

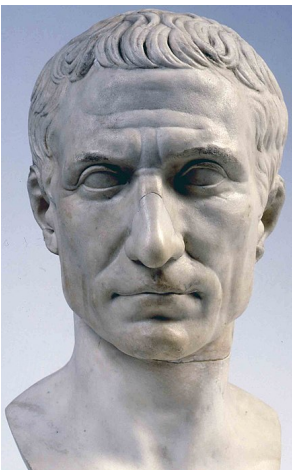
## HINTS Exam<sup>1</sup>

### **HISTORICAL VIGNETTE -**

It is said that Julius Cesar lived with what some of us today would refer to as a terrible disease however in his time it might have been considered “sacred” or a divine intervention. The emperor had many documented bouts of limb weakness, headaches and dizzy spells.

Occasionally impairing his ability to stand at ceremonies or continue on the battlefield. Though his chronic and mysterious illness has been attributed to many rare causes, perhaps his syndrome is in fact more clear today.

**CONTEXT AND USEFULNESS -** Acute vestibular syndrome (AVS) is characterized by acute onset vertigo accompanied by nausea, emesis, nystagmus and unsteady gait. A significant portion of patients presenting with AVS are simply manifesting the signs and symptoms of a vestibular neuritis. However, close to a quarter of these patients are actually exhibiting signs of a central lesion from a cerebellar or brainstem stroke. The H.I.N.T.S.<sup>2</sup> exam is a useful bedside exam that can be applied to these patients in order to distinguish central from peripheral pathology.



### **Model Proper (And Improper) Technique -**

**Head Impulse:** This test relies on a proper functioning vestibulo-ocular reflex. When the reflex is intact, an individual is able to focus on an object directly in front while laterally rotating the head. If peripheral vestibular disease is present, connections between the semicircular canals and the eye muscles are interrupted leading to “corrective saccades”. This however should not be seen in central lesions. In order to perform this correctly, have the patient sit up with his/her head situated 20 degrees away from the side which you intend to turn. Have the patient focus on the examiners nose, then briskly turn (high speed, low amplitude). The examiner should focus on the patient’s eye movements for corrective saccades.

**Bidirectional or changing Nystagmus:** In order to apply the H.I.N.T.S test the patient must have spontaneous nystagmus at presentation. The speed of nystagmus increases with eye movement towards the direction of the fast beating component. This is known as Alexanders Law. In peripheral vestibular disease, the fast beating component is opposite of the peripheral lesion and thus nystagmus increases with unilateral preference away from the lesion. However, in central causes of nystagmus such as in stroke, the nystagmus may increase in speed regardless of the gaze direction revealing the bidirectional or changing nystagmus. In order to properly elicit this finding, have the patient track their eyes to the extreme left or right without fixating on a single point. To do this, place a white piece of paper lateral to the eye and have the patient look past the paper.

**Test of Skew:** In patients with cerebellar or brainstem lesions an abnormal ocular tilt test reaction can be appreciated due to the interruption of the sensory signals to cranial nerve III, IV, VI. Clinically this will manifest as a vertical deconjugate gaze with cross cover testing. Have the patient sit up, look straight ahead while alternately covering one of their eyes. Monitor for signs of ocular hypertropia.

**INTERPRETATION -** A H.I.N.T.S exam that is concerning for a central lesion (cerebellar or brainstem) will manifest with one or more of the following: normal head impulse test (absent corrective saccades), bidirectional or changing nystagmus, and a positive test of skew.<sup>3</sup> Together these signs have a positive **likelihood ratio of 10.8** (sen = 95-99%, spec = 86-94%). The most important interpretation of this test is, that if all three signs are absent the negative likelihood ratio for a central lesion is 0.02.

**CAVEAT AND COMMON ERRORS -** Common errors in interpreting the findings can occur when other pathologies are present. For example, though a normal head impulse test is consistent with posterior fossa lesion a positive head impulse test can be seen in some strokes or demyelinating process that involve the vestibular nucleus. The skew test can be positive in patients who have undergone labyrinthectomy or have destructive labyrinthitis (i.e severe bacterial labyrinthitis). More common and simple reasons for misinterpretation of the above findings could be attributed to inattention or blinking during the exam disguising a corrective saccade.

*Special thanks to **Dr. Carlos Rubiano** for submitting this 5M2.*

<sup>1</sup> Chi J *et. al.* “The Five Minute Moment.” *Am J Med.* 2016 Aug; 129 (8): 792-795.

<sup>2</sup> H.I.N.T.S. stands for **H**ead **I**mpulse **N**ystagmus and **T**est of **S**kew

<sup>3</sup> Kung, N. H., & Van Stavern, G. P. (2018). HINTS in the Acute Vestibular Syndrome: Pearls and Pitfalls. *Journal of Neuro-Ophthalmology.*, 38(2), 244–250.