

# Perspective: Concussion in the Twenty-first Century: An Optometric Perspective

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The phenomenon of concussion is not a new medical problem. It dates back to ancient Greece, in the Hippocratic Corpus, as “commotio cerebri”.<sup>1</sup> It is derived from the Latin word ‘concutere’ meaning “to shake violently,”<sup>2</sup> which is a great, intuitive description for the typical ‘coup-contrecoup’ injury found in this population. The word concussion has been used over the past century in a variety of contexts, but mainly in sports, with the phrases “death harvest” in football (1905)<sup>3</sup> and “punch drunk” in boxing (1928).<sup>4</sup> This important issue of concussion continues today, with even greater intensity and interest. This has come about as a result of the recent wars in Afghanistan and Iraq, where mTBI/concussion was the “signature injury”<sup>5</sup> and really the “invisible” injury in many cases. This then led to the present area of sports concussion,<sup>6</sup> in particular those involving considerable physical contact, once again focusing on football and boxing. Thus, the area has come the full circle over the past 100 or so years.

This recent attention has had a positive aspect. It has alerted the medical establishment, and the optometric community, to the general problem, and more specifically to the constellation of visual problems so prevalent in this population.

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This includes general refractive, binocular/oculomotor, and ocular health issues, with their unique problems in each of these areas.<sup>7,8</sup> More specifically, they include a range of oculomotor and non-oculomotor deficits. In the former case, there are dysfunctions of the versional (e.g., saccadic dysmetria, reading eye movements), vergence (e.g., convergence insufficiency), and accommodative (e.g., accommodative insufficiency) systems, and thus there are a range of motor dysfunctions. Under non-oculomotor deficits, this includes abnormal egocentric spatial localization, photosensitivity, motion sensitivity, vestibular problems, visual field defects, and visual information processing and perceptual dysfunctions — and thus there is a range of

sensory and perceptual dysfunctions. Lastly, there is a range of non-vision-based problems (e.g., attentional issues, cognitive deficits) that, in general, we as optometrists cannot address directly except by referral. However, these non-vision-based problems are important to recognize and address, as their presence will likely adversely impact on the patient's prognosis and progress in vision rehabilitation.

Over the past decade, our profession of Optometry has "stepped up" to fill this gap and the visual needs in a multitude of ways in this population, for both the civilian and military population. First, we have attended and participated in professional meetings of the military and veteran's associations dealing with this important topic. Second, we have organized symposia dealing with the topic at all of the national optometric organizations, including COVD and the American Academy of Optometry, and furthermore have published these proceedings as 'special' issues of the various journals (e.g., JOVP, VDR). Third, we have organized specific courses in the area at COVD and NORA, and other organizations. Fourth, we have been politically active at the national governmental level to lobby support for these ideas and related congressional bills. Fifth, we have been given hospital privileges to assess and treat the mTBI/TBI patient in the hospital setting. Sixth, we have been aggressive in our clinical and basic research in the area, for example developing objective approaches in the diagnosis and treatment of concussion/mTBI, including attempting to find the related, diagnostic "visual biomarker" for its presence.<sup>9</sup> Seventh, we have developed a residency programs in this area (e.g. Neuro-Optometric Rehabilitation at SUNY College of Optometry), with others likely to follow in the near future, as well as fourth year externships in this area of optometry. Lastly, COVD has started a new journal, most appropriately named, "Vision Development and Rehabilitation," with the goal of providing

the latest optometric and interdisciplinary clinical research in this exciting area.

In doing the above, and more, we in Optometry have increased our clinical abilities and acumen in the area to help diagnose and remediate the range of sensory, motor, and perceptual dysfunctions frequently found in patients with concussion, with yet further advances to develop the most efficacious treatments for these visual problems in additional randomized clinical trials.<sup>10</sup> Given the above, the future bodes well for the optometric care of vision problems in the "concussion/mTBI" patient.

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