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Fukuda Stepping Test

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Fukuda Stepping Test: Sensitivity and Specificity

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**Includes Fukuda Stepping Test Assessment.
Located in Appendix.**

Fukuda Stepping Test: Sensitivity and Specificity

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Abstract

Background: A vestibulospinal test known as the Fukuda stepping test (FST) has been suggested to be a measure of asymmetrical labyrinthine function. However, an extensive review of the performance of this test to identify a peripheral vestibular lesion has not been reported.

Purpose: The purpose of this study was to evaluate the sensitivity and specificity of the standard FST and a head shaking variation for identification of a peripheral vestibular system lesion.

Research Design: In this retrospective review, we compared performance on the FST with and without a head shaking component to electronystagmography (ENG) caloric irrigation unilateral weakness results.

Study Sample: We studied these factors in 736 chronic dizzy patients.

Results: Receiving operating characteristics (ROC) analysis and area under the curve (AUC) indicated no significant benefit to performance from the head shaking variation compared to the standard FST in identifying labyrinthine weakness as classified by caloric unilateral weakness results.

Conclusions: These findings suggest that the FST with and without head shake component is not a reliable screening tool for peripheral vestibular asymmetry in chronic dizzy patients; however, future research may hold promise for the FST as a tool for patients with acute unilateral disorders.

Key Words: Caloric irrigations, Fukuda stepping test, head shake, unilateral weakness

Abbreviations: AUC = area under the curve; FST = Fukuda stepping test; ROC = receiving operating characteristics; UW = unilateral weakness

The ability to close one's eyes and step in place without turning depends on normal vestibulospinal and proprioceptive function. In particular, vestibulospinal tests such as stepping tests evaluate motor reactions of the head and neck that are dependent on vestibular sensory input. A variation on the tretversuch test by Unterberger (1938) and the waltzing test by Hirsch (1940) was proposed by Fukuda in 1959 and named the stepping test. The test is suggested to identify the weaker of the labyrinths (not necessarily the side with the lesion) by the direction of the rotation of a patient while walking in place with eyes closed. In the original work by Fukuda, 500 normal subjects were blindfolded and asked to extend both arms and march in place for 50 to 100 steps. The maximum rotation noted was 30° to either side with 50

steps; a deviation of greater than 30° about the vertical axis suggested asymmetrical labyrinthine function with the weaker side identified by the direction of rotation.

Peitersen (1964) used a modified version of the Fukuda stepping test (FST) to observe individuals with chronic unilateral inner ear or vestibular nerve damage. Individuals with unilateral dysfunction were noted to rotate to the side of the unilateral deficit. Jordon (1963) examined the reliability of a modified FST on 49 air-crew candidates. Each subject was instructed to perform two 30-step tests at two-hour intervals. A poor correlation between the test performances was noted as the angle of rotation varied for each subject on the two trials. The authors questioned the reliability of predicting imbalance of the labyrinthine system based on the poor reliability scores.

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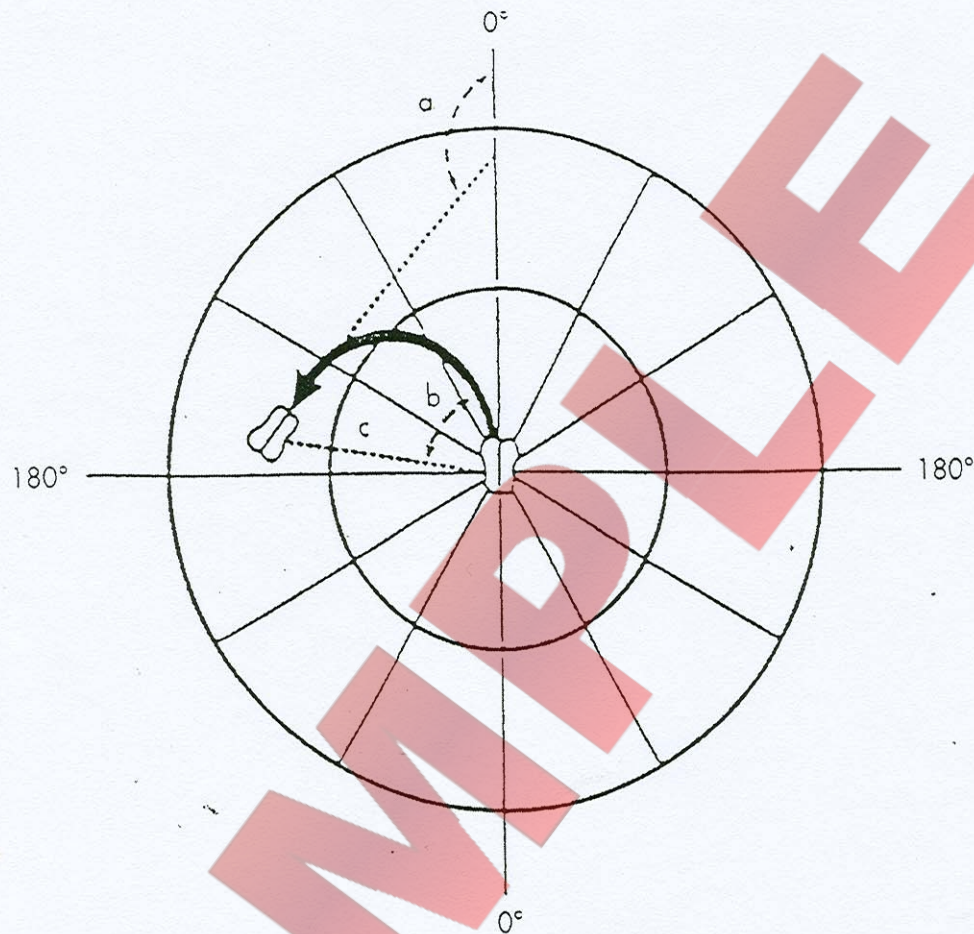


Fig. 28-15. The Fukuda stepping test for peripheral vestibular clients uses a floor grid to detect the extent of drift that occurs during an eyes-closed stepping task. (Reprinted from Newton R: *Brain Injury* 3:335. 1989.)

Adapted from: Umphred DA. *Neurological Rehabilitation*. 3rd ed. St. Louis, MO: Mosby, Inc. 1995.

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