From the Morton and Gloria Shulman Movement Disorders Clinic and the Edmond J. Safra Program in Parkinson's Disease, Division of Neurology (A.F.), Division of Neurosurgery (F.S., M.L., A.M.L.), Toronto Western Hospital–UHN, University of Toronto and Krembil Research Institute (A.F., A.M.L), Toronto, Ontario, Canada.

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Correspondence to Dr. Fasano: alfonso.fasano@uhn.ca

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Francis B. Panosyan, MD, PhD
Joan M. Mountain, RN
Mary M. Reilly, MD
Michael E. Shy, MD
David N. Herrmann, MBBCh

Supplemental data at Neurology.org

RYDEL-SEIFFER FORK REVISITED: BEYOND A SIMPLE CASE OF BLACK AND WHITE

In 1903, A. Rydel and F.W. Seiffer published the use of what is now commonly known as the Rydel-Seiffer tuning fork.[1] In their paper, they described an adaptation of the standard tuning fork to make it semiquantitative on an 8-point scale in measuring vibration sensing. The Rydel-Seiffer tuning fork has been used extensively over the past century and normative values have been published.[2] It has also been validated with the use of more modern sensory nerve action potentials.[3] Vibration threshold measurement with the Rydel-Seiffer tuning fork is therefore increasingly used in outcome measures assessing neuropathy from diverse etiologies: chemotherapy-induced peripheral neuropathy,[4] Charcot-Marie-Tooth disease,[5] multifocal motor neuropathy,[6] and immune-mediated neuropathies.[7]

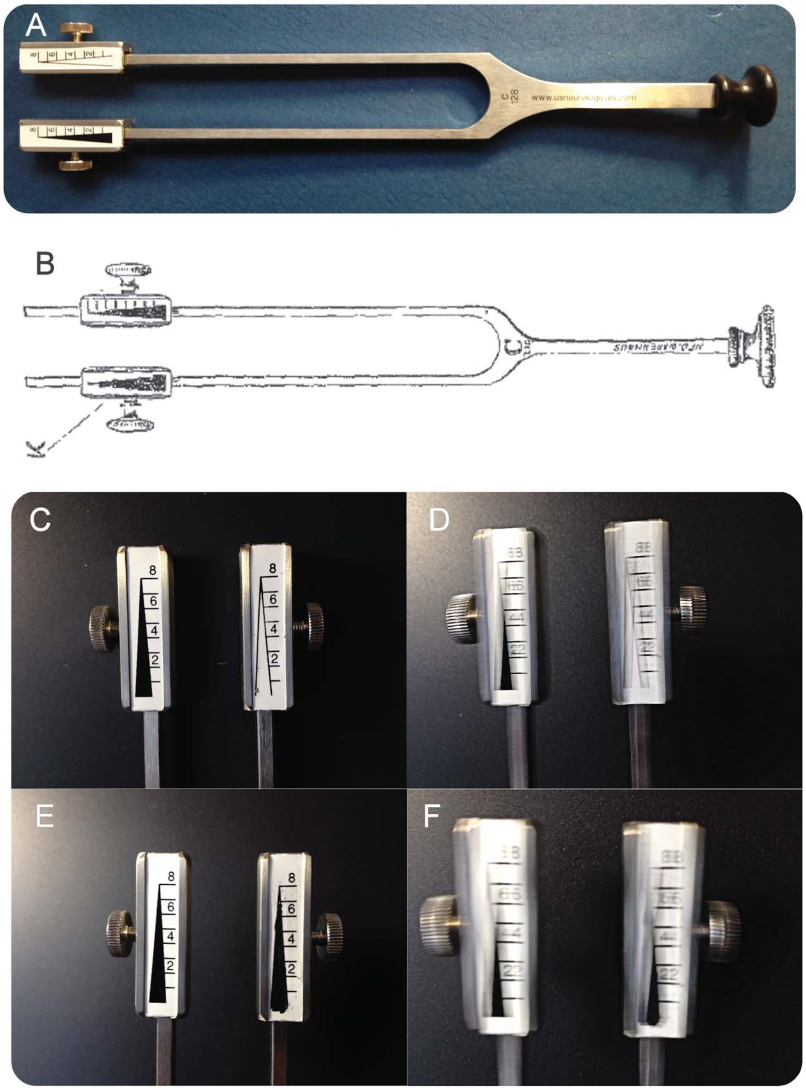
The modern Rydel-Seiffer tuning fork has a black triangle on one prong and a white triangle on the second prong (figure, A). After the fork is snapped into motion, the prongs start to oscillate and the illusion of 2 triangles becomes visible on each damper. The intersect between the 2 virtual triangles moves up the scale with gradual attenuation of the amplitude of the oscillation. The position of the intersect is recorded on an arbitrary scale from 0 to 8 once the subject is no longer perceiving vibration.

We have observed consistent discrepancy between the values obtained from the black triangle in comparison to the white triangle on the Rydel-Seiffer fork. Values obtained from the virtual intersect of the white triangle are consistently lower in comparison to that from the black triangle (figure, C and D). This discrepancy can be as much as 25% or 2 units in the scale of 0 to 8. This is best appreciated during the motion of the prongs (video on the *Neurology*® Web site at Neurology.org).

There is currently no report distinguishing between the black and white scales and both are used interchangeably.[2,3] Of note, the original publication from Rydel and Seiffer depicts the tuning fork with 2 black triangles on the dampers (figure, B). It is unclear as to why or when a modification was made and one of the black triangles was substituted with a white triangle.

Remarkably, the observed discrepancy between the 2 scales can be eliminated by simply darkening the white triangle on the fork with a marker (figure, E and F). It is of interest that, upon introducing color to the white triangle (purple or red), the readings obtained from the black triangle showed lower values in comparison

Figure Rydel-Seiffer tuning fork



(A) An example of a modern-day Rydel-Seiffer tuning fork. (B) Original design of the tuning fork as published by Rydel and Seiffer in 1903 (reprinted with permission of Springer).[1] (C) Rydel-Seiffer tuning fork at rest. (D) Rydel-Seiffer tuning fork in motion with the black triangle showing intersect between 4 and 5 (on the 0 to 8 scale) and white triangle showing intersect between 3 and 4 (discrepancy is better appreciated in the video). (E) Same Rydel-Seiffer tuning fork with the white triangle blacked out at rest. (F) Rydel-Seiffer tuning fork with 2 black triangles in motion showing equivalent reading with intersect at 4.

to the colored triangle (video). The perceived intersection between the triangles seems to be therefore influenced by the contrast and the color of the triangles. This is likely attributable to visual afterimage processing, although a more tangible explanation remains elusive.

To maintain an acceptable interrater reliability in the use the Rydel-Seiffer tuning fork, we suggest that the original design with the 2 black triangles is considered. Alternatively, consensus should be established on which triangle to use in the future for clinical practice and clinical research.

From the Department of Neurology (F.B.P., J.M.M., D.N.H.), University of Rochester Medical Center, NY; MRC Centre for Neuromuscular Diseases (M.M.R.), UCL Institute of Neurology, London, UK; and Department of Neurology (M.E.S.), University of Iowa Hospitals and Clinics, Iowa City.

Author contributions: Francis B. Panosyan: concept and design, acquisition of data, analysis and interpretation of data. Joan M. Mountain: revising the manuscript for content, acquisition of data. Mary M. Reilly: analysis and interpretation of data, revising the manuscript for content. Michael E. Shy: analysis and interpretation of data, revising the manuscript for content. David N. Herrmann: analysis and interpretation of data, revising the manuscript for content, supervisor.

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Correspondence to Dr. Panosyan: Francis_Panosyan@urmc.rochester.edu

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