally, the vestibular receptors in the inner ear provide an incredibly accurate representation of head motion in three dimensions.

The VOR has been tested across multiple frequencies and velocities of head rotation and shows velocity-dependent nonlinearities (Minor et al 1999). For lower head velocities, the output of the VOR remains constant (linear) across multiple frequencies of sinusoidal rotations. However, for rotations at higher frequencies and velocities, VOR output increases with greater stimulus velocity (velocity defined as having both a magnitude and direction), which is nonlinear.

This suggests therefore, that the systems output is the combined result of linear and nonlinear components (Minor et al 1999), which may correlate with unique afferent physiology. Normal activities of daily life (such as running) can have head velocities of up to 550 deg/sec, head accelerations of up to 6,000 deg/sec<sup>2</sup>, and frequency content of head motion from 1 to 20 Hz.

Only the vestibular system can detect head motion over this range of velocity, acceleration, and frequency. The VOR, therefore, is the primary mechanism for maintaining gaze stability during head movement (linear and angular). The VOR achieves stabilization of gaze by generating an eye movement in the direction opposite head movement, attempting to keep the target on the fovea of the retina.

The VOR can generate eye velocities up to 400 deg/sec and is most useful stabilizing the eyes in a frequency range from 0.5 to 10 Hz (Leigh et al. 1992, Tabak and Collewyn 1995). The acceleration of the VOR varies up to 5000 deg/sec<sup>2</sup> (Aw et al. 1996).

Aside from its broad range of function, the VOR remains an irreplaceable mechanism of gaze stability due to its remarkably short latency. The quickest reflex in the body, the latency to initiate the VOR is ~ 10 ms (Tabak and Collewyn 1995, Crane and Demer 1997 and 1998).

Testing of the VOR is best conducted with rapid head rotations, in order to isolating the vestibular contribution to gaze stability. Abnormal VOR tests can indicate pathology within the peripheral or central vestibular pathways.

Oculomotor function in patients with vestibular pathologies is a critical component of the clinical examination. Identified pathology within the various oculomotor systems is also essential for treatment planning and can assist in determining the best approaches for improving a patient's greater functional status.

In the next article, we will discuss clinical and laboratory measures for examining the oculomotor systems. This article is the first in a series on oculomotor topics, written by Dr. Schubert.

Stay tuned in future newsletter editions for the next article in this series.

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## Welcome Newly Elected VR SIG Officers

### Kenda S. Fuller, PT, NCS Nominating Committee

Michelle Gutierrez continues as Secretary. Her thoughts run along this line:

"I ran for this position because I am interested in staying very active with the Vestibular Rehabilitation SIG.

"During my time with the VR SIG we finalized the White Paper statement and the APTA HOD passed RC 26-07, stating that physical therapists are providers of choice for treating patients with vestibular-related balance disorders.

"Living in Las Cruces and working in El Paso, I am currently the only therapist with an interest in Vestibular Rehabilitation in this area. I want to stay involved in the Vestibular SIG as a means to meet peers with the same interests, and to get more individuals involved.

"I am currently working on my DScPT and am currently teaching Vestibular Rehabilitation courses in Texas and New Mexico, trying to expand students' and therapists' knowledgeable in the field.

"It is in my opinion that the Vestibular SIG will be even more popular in the upcoming years. We have to be prepared for this. Of course our biggest obstacle is reimbursement and anyone who is interested in, or performing, vestibular treatment will need our assistance.

"Vestibular Rehabilitation is not only an interest to Physical Therapists with an interest in Neurology, but other areas as well. We will have to expand ourselves. I want to help us achieve this."

Becky Olson-Kellogg is our newest member of the nominating committee. She has this to say about her reasons for running:

"The Vestibular SIG is a good "fit" for me, based upon my recent clinical practice, continuing education/competencies, & teaching experience in vestibular rehab."

She is currently full time faculty appointment at University of Minnesota Program in Physical Therapy with weekend casual hours at an acute care hospital; Previously developed an outpatient vestibular/balance clinic & expanded to 3 sites in Minneapolis / St. Paul area.

The Vestibular Rehabilitation Special Interest Group will be electing a Vice Chair and Nominating Committee Member in 2010. As you can see, there are specific and varied reasons for getting involved. What's your reason? Contact me at kendafuler@hotmail.com to share your goals in this direction. No obligation at this point. We can talk more, and I will provide the links necessary if your interest leads to the next step.

I feel strongly that members must volunteer & provide leadership in the Sections / SIG's. I have been involved in a variety of areas in the Geriatric Section, & now I have the opportunity to provide leadership in the Neuro Section as well.

### From Page 4:

Patricia A. Winkler, PT, DSc, NCS

1:00PM to 4:30PM

NIH Toolbox for Assessment of Neurological and Behavioral Function: Implications for Physical Therapy Practice and Research

Rose Marie Rine P.T., Ph.D.; Richard Gershon, PhD; Susan Whitney P.T., Ph.D, NCS, ATC, FAPTA; Michael Schubert, P.T., Ph.D. ; Susan Magasi, PhD, O.T.

3:00PM to 4:30PM

Spinal Cord Injury SIG Meeting and Educational Session: PT Implementation of SCI Clinical Practice Guidelines: A Comprehensive Review with a Focus on Upper Limb Preservation. Kendra Betz, MSPT, ATP

3:00PM to 4:30PM

Stroke SIG Meeting and Educational Session: Measuring and Improving Cardiovascular Health in People Post Stroke

Sandra A. Billinger, PT, PhD

5:00PM to 6:30PM

Eugene Michels Research Forum: Neuroimaging: The Story Behind the Blob

Moderator: Judith E. Deutsch,PT,PhD

Speakers: Scott Grafton, MD and Scott Frey, PhD