

Vestibular Dysfunction in Blast Exposed Active-Duty Service Members: A Case Series

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BACKGROUND

- **Blast-related mild traumatic brain injury (mTBI)** is common among active-duty service members.
- **Persistent symptoms** may include cognitive fatigue, headache, and mood disturbance, as well as dizziness despite normal standard vestibular testing.
- Ongoing symptoms may warrant **evaluation for visual-vestibular dysfunction** and underlying phenotypic variation (VVP).

METHODS

- **Participants:** Two active-duty service members with career low-level blast exposure and persistent post-concussive symptoms.
- **Vestibular Assessment:** SOT, VNG, caloric testing, cVEMP, and oVEMP.
- **Patient-Reported Outcomes:** HIT-6 and DHI.



Figure 1: Representative vestibular assessment procedures. Left: Ocular vestibular evoked myogenic potential (oVEMP) testing. Right: Sensory Organization Test (SOT) using computerized dynamic posturography (CDP).

CONCLUSIONS

- **Visual-vestibular dysfunction may be present despite normal vestibular testing.**
- **Mild dizziness (DHI: 28-30/100) contrasted with severe headache burden (HIT-6: 58-60/78), showing symptom discordance.**
- **VEMP detects partial peripheral vestibular dysfunction not detected by standard tests.**
- **Integrated VEMP with functional testing may improve phenotype identification and mTBI care precision.**

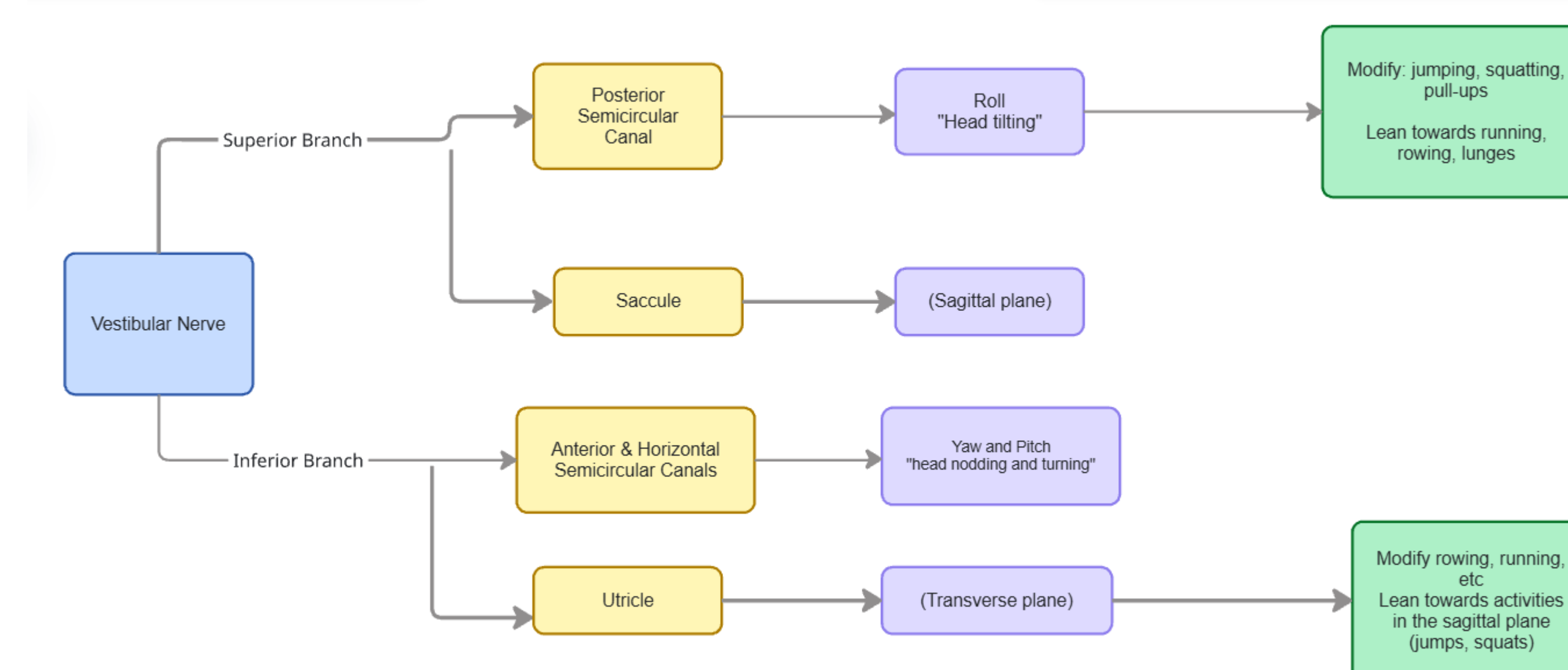


Figure 2: Outline of the vestibular nerve anatomy, highlighting the structures innervated by its superior and inferior divisions, their associated planes of motion, and corresponding activity modifications when these pathways are impaired.

FUTURE DIRECTIONS

- Investigate longitudinal responsiveness to targeted vestibular rehabilitation interventions in individuals with VVP.
- Evaluate integration of VVP screening into standard post-mTBI assessment protocols.
- Validate treatment approaches and expand clinician education to improve recognition and management of VVP.

Are you—or someone you know—a Veteran?
The Matthew Gfeller Center at UNC-Chapel Hill's Transforming Health & Resilience in Veterans (THRIVE) Program provides comprehensive evaluation and treatment for Veterans living with the lasting effects of TBI, PTSD, and related conditions.
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RESULTS

Case 1: SOT and VEMP Graphs

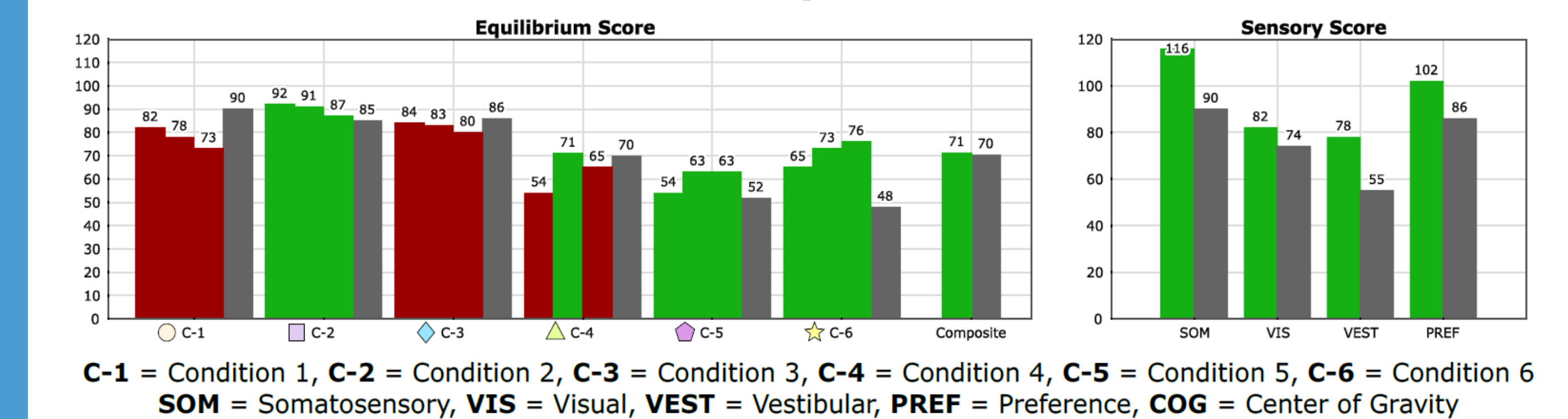


Figure 3: SOT results for Case 1 showed a progressive decline in equilibrium during Condition 2 (eyes closed), with abnormal scores in Conditions 3 and 4. In Condition 4, performance improved on the second trial but declined markedly on the third.

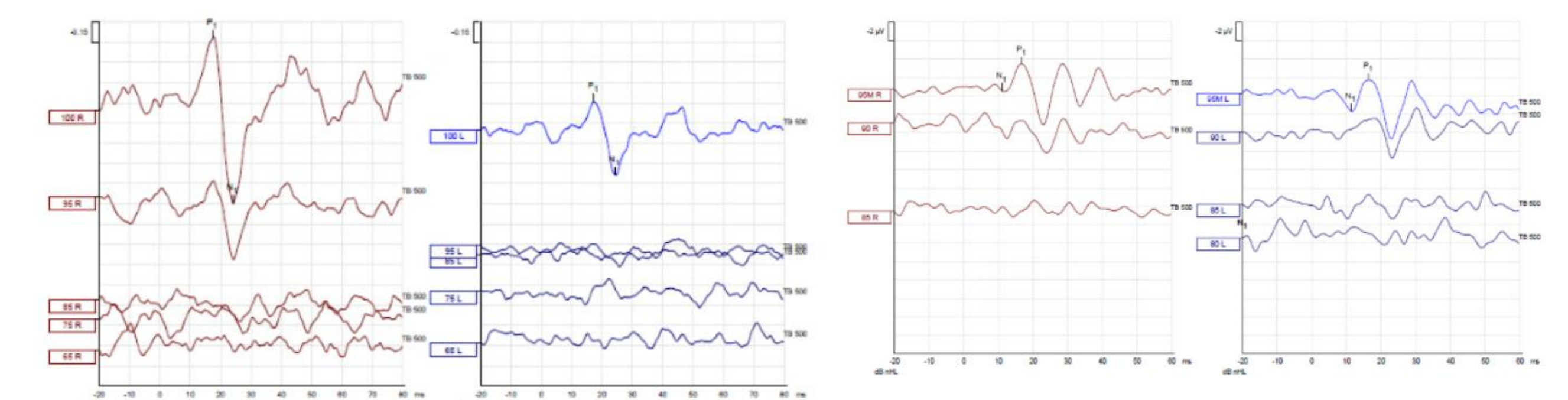


Figure 4a: cVEMP thresholds were 95db in the right ear and 100db in the left, with a 38% amplitude asymmetry reflecting reduced left-sided responses.

Figure 4b: cVEMP thresholds were 90db in the right ear and 95db in the left, with a 6% amplitude asymmetry.

Case 2: SOT and VEMP Graphs

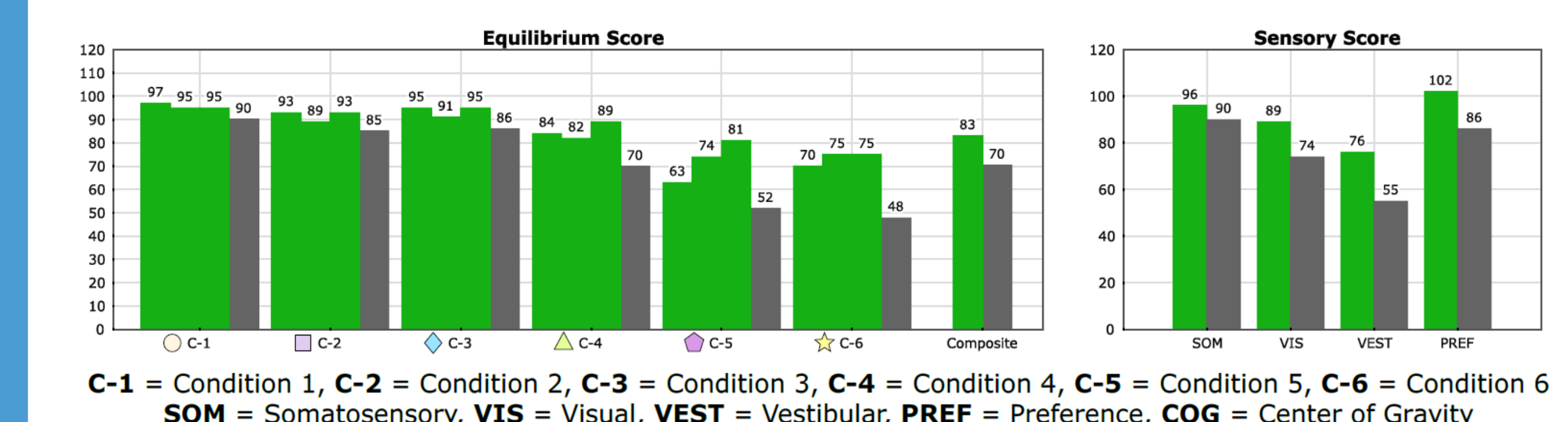


Figure 5a: SOT results for Case 2 showed equilibrium scores within normal limits across all conditions, though symptoms were reproduced during Conditions 2 and 5.

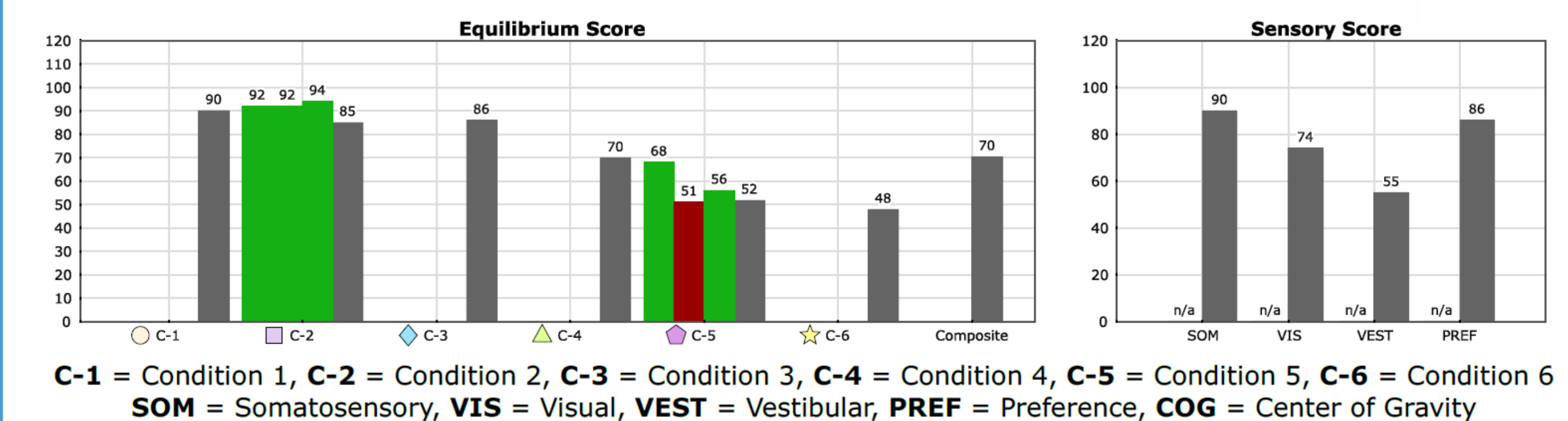


Figure 5b: A modified head-shake SOT assessing head-on-body movement showed normal equilibrium in Condition 2 and reduced scores in Condition 5.

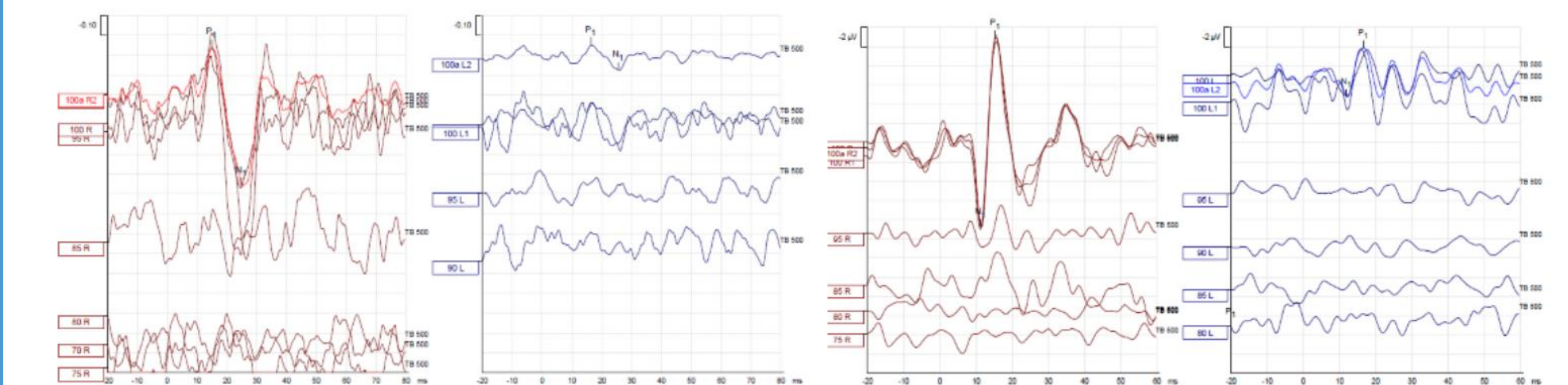


Figure 6a: cVEMP thresholds were 95db in the right ear and 85db in the left. Amplitude asymmetry was 69%, with reduced responses on the left.

Figure 6b: cVEMP thresholds were 85db for both the right and left ears. Amplitude asymmetry was 59% with reduced responses on the left.