

## Pediatric Vestibular Screening

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### **Cincinnati Children's Pediatric Balance Program Notes**

Referrals from ENT, Neurology, Sports Medicine, Rehab Medicine (Trauma), Hem/Onc

Team meetings twice a month with all disciplines to discuss patient cases and treatments

Even three way split in outcomes for Audiology eval: Normal test, central test results, peripheral test results

Primary treatment options for children include vestibular rehabilitation, behavioral/ psychology involvement, migraine medication (prescribed by ENT/Neuro)

### **Two Primary Reflexes of the Vestibular System**

Vestibular Spinal Reflex- A reflex mediated from the inner ear vestibular apparatus up through the brainstem and cerebellum down to the postural control muscles. This reflex helps to maintain stance (or posture) when presented with vestibular stimuli either at rest or while moving.

Absence or deficiency of this reflex may be evident in delaying motor milestones. In addition, it may become apparent in older children attempting to do complex motor tasks (sports, riding a bike, running, etc).

Vestibular Ocular Reflex- A reflex mediated from the inner ear vestibular end organ up through the brainstem out to the motor neuron nuclei of the ocular motor muscles. This is a reflex acting to stabilize gaze during head movement, with eye movement due to activation of the vestibular system.

Absence or deficiency of this reflex may become evident in attempting to see clearly while head is in motion. Patients may have oscillopsia, or a feeling of bouncing vision, while head is in motion. Some early evidence suggests reading acuity may be affected.

### **Who Is At Risk for a Vestibular Disorder?**

Cochlear Malformations (EVA, Partitioning defects, common cavity, monodini dysplasia)

Cytomegalovirus

Meningitis

Cochlear Implant patients (pre and or post CI)

Syndromes (CHARGE, Waardenburg, Usher's, Pendred, Klippel-Feil, etc)

VIII Nerve Defects ("wispy nerve", absent nerve, ANSD)

Ototoxicity-Vestibulotoxicity

Head Trauma (Sports related or accidental)

### **How to Identify the Children at the Greatest Risk for Vestibular Impairment**

Questionnaires: pDHI (McCaslin et al 2015); Pediatric Vestibular Symptom Questionnaire- both good for dizzy child

With hearing loss: Ask the family for concerns for balance, look at degree of hearing loss, ask about age to walk and sit; outlined by Janky et al, 2018.

Bedside testing

Head Impulse test-good for all ages

One foot stance- outlined by Oyewumi et al, 2016; for ages ~5 and up (with hearing loss)

Head righting reflex- good for those under 18 months

Visual Acuity Screening- good for those who can read or identify shapes

Ages and Stages Questionnaire- screener to look at motor milestones

Modified Clinical Test of Sensory Interaction on Balance- good for those who can stand independently, normative data down to 6 years old

### **References:**

1. Oyewumi, M., Wolter, N. E., Heon, E., Gordon, K. A., Papsin, B. C., & Cushing, S. L. (2016). Using Balance Function to Screen for Vestibular Impairment in Children With Sensorineural Hearing Loss and Cochlear Implants. *Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology*, 37(7), 926–932.
2. Janky, K. L., Thomas, M., High, R. R., Schmid, K. K., & Ogun, O. A. (2018). Predictive Factors for Vestibular Loss in Children With Hearing Loss. *American journal of audiology*, 27(1), 137–146.
3. Braswell, J., & Rine, R. M. (2006). Evidence that vestibular hypofunction affects reading acuity in children. *International journal of pediatric otorhinolaryngology*, 70(11), 1957–1965.
4. Bachmann, K., Lavender, V., & Castiglione, M. (2018). Development of a Pediatric Balance Center: A Multidisciplinary Approach. *Seminars in hearing*, 39(3), 243–256.