

ONTARIO
SUPERIOR COURT OF JUSTICE

BETWEEN:

Richard Michaelis and Melanie Meade, by her litigation guardian, Lisabet Benoit
Plaintiffs

– and –

Ibrahim Hussein, Gore Mutual Insurance Company and Echelon General Insurance Company
Defendants

Mark Elkin and Sherilyn Pickering, for the plaintiff Melanie Meade
Ari Krajden, for the defendant Ibrahim Hussein

Heard: November 23-25, 2021

S.T. BALE J.: -

REASONS FOR DECISION

Introduction

[1] In this action, Melanie Meade claims damages from Ibrahim Hussein for personal injuries suffered as a result of a motor vehicle accident. The claims involving the remaining parties have been settled.

[2] At the outset of trial, the defendant moved for an order excluding all evidence referring to a brain SPECT scan administered to the plaintiff in May 2019. The plaintiff opposed the motion and a *voir dire* was held. SPECT is an acronym for “single-photon emission computed tomography.”

[3] The position advanced by the defendant is that Dr. Siow’s use of the brain SPECT to diagnose TBI constitutes “novel science” which does not meet the “reliable foundation” test set out in *R. v. J.-L.J.*, 2000 SCC 51, and should therefore be excluded from evidence.

Background facts

[4] The plaintiff alleges that she sustained a traumatic brain injury (TBI) in the accident. She also alleges that she suffers from psychological and emotional trauma as a result of the accident.

[5] The plaintiff underwent a SPECT brain scan on May 13, 2019. On May 16, 2019, Dr. Hui-Yin Siow prepared a clinical consultation report, in which he interpreted the brain SPECT to conclude that it represented a "previous traumatic brain injury".

The evidence of Dr. Yin-Hui Siow

[6] Dr. Siow is certified by the Royal College of Physicians and Surgeons of Canada as a specialist in diagnostic radiology and nuclear medicine. For the past 22 years, he has been the Director of Nuclear Medicine at Southlake Regional Health Centre in Newmarket.

[7] Dr. Siow administers 50 to 60 SPECT scans per month. The patients are referrals from other physicians including neurologists, neurosurgeons, psychiatrists, general practitioners and emergency medicine physicians.

[8] In his diagnostic imaging report dated May 16, 2019, Dr. Siow summarized his findings from the plaintiff's brain SPECT as follows:

MRI brain is unremarkable and is noncontributory except to demonstrate no anatomic abnormalities to account for the brain SPECT findings. This is not unusual in traumatic brain injury.

Brain SPECT demonstrates perfusion abnormalities in the anterior temporal lobes and the inferior frontal lobes. These are the most common locations for traumatic brain injury to be seen on brain SPECT.

In addition, the focal nature of the perfusion defects mentioned above is the most common appearance for traumatic brain injury to be seen on brain SPECT.

Thus, in the balance of probabilities, the above mentioned findings represent previous traumatic brain injury.

Increased perfusion to the basal ganglia has been described with anxiety disorders. Increased perfusion to the thalamus has been described with depression. As a result, there may be a superimposed psychiatric condition, psychiatric assessment is recommended if not already obtained.

The evidence of Dr. Sarah Mitchell

[9] Dr. Sara Mitchell is certified by the Royal College of Physicians and Surgeons of Canada as a specialist in neurology. She is a staff neurologist at Sunnybrook Health Sciences Centre and an assistant professor in the Neurology Division of the Department of Medicine, University of Toronto. Sunnybrook is a teaching hospital. In addition to providing patient care at Sunnybrook, Dr. Mitchell works with doctors at other teaching hospitals in the GTA in teaching and research.

[10] Dr. Mitchell specializes in complex brain diseases. About 30 per cent of her practice involves traumatic brain injuries. She uses brain SPECTS in her clinical practice, but exclusively as an ancillary diagnostic tool for dementia.

[11] She says that the use of brain SPECT in the diagnosis of TBI is currently the subject of controversy and that there is no consensus in the medical or scientific community that SPECT is

an accurate or reliable tool to diagnose TBI or mTBI (mild traumatic brain injury), at the individual patient level. She says that in giving this opinion, she relies upon her clinical experience and training and collaboration with others, as well as relevant guidelines.

[12] With respect to the controversy she mentions, she says that none of her colleagues support the use of SPECT to diagnose TBI, but concedes that there are physicians who do, particularly in the medico-legal world.

[13] Dr. Mitchell says that there is a lot of overlap which makes it difficult to differentiate between various conditions that affect the brain. Although she would defer to a nuclear medicine specialist or radiologist for the purpose of reading the scans, she would not rely upon their diagnoses.

The issues

[14] The first issue is whether Dr. Siow's use of brain SPECT evidence in this case is "novel science". The second is whether if the evidence is novel science, the reliable foundation test set out in *J.-L.J.* has been satisfied.

Analysis

Whether the proposed brain SPECT evidence constitutes novel science

[15] The first step is to determine the nature and scope of the proposed expert opinion: *R. v. Sekhon*, 2014 SCC 15, [2014] 1 S.C.R. 272, at para. 46.

[16] In the present case, the issue is whether a physician, at the individual patient level, is able to use a brain SPECT scan, as either an adjunct or primary diagnostic tool, to diagnose TBI, and distinguish it from anxiety disorders and depression.

[17] Brain SPECT scans have been used in clinical practice for about thirty years. In that sense, it is not novel science. However, what is novel is the use of brain SPECT to prove that a patient has suffered TBI, particularly where it is necessary to differentiate TBI from anxiety disorders and depression.

[18] As with the use of the penile plethysmograph in issue in *J.-L.J.*, while the use of brain SPECT itself is not novel science, in this case, Dr. Siow is using SPECT for a novel purpose. A level of reliability that is useful in therapy because it yields some information about a course of treatment for a patient known to have TBI, is not necessarily sufficiently reliable to be used, as a forensic tool, in a court of law, to prove that a patient has TBI. See also *R. v. Trochym*, [2017] 1 S.C.R. 239, at para. 133.

The reliable foundation test

[19] "Expert evidence which advances a novel scientific theory or technique is subjected to special scrutiny to determine whether it meets a basic threshold of reliability, and whether it is essential in the sense that the trier of fact will be unable to come to a satisfactory conclusion

without the assistance of the expert. The closer the evidence approaches an opinion on an ultimate issue, the stricter the application of this principle”: *R. v. Mohan*, [1994] 2 S.C.R. 9, 1994 CanLII 80, at para. 25; *White Burgess Langile Inman v. Abbott and Haliburton Co.*, 2015 SCC 23, [2015] 2 S.C.R. 182, at para. 23.

[20] Trial judges should take seriously the role of “gatekeeper”. “The admissibility of the expert evidence should be scrutinized at the time it is proffered, and not allowed too easy an entry on the basis that all of the frailties could go at the end of the day to weight rather than admissibility”: *J.-L.J.*, at para. 28. “Dressed up in scientific language which the jury does not easily understand and submitted through a witness of impressive antecedents, this evidence is apt to be accepted by the jury as being virtually infallible and as having more weight than it deserves: *Mohan*, at para. 19.

[21] In *J.-L.J.*, at para. 33, the court cited the decision of the U.S. Supreme Court in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). In that case, the court identified four factors that could be helpful in assessing the reliability of expert evidence (the “reliable foundation” test):

- (1) whether the theory or technique can be and has been tested;
- (2) whether the theory or technique has been subject to peer review and publication;
- (3) whether there is a known or potential rate of error or the existence of standards to test the theory or technique; and,
- (4) whether the theory or technique is generally accepted by the relevant scientific community.

[22] These four factors are not a closed list to determine the admissibility of proposed expert evidence. The test is flexible and the *Daubert* factors do not necessarily or exclusively apply to all expert evidence in all cases. Rather, the trial judge may consider the *Daubert* factors, and others, to evaluate the reliability of the proffered expert evidence: Sidney N. Lederman, Alan W. Bryant & Michelle K. Fuerst, *Sopinka, Lederman & Bryant: The Law of Evidence in Canada*, 5th ed., at §12.124.

Whether the theory or technique can and has been tested

[23] Dr. Siow concedes that his methodology has not been tested but argues that by its nature, it is not susceptible to testing.

Whether the theory or technique has been subjected to peer review and publication

[24] Dr. Siow concedes that his work has not been published or peer-reviewed and that there are no peer-reviewed articles supporting his theory that at the individual patient level, brain SPECT can distinguish TBI from depression or anxiety disorders.

Whether there is a known or potential rate of error or the existence of standards to test the theory or technique

[25] There is no known or potential rate of error associated with Dr. Siow's theory or technique. While there may be standards by which the theory technique could be tested, they have not been.

Whether the theory or technique has been generally accepted by the relevant scientific community

[26] A reliability assessment does not require a particular degree of acceptance within the relevant academic community. However, widespread acceptance can be an important factor and a known technique which has been able to attract only minimal support may properly be viewed with skepticism: *J.-L.J.*, at para. 33.

[27] The evidence of Dr. Mitchell is that the use of SPECT to diagnose TBI is not supported by the academic community represented by the teaching hospitals in the GTA.

[28] Dr. Siow cites a number of journal articles which he says support the use of SPECT to diagnose TBI. However, none of the articles address the issue of whether SPECT can be used to distinguish TBI from depression or anxiety disorders.

[29] In particular, he cites P.F. Cohen et al., "CANM Guidelines for Brain Perfusion Single Photon Emission Computed Tomography (SPECT)", published by The Canadian Association of Nuclear Medicine. Dr. Siow is one of the many authors of those guidelines.

[30] The guidelines do not address the issue of whether SPECT can be used to diagnose TBI where anxiety and depression are present. They do, however, refer to a retrospective study that showed that SPECT can distinguish TBI from PTSD. On cross-examination, Dr. Siow conceded that the results of the study were subject to a 30 per cent error rate.

[31] Counsel for the defendant argues that the fact that the guidelines do not say that SPECT can distinguish TBI from depression or anxiety disorders suggests that it cannot. I would not go so far. The fact that the guidelines have nothing to say on the issue would suggest that a retrospective study of the same nature has not been undertaken.

[32] The guidelines for the diagnosis and management of concussions and mild traumatic brain injury published by the Ontario Neurotrauma Foundation do not discuss the use of SPECT scans to diagnose mTBI.

[33] The "Statement on Traumatic Brain Injury (TBI) Imaging" published by the Radiological Society of North America provides that at present, there is insufficient evidence supporting the routine clinical use of SPECT for diagnosis or prognostication of TBI at the individual patient level, and that it is the focus of ongoing research.

[34] In Franck Amyot et al., "A Review of the Effectiveness of Neuroimaging Modalities for the Detection of Traumatic Brain Injury," *Journal of Neurotrauma* 32:1693-1721 (November 15, 2015), following a review of what they found to be the most relevant peer-reviewed publications, the authors reached the following conclusions with respect to the diagnostic role of SPECT:

As more information is obtained about SPECT findings in this population and new promising radiopharmaceuticals are developed, SPECT will prove an important adjunct or primary diagnostic tool capable of quantifying and following mTBI patients, as well as providing useful prognostic information to better direct the care and management of these individuals.

[35] I have not been provided with any evidence to suggest that the time has come.

Other factors

[36] Counsel for the plaintiff argues that the brain SPECT evidence should be admitted based upon Dr. Siow's 22 years of experience in administering SPECT scans, the fact that he administers 30 to 50 SPECT scans per month, and the fact that he has a large base of referring physicians, including neurologists and neurosurgeons. However, while I agree that Dr. Siow's credentials are impressive, this evidence alone is not sufficient to overcome the lack of peer review and acceptance in the relevant scientific community.

[37] In his evidence, Dr. Siow was able to explain his theory by reference to medical illustrations based on the plaintiff's brain SPECT. Counsel for the plaintiff argues that the demonstration supports the reliability of his evidence. While I agree that the demonstration was compelling, if proving the reliability of Dr. Siow's methodology was so easy, one would expect it to have gained widespread acceptance. The effectiveness of this evidence demonstrates why it is necessary that novel scientific evidence meet at least a basic level of reliability.

[38] Counsel for the plaintiff also relies on the fact that brain SPECT evidence has been admitted into evidence in multiple cases in this court, including the recently decided case of *Legree v. Origlieri*, 2021 ONSC 7650 and a case currently being tried by Sutherland J. (*Wabie v. Wilson*).

[39] However, counsel was only able to refer me to one case in which the court was asked to determine the admissibility of SPECT evidence: *Morgan v. Metropolitan Toronto (Municipality)*, [2006] O.J. No. 4948. In that case, the trial judge allowed SPECT evidence to be given. However, I note that the issue to which the evidence was directed was the effect on the plaintiff's brain of a vaccination for hepatitis B and its relation to a diagnosis of chronic fatigue syndrome, unlike the present case. I also note that the issue of novel evidence does not appear to have been raised and that in her judgment following trial, the trial judge placed no weight on the brain SPECT evidence: *Morgan v. Metropolitan Toronto (Municipality)*, [2006] O.J. No. 4951, at para. 205.

[40] Counsel for the plaintiff argues that novel science is less of a concern in a nonjury case and that where the trial is by a judge sitting alone, there is no prospect that the evidence will obfuscate the issues. However, while I agree that novel science may be of less concern in a judge-alone trial, if evidence cannot be shown to be sufficiently reliable to go to a jury, it is equally inadmissible in a trial by judge alone.

Conclusion

[41] In the result, I find that Dr. Siow's brain SPECT evidence is inadmissible as it fails to satisfy the reliable foundation test for novel scientific evidence set out in *R. v. J.-L.J.*

[42] I wish to make it clear that in coming to my conclusion, I did not regard the question to be a debate between the opinions of Dr. Siow and Dr. Mitchell. The function of Dr. Mitchell's evidence was to bring relevant journal articles to the court's attention, and to advise as to the acceptance or nonacceptance in the community in which she works (teaching hospitals in the GTA) of the use of brain SPECT to diagnose TBI.

Disposition

[43] For the reasons given, the proposed brain SPECT evidence will be excluded from the evidence admissible at trial.

“S.T. Bale J.”

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