UNITED STATES DISTRICT COURT

DISTRICT OF MINNESOTA

In re NATIONAL HOCKEY LEAGUE PLAYERS' CONCUSSION INJURY LITIGATION This Document Relates To: ALL ACTIONS.	MDL No. 14-2551 (SRN/JSM) REBUTTAL DECLARATION OF STEPHEN T. CASPER, PH.D

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I. INTRODUCTION

My name is Dr. Stephen T. Casper, and I submit this rebuttal declaration in response to the NHL's attacks on the Declaration of Stephen T. Casper, Ph.D ("Declaration").[1]

My Declaration begins with approximately eleven pages dedicated solely to the methodology underlying my Declaration, explaining in thorough detail how – and why – I reached the conclusions that I did. Some of the NHL's opposition experts, such as Dr. McKeag, dedicate less space to the entire substantive portion of their declaration than I did to my methodology, with no regard to discussion of their own methodology.[2] Dr. McCrory's declaration[3] is longer than Dr. McKeag's and yet he also foregoes any discussion of methodology, requesting instead that diligent readers interpret his findings as non-partisan statements of science, relying on faith alone. Dr. Lisa Brenner's declaration[4] argues that systematic review is the only credible methodology for reviewing the historical record, and uses that basis to criticize my Declaration but does not present an alternate, "correct" declaration using the methodology she touts. Ultimately, the NHL produced several experts that are well-qualified as naysayers, but failed to produce a declaration that shows that my interpretation of the historical record is incorrect. No such "alternative record" exists, and certainly not one produced with

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1 Dkt. 644.

2 *See* Declaration of Douglas B. McKeag, M.D., M.S. ("McKeag Decl."), Dkt. 732-8.

3 Declaration of Paul R. McCrory ("McCrory Decl."), Dkt. 732-7.

4 Declaration of Lisa A. Brenner, Ph.D ("Brenner Decl."), Dkt. 732-1.

neutrality and academic integrity. Instead, the NHL's experts rely on anecdote and selective interpretation of scientific literature, seemingly picked at random.

Most critically, the NHL and its declarations target my credentials as a medical historian, and my decision to not parse through all of the literature and categorize it using their preferred definitions of head trauma. They attack my decision to review each piece of evidence as equally relevant to the historical record, ultimately concluding that I am unqualified to render my opinion on the history of medical and scientific knowledge as it relates to the dangers of head trauma. As explained below, these arguments are predicated on an artificially, and intentionally, hyper-partisan caricature of the historical record, a misunderstanding of the role of a historian, and deployment of similar lines of thinking as those proffered by tobacco companies and their supporters, who sought to obfuscate the negative effects of smoking in the mid-20th century.

II. REBUTTAL

A. My Expertise and Qualifications Are Significant and Bolster My Declaration

In an effort to discredit my Declaration and combat the opinions expressed therein, several NHL experts decided not to disprove its contents, but instead to question my historical expertise, my methodology, and my inclusion of the full spectrum of head injuries. Some NHL experts claim that, without a medical degree (and specialization in neurology), it would be improper for a medical historian to opine on the history of medicine.[5] On the contrary, however, the substance of my Declaration is the

[5] McKeag Decl., ¶¶27-28.

prototypical example of a medical historian offering an opinion within their expertise, and was subject to identical methodological rigors as any other medical historical academic work would be. Not a single one of the NHL's experts retained on this topic have comparable credentials or experience in this field, and the relatively rudimentary historical records discussed in their declarations reinforce this fact. Other of the NHL's experts resort to carelessness or condescension, as is the case with Dr. McCrory's decision to refer to me as "Mr." throughout the entirety of his declaration.[6] Any reader should interpret such rudimentary or careless statements with appropriate skepticism.

My credentials in the field of medical history speak for themselves. I hold a Ph.D. in the History of Medicine from University College London, and my formal training and work experience are all precisely the subject matter of my Declaration. Any rebuttal that fails to use a discernable historical methodology, such as the NHL experts' rebuttals here, do not undermine my expertise. In the time since I became involved in these proceedings – July 2015 – I have been an invited speaker on the topic of the history of medicine (and neurology, in particular) at: (1) the World Congress of Neurology in Santiago, Chile, (2) Manchester University, (3) the Autonomous University of Barcelona, (4) Cornell-Weill Medical School, (5) the Institute for the History of Medicine at Johns Hopkins University, (6) the University of Leeds, (7) the University of New Hampshire, and (8) Columbia University. In May 2017, I was invited to give "Neurology Grand Rounds" at Dartmouth University Medical School. I

[6] *See generally* McCrory Decl.

also published peer-reviewed articles in the prestigious *Canadian Medical Association Journal*, *The Canadian Bulletin of the History of Medicine*, and *Social History of Medicine*, and co-edited a peer-reviewed volume published by University of Rochester Press entitled *The History of the Mind and Brain Sciences: Technique, Technology, and Therapy*. I have forthcoming peer-reviewed articles in the *Canadian Medical Association Journal* and *Headache*. These credentials reinforce my authority to opine on the topics discussed in my Declaration. Contrast my expertise in the history of medicine with the NHL's experts. Not only are none of them a medical historian, but the NHL did not even retain a medical historian, which is surprising given the vast and lengthy medical historical record relating to the dangers of head trauma.

B. It Was Appropriate to Consider All Forms of Head Injury Discussed in the Historical Record

My Declaration accurately sets forth the fact that hockey players regularly experience head injuries of varying severity. NHL hockey is an industry where subconcussive blows result in broken noses, lost teeth, and facial lacerations. Concussions occur as a matter of routine. A loss of consciousness occurs frequently enough to be reported in newspapers.[7] Bare-knuckle fighting is one way the industry sells itself as a spectator sport.[8] None of these self-evident facts are discussed at any length by the NHL's experts.

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[7] *See, e.g., Canucks' Larsen leaves on stretcher after huge hit by Hall*, CBC SPORTS (Dec. 6, 2016), http://www.cbc.ca/sports/hockey/nhl/canucks-philip-larsen-devils-taylor-hall-1.3884681.

[8] *See generally* Declaration of D'Arcy Jenish, Dkt. 643, §VI.

Throughout the post-war period (1945 through the present), head injury researchers (including clinicians, scientists, and engineers) have been calling attention to the dangers of single and recurrent concussions. Consider a few of many examples from the 1950s: in 1951 a prominent neurophysiologist deplored the public's ignorance of the dangers of repeated concussions.[9] In 1952, it was clear to a founder of American sports medicine that three concussions in one season was sufficient to indicate cessation of the sport – permanently.[10] In 1955, authorities, among them a prominent neurosurgeon, warned that injuries too mild to cause concussive effects produced "cellular changes" in the brain stem and medulla, "which may explain certain reversible posttraumatic states seen in the human."[11] In 1957, one of the most eminent neurologists of his generation characterized the tangle pathology of chronic traumatic encephalopathy (CTE).[12] And, an engineer in 1958 wrote of the need to design helmets to protect heads against subconcussive and concussive blows in order to prevent the pathology of CTE from initiating.[13]

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[9] F. Gibbs, *The Most Important Thing*, 41 AM. J. PUB. HEALTH 12, 1503-08, 1506 (1951).

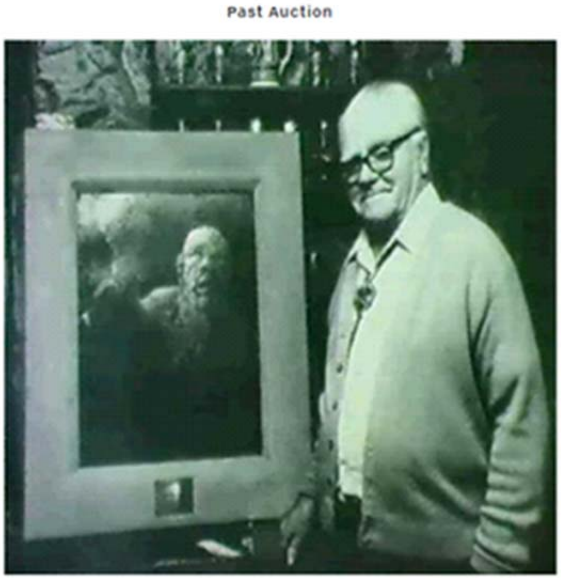
[10] A. Thorndike, *Serious Recurrent Injuries of Athletes: Contraindications to Further Competitive Participation*, 247 NEW ENG. J. MED. 15, 554-56, 554 (1952).

[11] E. S. Gurdjian, H. R. Kissner, and J. E. Webster. *Observations on the Mechanism of Brain Concussion, Contusion, and Laceration.* 101 SURGERY, GYNECOLOGY & OBSTETRICS, 680-690, 684 (1955).

[12] M. Critchley, *Medical Aspects of Boxing, Particularly from a Neurological Standpoint*, 1 BR. MED. J. 5015, 357-62 (1957).

[13] A.G. Gross, *A New Theory on the Dynamics of Brain Concussion and Brain Injury*, 15 J. NEUROSURG. 5, 548-61, 548 (1958).

To demonstrate the pervasiveness of such knowledge, in 1974 actor and artist James Cagney painted a memorable study of a suffering boxer (Figure 1), titled "The Winner: Chronic Progressive Fibrotic Encephalopathy (Punch Drunk):



Artist: James Cagney (American, 1899–1986)

Title: *THE WINNER: CHRONIC PROGRESSIVE FIBROTIC ENCEPHALOPATHY (PUNCH DRUNK); TOGETHER WITH PHOTO OF ARTIST WITH WORK*

Figure 1.

Cagney obtained the name of this condition from his brothers, who were physicians.[14] These views and acceptance of the existence of this neurodegenerative condition would be echoed again and again in medicine, as discussed at length in my initial Declaration.

[14] R. Smith, *Jim Cagney Takes Off the Gloves*, N.Y. TIMES (Sept. 11, 1974).

As the historical record advanced to the present, greater detail about the mechanism and pathology of CTE and other effects of head trauma was discovered, but contemporary researchers have also continued to validate the findings of past eminent authorities.[15] They have unsurprisingly found CTE in numerous contact sports players, including NHL hockey players.[16] In the same year (and journal) that a case of CTE in a retired football player was reported,[17] one of the NHL's own experts reported general evidence that retired football players showed elevated incidence of cognitive decline.[18] Despite this, even as experts on all sides of this case have joined together and showed, in a systematic review, that what people were saying in the 1950s (and before) remains

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[15] For example, 63 years after Gurdjian noted the cellular changes in the brain from head trauma not severe enough to cause a concussion, one widely reported study again concluded that "closed-head impact injury, independent of concussion, represents a potent insult with potential to induce enduring neurophysiological dysfunction and persistent (and possibly progressive) sequelae, including CTE brain pathology." Tagge, C. A., *et al.*, *Concussion, microvascular injury, and early tauopathy in young athletes after impact head injury and an impact concussion mouse model*, BRAIN (Jan. 18, 2018) at 2, 31. Tagge's study, not surprisingly, starts with an acknowledgment that Martland and Critchley each found (in 1928 and 1949, respectively) "[a]n association between sports-related head injuries and chronic neuropsychiatric disturbances[,]" which condition, in 1934, was termed "traumatic encephalopathy," and in 1949 and 1957, was termed "chronic traumatic encephalopathy." *Id.* at 2.

[16] *CTE found in Probert's brain tissue*, NHL.COM (Mar. 3, 2011), https://www.nhl.com/news/cte-found-in-proberts-brain-tissue/c-554909.

[17] B.I. Omalu *et al.*, *Chronic Traumatic Encephalopathy in a National Football League Player*, 57 NEUROSURG. 1, 128-34 (2005).

[18] K.M. Guskiewicz *et al.*, *Association between Recurrent Concussion and Late-Life Cognitive Impairment in Retired Professional Football Players*, 57 NEUROSURG. 4, 719-26, 719 (2005).

correct,[19] the NHL's experts say that it would have been irresponsible for doctors advising NHL players to warn players about these risks.

In the broadest terms, the NHL's experts' view of my methodology and inclusion of a range of historical categories of head injury in my Declaration is contradictory at best. In part, they present a disingenuous intuition that the historical definitions of concussion and its sequelae ought to be exactly as the NHL wants them to be today. At the same time, the NHL's proffered experts say medical investigation of these issues is only a very recent phenomenon and thus appear surprised to learn, for example, that the definition of concussion today has a high degree of commonality with that in the nineteenth century. Perhaps it is because these truths challenge their myths and memories as skeptics of the risk of repeated blows to the head.

Regarding the historical definitions of concussion, Dr. McCrory offers minimal changes to the definition he and his colleagues developed for their meetings of industry insiders as evidence of change.[20] Dr. McKeag recalls – wrongly – that a loss of consciousness was always the definition of concussion.[21] Dr. Brenner offers as her evidence the fact that MTBI was defined in 1993, but for some reason postulates that this means she and her colleagues invented MTBI research.[22] Most ignore that in his

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[19] G. Manley *et al.*, *A systematic review of potential long-term effects of sport-related concussion*, BR. J. SPORTS MED. (2017).

[20] McCrory Decl. ¶¶36-40, 72.

[21] McKeag Decl. ¶16.

[22] Brenner Decl., §II.B; Table 1.

deposition, Dr. Cantu indicated the definition had been "tweaked" over the years, a view I fully validated as historically correct.[23]

I was surprised that Drs. Brenner and McKeag were unaware of the origins of the terms post-concussion syndrome and CTE.[24] As an initial matter, it is true that mental nomenclature has seen much revision throughout the entirety of the twentieth century, and few with any awareness of psychiatry today and the many revisions to the *Diagnostics and Standards Manual of Mental Disorders* would deny it. The genealogy has been complex for the psychiatric sequelae of head injury, not least because of the influence of Freud and psychoanalysis on American and British psychologists and psychiatrists, which lasted into the 1950s, as discussed in ¶¶132-134 and ¶143, of my Declaration.

Nonetheless, the genealogy of CTE, neurologically speaking, is quite clear. Traumatic dementia in the nineteenth century evolved in the hands of clinicians towards those observations about traumatic encephalopathy that first appeared in Osnato and Giliberti (1927),[25] and which were subsequently described through the example of *Punch Drunk* by Martland,[26] and then fleshed out further in publications by Osnato

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[23] Deposition Transcript of Robert C. Cantu, M.D., Feb. 22, 2017 at 289:4 – 290:13.

[24] Brenner Decl. ¶45 n.46; McKeag Decl. §C.

[25] M. Osnato & V. Giliberti, *Postconcussion Neurosis - Traumatic Encephalitis. A Conception of Postconcussion Phenomena*, 18 ARCH. NEUR. & PSYCHOL. 2, 181-214 (1927).

[26] H.S. Martland, *Punch Drunk*, 91 JAMA 15, 1103-07 (1928).

(1930),[27] Strauss and Savitsky (1934),[28] and then many others like Critchley (1957)[29] afterwards. Ignoring these historical facts, Dr. McCrory speculates that traumatic dementia refers only to a "persistent vegetative state." That is false. McCrory's speculation does not rebut the historical record of concussion research and is implausible, given that "persistent vegetative state" was coined and discovered in 1972.[30] Nor does McCrory's speculation make common sense. In the late nineteenth century there were only minimal hydration technologies available and hospitals had not yet been electrified (and would not be fully until after the 1920s).[31] The invention of intensive care units would not occur until decades later.[32] In other words, nineteenth century neurological patients in "persistent vegetative states" (the general category was

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[27] M. Osnato, *The Role of Trauma in Various Neuropsychiatric Conditions*, 86 AM. J. PSYCHIATRY 4, 646-60 (1930).

[28] I. Strauss & N. Savitsky, *Head Injury: Neurologic and Psychiatric Aspects*, 31 ARCH. NEUR. & PSYCHOL. 5, 893-955 (1934).

[29] M. Critchley, *Medical Aspects of Boxing, Particularly from a Neurological Standpoint*, 1 BR. MED. J. 5015, 357-62 (1957).

[30] B. Jennett & F. Plum, *Persistent vegetative state after brain damage: a syndrome in search of a name*, 299 LANCET 7753: 734-737 (1972).

[31] J. D. Howell, *Technology in the Hospital: Transforming Patient Care in the Early Twentieth Century* (1995).

[32] M. Hilberman, *The Evolution of Intensive Care Units*, 3 CRITICAL CARE MED., 159-165 (1975); S. J. Reiser, *The Intensive Care Unit: The Unfolding and Ambiguities of Survival Therapy* 8 INT'L J. TECH. ASSESSMENT HEALTH CARE, 382-94, (1992); Alice Nicholls, *Life in the Balance: Critical Illness and British Intensive Care, 1948-1986*, DOCTORAL DISSERTATION, UNIV. MANCHESTER (2011).

then called "coma vigil") would often have died relatively quickly.[33] In contrast, traumatic dementia patients were institutionalized in large asylums and thereby reported in numerous medical papers, usually as case studies. Thus, Dr. McCrory's conjecture is anachronistic, unrealistic, and fails to demonstrate that it was improper for me to consider "traumatic dementia" research within my Declaration.

Dr. McKeag tells us that the term "concussion" always meant a loss of consciousness in his personal practice.[34] While it is difficult to debate the personal anecdote of Dr. McKeag, the historical record contradicts him. For example, a chapter titled "Injuries of the Brain: Concussion and Contusion" in a neurology textbook by F. M. R. Walshe – a neurologist well-known to have been suspicious of patients with traumatic neuroses – shows otherwise. Walshe stated in 1941 that the symptoms of head injury ranged from: "transient dazedness, followed by a brief phase of automatism in mild injuries, to profound and long-lasting coma in the most severe. Between these extremes we find various grades of unconsciousness of varying duration."[35] In the tenth edition of that book, published in 1963, Walshe provided a schematic representation of the degree of injury from mildest to severe, which, just as it had twenty years before,

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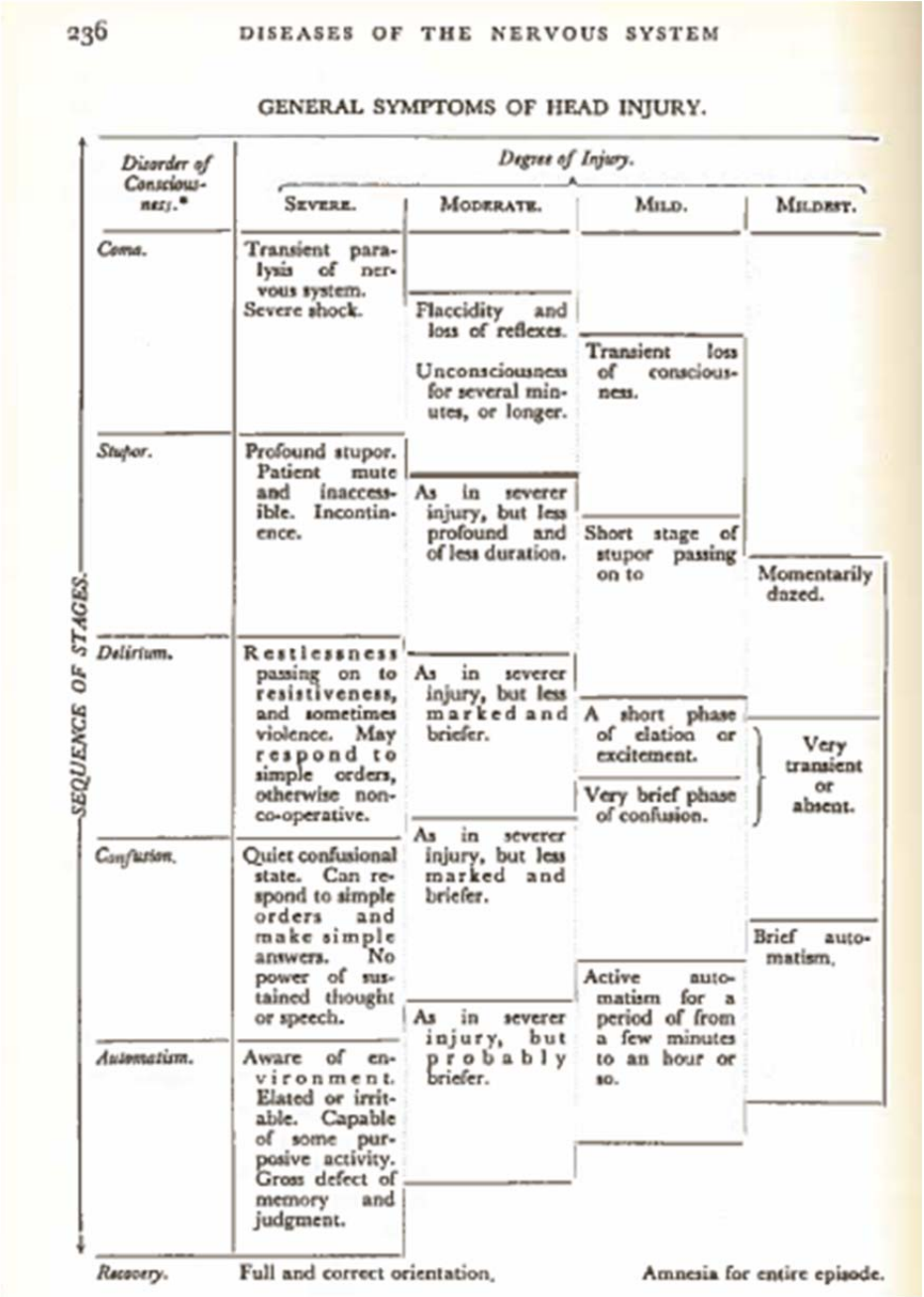
[33] On the history of neurological patients, *see* L.S. Jacyna & S.T. Casper, *The Neurological Patient in History* (2012). On "coma vigil," *see* D.H. Tuke, *A Dictionary of Psychological Medicine* (1st ed. 1892), 239-40.

[34] McKeag Decl. ¶16.

[35] F.M.R. Walshe, *Diseases of the Nervous System Described for Practitioners and Students* (2nd ed. 1941) at 181.

showed that a loss of consciousness was not seen as necessary for a concussion (*see* Figure 2).



236 DISEASES OF THE NERVOUS SYSTEM

GENERAL SYMPTOMS OF HEAD INJURY.

SEQUENCE OF STAGES. Disorder of Consciousness.*	Degree of Injury. Severe.	Moderate.	Mild.	Mildest.
Coma.	Transient paralysis of nervous system. Severe shock.	Flaccidity and loss of reflexes. Unconsciousness for several minutes, or longer.	Transient loss of consciousness.	
Stupor.	Profound stupor. Patient mute and inaccessible. Incontinence.	As in severer injury, but less profound and of less duration.	Short stage of stupor passing on to	Momentarily dazed.
Delirium.	Restlessness passing on to resistiveness, and sometimes violence. May respond to simple orders, otherwise non-co-operative.	As in severer injury, but less marked and briefer.	A short phase of elation or excitement.	Very transient or absent.
			Very brief phase of confusion.	
Confusion.	Quiet confusional state. Can respond to simple orders and make simple answers. No power of sustained thought or speech.	As in severer injury, but less marked and briefer.		Brief automatism.
Automatism.	Aware of environment. Elated or irritable. Capable of some purposive activity. Gross defect of memory and judgment.	As in severer injury, but probably briefer.	Active automatism for a period of from a few minutes to an hour or so.	
Recovery.	Full and correct orientation.		Amnesia for entire episode.	

Figure 2: The grades of consciousness as reflected in a 1963 edition of F.M.R. Walshe, *Diseases of the Nervous System Described for Practitioners and Students* (10th ed. 1963) at 236.

The above discussion shines a less than favorable light on Drs. Brenner, McCrory, McKeag, and Yaffe's "gut feeling" that I should not have focused on the spectrum of head injury, or that I misapplied relevant nomenclature. Two additional points on this criticism are worth making:

- Firstly, my methodology reflects the nature of the historical record, and only the historical record. General practitioners and consultants in past medicine organized concussions within the broad subject category "head injury". This fact can be verified, for instance, by examination of the *Index Catalogue of the Surgeon General of the United States*.[36] In a time before medical specialization was as advanced as it is today, doctors lumped together information about head injuries, whether in medical dictionaries, medical encyclopedias, textbooks, reviews, and journal articles.[37] It was not uncommon to find doctors discussing cases of relatively mild concussion alongside other cases of more severe traumatic injury. This combination is how the scientific and clinical literature comes packaged to a diligent historian or clinician reviewing the medical and historical record, either at the time or now in review.
- Secondly, substantial historical evidence shows that hockey players at all levels of the sport – from peewee to professional – have a high degree of head injury

[36] Declaration §IV.F.

[37] For a discussion of medical generalism, medical specialization, and neurology, *see* S.T. Casper, *The Neurologists: A History of a Medical Specialty in Modern Britain (c. 1789-2000)* (Manchester: Manchester University Press, 2014).

> exposure of wide-ranging severity.[38] Thus, ignoring the spectrum of head injury makes little sense. Subconcussive blows have resulted in facial lacerations, broken noses and jaws, dental injuries, and blindness in hockey.[39] CTE has been found in deceased NHL players with a wide range of head injury exposures.[40] Second impact syndrome has been known to occur in hockey.[41] In other words, the nature of hockey provides its own justification for exploring head injury in a broad manner.

As these points, as well as those in my initial Declaration, make clear, my decision to review all manner of discussion of head trauma was historically grounded and appropriate.

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[38] *See generally* Declaration of T. Blaine Hoshizaki, Ph.D, Dkt. 645.

[39] *See, e.g.*, J. McDonald, *Bryan Berard remembers the injury that changed his life*, ESPN (Mar. 11, 2016), http://www.espn.com/nhl/story/_/id/14947576/nhl-bryan-berard-remembers-injury-changed-life.

[40] A. Maki, *Former NHLer had condition linked to concussions at time of death*, THE GLOBE & MAIL (Dec. 17, 2009), https://www.theglobeandmail.com/life/health-and-fitness/health/conditions/former-nhler-had-condition-linked-to-concussions-at-time-of-death/article597014/; J. Branch, Derek Boogaard: *A Brain 'Going Bad'*, N.Y. TIMES (Dec. 5, 2011), http://www.nytimes.com/2011/12/06/sports/hockey/derek-boogaard-a-brain-going-bad.html?pagewanted=all.

[41] J. Rosengren, *Rarely told reason cited for Bill Masterton's death underlines concussion issue*, ESPN (Mar. 8, 2016), http://www.espn.com/nhl/story/_/id/14892790/nhl-real-reasons-death-bill-masterton-highlight-concussion-issue.

C. The Methodology for Selecting and Reviewing the Historical Record Identified in My Initial Declaration Is Reliable and Appropriate

In yet a further complaint, some of the NHL's experts argue that my methodology in selecting materials was inappropriate, but they provide limited factual support aside from conjecture. Tellingly, few of these experts provide even a slight hint of their own methodologies, while finding it appropriate to criticize my own. Where the NHL's experts attempt to tout their autobiographies in place of methodology, I offered eleven pages describing the methodology behind how I selected my sources, as well as two bibliographies describing the sources I used to arrive at my opinions. Dr. Brenner, for instance, deems my methodology not replicable.[42] All Dr. Brenner needs to replicate my findings is to read the historical literature referenced therein, or follow similar methodology to that plainly described in my Declaration. The fact that Dr. Brenner may find this effort taxing does not negate the validity of the methodology. But, in any event, Dr. Brenner possesses a doctorate in psychology, and is neither a medical historian nor a historian at all. With due respect, a psychologist's criticism of a medical historian's methodology should be given little if any weight, particularly so when Dr. Brenner's does not even attempt to employ her purportedly "superior" methodology.

The NHL's experts also complain that I treated all sources equally, and claim my methodology is unreliable because I include case studies, cross sectional studies, retrospective studies, and prospective studies (among other materials) in my review of

[42] Brenner Decl. §II.F.

the historical record, without discounting some studies in favor of others.[43] They propose that only evidence meeting a normative standard (that they have unilaterally determined is appropriate) should be used, and all other forms of evidence discounted or ignored. But in a great example of trying to have one's cake after eating it, they appear to have found, in my very Declaration, their main talking point: a 1976 *Lancet* editorial that appeared shortly after a publication demonstrated that concussions were cumulative injuries.[44] If they were consistent in applying their own standards of evidence, it would not be important, yet they are wildly enthusiastic about it, which is amusing since I explicitly drew it to their attention. What they appear to like is the fact that the editorial's authors state clearly that there is no evidence that repeated concussions in sports resulted in chronic traumatic encephalopathy. The NHL's experts ignore, however, the remainder of the document, which describes that many neurologists were concerned that ***sportsmen in a wide range of sports were suffering from chronic traumatic encephalopathy***.[45] Having thus mischaracterized the primary source, the NHL's experts and counsel nevertheless hold it out as evidence supporting their views.[46] While the source does not say what they want it to say, I whole-heartedly agree with them: it is evidence. That is precisely how my initial Declaration treated it.

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[43] *See, e.g., id.* §II.A.

[44] I.D. Adams & J. Potter, *Brain Damage in Sport*, 307 LANCET 7959, 401-02 (1976).

[45] *Id.* at 402.

[46] *See, e.g.*, McKeag Decl. ¶¶36-37; Brenner Decl. ¶75; McCrory Decl. ¶32.

The reasons to treat primary sources with equal respect in a historical analysis are obvious: times change, people change, medical and scientific knowledge – and forms of research – change. For such reasons, the American Historical Association enjoins historians in their Standards of Professional Conduct to (1) honor the integrity of the historical record, (2) respect the integrity of primary sources, (3) leave a clear trail for others to follow, (4) do justice to the views of people in the past, and (5) endeavor to present historical evidence that runs counter to their interpretations.[47] Clearly, an objective intellectual historian cannot elevate any one primary source above another as a matter of professional standards. Had I done so, I might have excluded that 1976 *Lancet* editorial that the NHL depends upon (with outsized emphasis). Of course, had my Declaration excluded any particular type of source, these same NHL witnesses would have most certainly accused it not of lacking rigorous objectivity but of lacking impartiality.[48] Thus, my Declaration followed the highest professional standards of historical research, opted for complete transparency, and adopted an equal approach to the historical sources in order to explain what was known and published in medical history, where, and when.

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[47] *Statement on Standards of Professional Conduct*, AM. HISTORICAL ASS'N, https://www.historians.org/jobs-and-professional-development/statements-standards-and-guidelines-of-the-discipline/statement-on-standards-of-professional-conduct#Scholarship (last visited June 25, 2017).

[48] In fact, this was raised in my deposition about a single primary source that I missed in my review of the literature. Deposition Transcript of Stephen T. Casper, Ph.D., Mar. 22, 2017 at 525:1 – 525:21.

The NHL's experts' own declarations can be used to highlight the problem of exaggerating the value of a source. Good scholars in any field that foregrounds research know the risks of elevating any one source or study over others. Doing so can result in: (1) overestimating the importance of information, (2) failing to recognize personally held cognitive biases, or selectively reading in ways that accords with personal preconceptions, (3) overlooking the broader context that the source exists in, and (4) confusing the limitations of individual sources with the sum of knowledge as a whole. And yet, throughout their declarations, the NHL's experts repeatedly make all of these elementary mistakes.

Looking more carefully at three sources demonstrates these problems fully. For the first source, several NHL experts mention a 1969 article entitled "Decisions concerning cerebral concussions in football players".[49] The NHL's experts make much of my acknowledgement – expressed with objective honesty in my deposition and Declaration – that given the scope of the historical record, I inevitably missed some literature, including this source. This, of course, does nothing to diminish the reliability of my report from historical academic standards, none of which require the uncovering and relation of every single fact known to human kind during a given time period, but seek to employ an appropriate review to create an academically reliable recitation of

[49] R.C. Schneider & F.C. Kriss, *Decisions concerning cerebral concussions in football players*, 1 MED. SCI. SPORTS 2 (1969).

history.[50] Putting that aside, which the NHL experts do because they are not historians, reading the primary source in question, it includes a discussion of a high school football player who is malingering. In other words, he is scared to play a contact sport, but he is under peer and parental pressure to do so, and so the player uses a pretend concussion to convince the doctor to release him from further play. Perhaps hoping to convince us that all retired professional hockey players are like this high school player, the experts chose to ignore a key passage framing the whole discussion of the adolescent. There, the authors say: "Quigley has stated that three concussions sustained in football during one season automatically should remove the player permanently from the sport. The author[s] agree, but often circumstances are such that it will be wise to exclude the player permanently from any further play after only one severe concussion."[51] That seems important information to neglect.

In the case of the second source – the 1976 *Lancet* editorial that the NHL foregrounds – a similar scenario is apparent.[52] As discussed above, there is no question that this editorial is important evidence; however, it is important not simply for what it says about CTE but also because of the reasons that stimulated its appearance. As I stated in my deposition several times, sources speak to each other across space and time, and this editorial by British medical authorities is a great example. Its appearance came

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[50] Ludmilla Jordonova, *History in Practice* (2000); *Statement on Standards of Professional Conduct,* AM. HISTORICAL ASS'N, *supra* n. 47.

[51] *Id.*

[52] *Supra* n. 44.

less than one year after a 1975 *Lancet* article by medical authorities in New Zealand demonstrated, unequivocally, that the psychological effects of concussion were cumulative.[53] This result led the authors of that study to assert that clinicians had a duty to convince sporting authorities that concussions were dangerous and their effects cumulative. The authors of the 1976 editorial subsequently asked their colleagues in British neurology whether they were concerned about CTE in other contact sports, with more than a few speculating this might in fact be the case. Taken together, these sources link concussions, CTE, and all contact sports with a duty to warn. All of this took place in an esteemed and easily accessible medical journal in the 1970s. Clearly the historical context matters.

Finally, for the third source, the NHL's experts make much ado about what they incorrectly describe as a 2004 World Health Organization ("WHO") Report.[54] The lack of attention to detail is again puzzling. It is patently clear that this is not an official publication of the WHO, and is instead an informal collaboration between researchers at Karolinska Hospital, some of whom were members of the WHO Collaborating Centre for Neurotrauma, and other researchers entirely unaffiliated with the WHO. It is unclear whether this paper has even been peer-reviewed. The NHL experts also ignore several important facts about this document. For example, it is noteworthy that the research for

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[53] D. Gronwall & P. Wrightson, *Cumulative Effect of Concussion*, 306 LANCET 7943, 995-97 (1975).

[54] J. Cassidy *et al.*, *Incidence, risk factors and prevention of mild traumatic brain injury: results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury*, 36 J. REHAB. MED. 0 (2004).

this review was sponsored by car manufacturers and insurance companies. The NHL's experts further overlook the fact that this review generated a critical letter from other eminent authorities in psychology in a subsequent issue of the same journal.[55] The primary source matters, and so do the details. As my Declaration has made clear, the historical medical record is there to see, for those who wish to look.

It is possible, nevertheless, to see common threads that bind together these documents that the NHL's experts highlight. All three sources add to what the record as a whole shows: clinicians and other stakeholders (except, apparently, the NHL) have been consistently worried about concussive head injuries, both because of their acute consequences and their chronic dangers. The 1969 source makes clear that there were clinicians who agreed with their predecessors, could quote them accurately, and that exposure to more than three concussions was too risky to warrant continued exposure. The 1976 *Lancet* editorial demonstrates that the concerns were sufficiently high, yet again, for clinicians to informally survey one another about whether chronic traumatic encephalopathy occurred in contact sports other than boxing, a worry that had already been expressed by the 1930s and determined reasonable by the 1950s.[56] The 1975 article that stimulated the appearance of that thoughtful editorial also indicated that there was a duty to warn individuals exposed to repeated head injuries that those injuries were

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[55] M. McKerral *et al.*, *Comments on the Task Force Report on Mild Traumatic Brain Injury*, 37 J. REHAB. MED. 1, 61-62 (2005).

[56] *See, e.g.*, Declaration ¶202.

cumulatively damaging to the brain.[57] The 2004 review shows that, as I pointed out in my original Declaration at ¶¶23, 67-68, 177, both the automobile industry and insurers, having been concerned about head injury since the 1950s, remained sufficiently concerned about the dangers of traumatic brain injury that even in 2004 they were sponsoring industry research.

In sum, there is nothing in these sources that contradicts any of my findings. The NHL's experts' critique of my methodology and opinions is equally groundless, made plain by the fact that none of them are historians. Not surprisingly, then, their critiques of my expertise are not rigorous and are insufficient. On balance, and in fact, the sources they emphasize lend further weight to my conclusion that physicians and scientists have known for a very long time about the dangers of single and repeated blows to the head. In my view, it takes a great deal of denial not to recognize the reasonableness of warning a patient or employee that repeated blows to the head may result in long term neurological problems.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: Jan 23, 2018

Stephen T. Casper, Ph.D

[57] *Supra* n. 53.