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## Editorial Perspective.

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## Editorial Perspective

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The EBSJ section of *GSJ* welcomes this study as an important contribution to our understanding of the larger field of spinal diseases for several reasons.

First, it will hopefully serve as a useful reminder for all spine surgeons to consider neurodegenerative diseases such as amyotrophic lateral sclerosis (ALS) as a differential diagnosis in their assessment of patients presenting with symptoms like motor weakness, clumsiness, spasticity in their extremities. This is all the more important in this disease entity as it can disproportionately affect relatively young individuals who are perceived to be very fit and of outstanding health. While this study did not seek to address the time to diagnosis and the incidence of delay or missed diagnosis of ALS due to a preliminary focus on spine disorders it stands to reason that many of the athletes affected by this devastating disease probably received nondirected care for their presenting symptoms for some duration. Hopefully our spine surgeon readers will take the time to read up on more recent fact sheets on this disease.<sup>1</sup>

Second, and perhaps more important, our understanding of the vulnerability of neuronal tissue to concussive trauma has undergone a dramatic shift over the past decade with the increased focus on traumatic brain injuries and chronic traumatic encephalopathy.<sup>2,3</sup> It very much stands to reason that our insights into the susceptibility of our neurons to concussive trauma are nowhere complete and moreover that there is no reason why the cervical spinal cord should be more insulated from such trauma than brain tissue. With increasing understanding of pathologic reactions brain tissue subjected to blunt trauma, our understanding of neurotrauma has entered a new phase. Perhaps, in the not too distant future, the same mechanisms will be recognized for the spinal cord as well, as neuroimaging and availability of biomarkers will hopefully improve with the recently increased emphasis on brain injuries and increased funding support.

Furthermore, with increasing genetic mapping being available it appears that there are different pathways or actual diseases present, which are currently subsumed under the term “ALS.” Improved understanding of potential risk exposures and more refined data gathering for relatively rare conditions will be helpful to establish more accurate predictive modeling. For instance, in the present study repetitive head impact trauma had not been directly investigated, leading the authors to

having to extract such types of athletes from more general athletic activities.

This study can be probably best described as a “sentinel study” in which investigators try to identify a relatively rare, but very serious condition from available larger datasets. Their efforts are obviously limited by the statistical tools used and then reported by previous researchers.

One of our reviewers correctly pointed out that there are inherent problems when researchers try to incorporate *odds ratios* and *risk ratios* into a single meta-analysis. These 2 entities can obviously not be “mashed together” and they are clearly not interchangeable.<sup>4</sup> After consultation with statisticians we believe that the authors did provide due diligence by developing a common “proportional mortality rate” (PMR) from the overall mortality and incidence rates quoted in their source articles and that they applied a stringent “risk of bias” analysis to all available studies on this subject. A helpful review for the statistical background for such constructs can be found courtesy of the Cochrane Collaborative.<sup>5</sup>

Overall, this article provides a sobering review of what we know right now on the causes of ALS, which remains little, despite major public campaigns such as the “ice bucket challenge.”<sup>6</sup> This study, just as predecessors obviously struggles with the enormous task of extracting the proverbial needle of a very specific disease entity, ALS, with its delayed but grave impact, from a gargantuan haystack of big data. While there can be some justified criticism of their “sentinel event” study approach in the bigger picture this seems to a novel and meritorious undertaking as we humans can only see what we are looking for and Blecher and his coauthors have opened a new vision for future investigations. Based on this large-scale systematic review there seem to be enough concern raised to warrant inclusion of ALS and ALS type disorders into existing data bases for professional sports leagues with head impact potential, like American and Canadian Professional Football, rugby, hockey, soccer, boxing and many other similar impact sports similar to what is being done for the evaluation of long-term effects of traumatic brain injuries.

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