OFFICE OF SPECIAL MASTERS

Filed: November 30, 2005

LORIE KATZ,	*	
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Petitioner,	*	
	*	
v.	*	No. 04-714V
	*	
SECRETARY OF HEALTH	*	
AND HUMAN SERVICES,	*	
	*	
Respondent.	*	

Peter H. Meyers, with whom were Jason T. Lagria, and Stephen A. Broome, Washington, D.C., for Petitioner.

Lynn E. Ricciardella, United States Department of Justice, Washington, D.C., for Respondent.

DECISION[1]

SWEENEY, Special Master

On April 23, 2004, Lorie Katz filed a petition for compensation under the National Childhood Vaccine Injury Act ("Vaccine Act"), 42 U.S.C. §§ 300aa-1 to -34 (2000 & Supp. II 2003). The petition alleges that Ms. Katz developed optic neuropathy[2] and its sequela as a result of the hepatitis B vaccination[3] that she received on August 15, 2001.

[1] The court encourages the parties to review Vaccine Rule 18, which affords each party 14 days to object to disclosure of (1) trade secret or commercial or financial information that is privileged or confidential or (2) medical information that would constitute "a clearly unwarranted invasion of privacy."

[2] A neuropathy is "a functional disturbance or pathological change in the peripheral nervous system." Dorland's Illustrated Medical Dictionary 1257 (30th ed. 2003). An optic neuropathy affects the eye. Id. at 1300, 1319.

[3] The hepatitis B vaccine is "a noninfectious viral vaccine derived by recombination from hepatitis B surface antigen and cloned in yeast cells; administered intramuscularly for immunization of children and adolescents and of persons at increased risk for infection." Dorland's Illustrated Medical Dictionary, supra note 2, at 1999.

The question presented in this case is whether petitioner's optic neuropathy and subsequent symptoms were caused by her August 15, 2001 hepatitis B vaccination. The key factors in the special master's decision were the qualifications of each expert to render an opinion regarding petitioner's diagnosis, whether the diagnosis implicated a demyelinating disease, and whether petitioner set forth a medical theory connecting the injury and the vaccine. The testimony of petitioner's treating ophthalmologist was persuasive as to the diagnosis of petitioner's condition. Unfortunately for petitioner, her expert's causation theory was based on a diagnosis rejected by petitioner's treating ophthalmologist. Thus, petitioner's experts were at odds with each other. The special master found the testimony of petitioner's causation expert to be unpersuasive because it assumed a critical fact, that petitioner suffered a demyelinating injury, firmly rejected by the other experts. Accordingly, because petitioner's theory lacks a sound factual predicate, petitioner failed to prove by a preponderance of evidence that (1) the vaccine was the "but-for" cause of her injury and (2) the vaccine was a substantial factor in bringing about her injury.

FACTUAL HISTORY

Ms. Katz was born on March 15, 1944.[4] Pet. ¶ 1. In the 20 years prior to the hepatitis B vaccination at issue in this case, Ms. Katz regularly visited her ophthalmologist, William Cooper Stivelman, M.D. Id. ¶ 17; Pet. Ex. 16 at 3-11. In a record dated August 27, 1993, Dr. Stivelman included the following notation: "drusen?"[5] Pet. Ex. 16 at 3. On April 5, 2001, Dr. Stivelman measured Ms. Katz's visual acuity, corrected with glasses, as 20/25 in the right eye and 20/20 in the left eye. Id. at 11. After this examination, Dr. Stivelman noted that Ms. Katz had normal fundi[6] and exhibited no evidence of increased intraocular pressure or optic disc edema.[7] Id.

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[4] All references to the Petition shall be designated herein as "Pet. ¶ __." All references to the pertinent Petitioner's Exhibit shall be designated herein as "Pet. Ex. __ at __."

[5] Drusen are "small yellowish deposits of cellular debris that accumulate between the pigmented epithelial layer of the retina and the inner collagenous layer of the choroid, that are typically associated with aging, and that may be a sign of certain pathological conditions (as age-related macular degeneration) . . . ." Merriam-Webster, Inc., MedlinePlus: Medical Dictionary, at http://www.nlm.nih.gov/medlineplus/mplusdictionary.html (last visited October 24, 2005).

[6] Plural for fundus, fundi are "the back portion of the interior of the eyeball." Dorland's Illustrated Medical Dictionary, supra note 2, at 743.

[7] The optic disc is "the intraocular portion of the optic nerve formed by fibers converging from the retina and appearing as a pink to white disk." Dorland's Illustrated Medical Dictionary, supra note 2, at 527. Edema is "the presence of large amounts of fluid in the intercellular tissue spaces of the body, usually referring to demonstrable amounts in the subcutaneous tissues." Id. at 589.

In preparation for a trip to South America, Ms. Katz received her first hepatitis B vaccination at the Clark County Public Health Department on August 15, 2001. Pet. ¶ 2; Pet. Ex. 2 at 1; Pet. Ex. 11 at 1. Then, almost three weeks later, on September 3, 2001, Ms. Katz experienced "a shooting pain in her left temple" lasting "about 20-30 seconds," followed by "cloudy vision" in her left eye. Pet. ¶ 3; see also Pet. Ex. 4 at 1.

On September 4, 2001, Ms. Katz saw an ophthalmologist.[8] Pet. Ex. 1 at 1. According to Ms. Katz, the ophthalmologist observed that Ms. Katz had swelling in the optic nerves of both eyes. Id. The following day, Ms. Katz states she had "visual difficulties when trying to read and had some loss of vision in the right eye for about one hour." Id.

On September 6, 2001, Ms. Katz states that she saw retinologist Jeffrey Parker, M.D., who found neuropathy of the maxillary and mandibular branches of the fifth cranial nerve on the left side. Pet. ¶ 6. David L. Ginsburg, M.D., a neurologist, also examined Ms. Katz on September 6, 2001. Pet. Ex. 4 at 1-4. In his history, Dr. Ginsburg described Ms. Katz's onset:

> Three days ago while shopping at a mall the patient noted some pain in the left temporal region for 10 or 15 seconds followed by cloudy vision in the left eye, which has subsequently been fluctuating in severity. She also has some discomfort in the left eye. Yesterday she also had some cloudiness in the right eye although this has improved today. She also has noted some slight numbness along the left side of the face.

Id. at 1. On examination, Dr. Ginsburg found Ms. Katz's visual acuity, corrected with glasses, to be 20/25 in the right eye and 20/20 in the left eye. Id. at 2. After an examination, where he observed that Ms. Katz had "bilateral optic disc blurring and absences of venous pulsations," Dr. Ginsburg described his impression as a "[r]ecent onset of fluctuating diminished vision in both eyes." Id. at 3. His differential diagnosis included bilateral optic neuritis[9] and papilledema.[10] Id.

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[8] In a laboratory report dated September 4, 2001, the requesting physician's name is Dr. Tushina A. Reddy. Pet. Ex. 3 at 3. However, no other records from Dr. Reddy have been submitted.

[9] Optic neuritis is defined as "inflammation of the optic nerve." Dorland's Illustrated Medical Dictionary, supra note 2, at 1252.

[10] Papilledema is "edema of the optic disc, most commonly due to increased intracranial pressure, malignant hypertension, or thrombosis of the central retinal vein." Dorland's Illustrated Medical Dictionary, supra note 2, at 1359.

A magnetic resonance image ("MRI")[11] of the brain and of the orbits, performed on September 6, 2001, was normal. Id. at 9-10. A visual evoked potential study[12] also revealed normal results. Pet. Ex. 34 at 1.

On September 7, 2001, Ms. Katz visited neuro-ophthalmologist Anthony C. Arnold, M.D., at the Jules Stein Eye Institute at the University of California, Los Angeles ("UCLA"). Pet. Ex. 5 at 1-6. Dr. Arnold noted that prior examinations revealed bilateral optic disc edema, and that she had a history of a lazy right eye. Id. at 1. During his examination of Ms. Katz, Dr. Arnold noted that Ms. Katz had bilateral optic edema with peripapillary hemorrhages[13] in the right eye and surface telangiectasia[14] in the left eye. Id. at 4-5. Further, visual field testing showed a "[s]uperior arcuate defect, worse nasally, with mild inferonasal[15] depression" in the left eye. Id. at 5 (footnote added); see also id. at 7. Thus, Dr. Arnold diagnosed bilateral optic disc edema and visual field loss in the left eye. Id. at 5. He noted that the specific etiology of Ms. Katz's symptoms was unclear. Id. However, Dr. Arnold "considered the possibility of a 'post-immunization immune reaction with optic neuropathy related to [Ms. Katz's] hepatitis inoculation'" as well as idiopathic neuroretinitis[16] as possible etiologies. Id. at 5-6.

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[11] An MRI is "a method of visualizing soft tissues of the body by applying an external magnetic field that makes it possible to distinguish between hydrogen atoms in different environments." Dorland's Illustrated Medical Dictionary, supra note 2, at 908.

[12] A visual evoked potential study measures, using electroencephalography, "changes in the evoked cortical potential when the eye is stimulated by light . . . ." Dorland's Illustrated Medical Dictionary, supra note 2, at 1496. "[V]ariations are diagnostic for abnormalities of the visual system and for other disorders, particularly neurological disorders such as multiple sclerosis, that have visual symptoms." Id.

[13] Peripapillary means around the optic disc. Dorland's Illustrated Medical Dictionary, supra note 2, at 1527, 1359, 405. A hemorrhage is the "escape of blood from the vessels; bleeding." Id. at 834.

[14] Telangiectasia is the "permanent dilation of preexisting small blood vessels . . . creating focal red lesions, usually in the skin or mucous membranes." Dorland's Illustrated Medical Dictionary, supra note 2, at 1861.

[15] Inferonasal refers to the "quadrant of the eye or of the visual field inferior to the horizontal meridian of the eye and medial to the vertical meridian." Dorland's Illustrated Medical Dictionary, supra note 2, at 929.

[16] Neuroretinitis is the "inflammation of the optic nerve and retina." Dorland's Illustrated Medical Dictionary, supra note 2, at 1259.

Dr. Arnold examined Ms. Katz again on September 10, 2001. Pet. Ex. 6 at 1-2. He observed that Ms. Katz's MRI scans were normal, "although the optic nerves are borderline enlarged in diameter anteriorly in the orbits and are prominent on fat suppression views." Id. at 1. Dr. Arnold further noted that in "the past several days, [Ms. Katz] has noted worsening of vision superiorly and centrally with some improvement in the temporal field in the past 24 hours," but "[n]o other new symptoms have developed." Id. Again, his impression was bilateral optic disc edema, "etiology undetermined." Id. at 2. Dr. Arnold informed Dr. Stivelman that Ms. Katz's case was "unusual," and he was "unclear as to the specific etiology." Pet. Ex. 35 at 1.

Neurologist Lisa D. Cohen, M.D., examined Ms. Katz on September 21, 2001, and reported that Ms. Katz's symptoms were "compatible with an optic neuritis."[17] Pet. Ex. 10 at 3. Dr. Cohen postulated that Ms. Katz may have a demyelinating[18] disease that could have been caused by the hepatitis B vaccine. Id.

Rheumatologist Bevra Hahn, M.D., examined Ms. Katz on November 20, 2001, to determine whether Ms. Katz's optic neuropathy was related to her vaccination. Pet. Ex. 11 at 1. Dr. Hahn reported that Ms. Katz's optic neuropathy might be "related to the hepatitis vaccine since [Ms. Katz's] husband also suffers from a peripheral neuropathy following that vaccination."[19] Id. at 2. Dr. Hahn also remarked that "both the optic nerve disease and the peripheral neuropathy are described in a few cases following hepatitis vaccination." Id.

During a follow-up examination with Dr. Arnold on November 20, 2001, Ms. Katz reported that the vision in her left eye may have been slightly worse. Pet. Ex. 16 at 15. Dr. Arnold's impression was bilateral "[r]esolving optic disc edema" with a "persistent visual field defect" in the left eye. Id. at 16. He also noted that Ms. Katz's condition appeared "to be stabilizing." Id.

On April 2, 2002, Ms. Katz had a neuropsychological evaluation performed by George K. Henry, Ph.D. Pet. Ex. 12 at 1-7. Dr. Henry noted: "[D]eficits were most noteworthy in visual organization, visual-motor integration, verbal fluency, sustained attention, susceptibility to interference, and information processing capacity." Id. at 6.

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[17] Optic neuritis is defined as "inflammation of the optic nerve." Dorland's Illustrated Medical Dictionary, supra note 2, at 1252.

[18] Demyelination is the "destruction, removal, or loss of the myelin sheath of a nerve or nerves." Dorland's Illustrated Medical Dictionary, supra note 2, at 488.

[19] Petitioner's husband filed a Vaccine Act petition on August 6, 2004. Katz v. Sec'y of HHS, No. 04-1258V. The case was dismissed pursuant to an unpublished decision issued on October 25, 2005.

Ms. Katz had repeat MRI scans on January 5, 2004, that revealed normal results. Pet. Ex. 13 at 1-2. Additionally, Ms. Katz has undergone testing to exclude potential causes of her optic neuropathy. Pet. Ex. 1 at 3. Potential causes, including Lyme disease, multiple sclerosis, infectious agents, and other connective tissue disorders and brain conditions, were considered and rejected. Id.; Pet. Ex. 3 at 1-2; Pet. Ex. 8 at 1-9.

Presently, as a result of the diminished vision in her left eye, Ms. Katz has "substantial difficulties with depth perception, affecting her ability to do such things as negotiate stairs and drive." Pet. ¶ 15. In addition, Ms. Katz "suffers from short-term memory loss, impaired concentration and speech, reduced attention, and distractibility as a result of her optic neuropathy." Id. It is noteworthy that although three of the eight physicians who examined Ms. Katz speculated that the hepatitis B vaccine could be responsible for her eye condition, all three physicians offered that possibility as only one of several alternative diagnoses.

DISCUSSION

The Vaccine Act and Federal Circuit Precedent

Pursuant to 42 U.S.C. § 300aa-13(a)(1), the court shall award compensation if petitioner[20] proves, by a preponderance of the evidence, all of the elements set forth in § 300aa-11(c)(1)[21] of the Vaccine Act and that the illness is not due to factors unrelated to the administration of the vaccine.[22] A petitioner in the Vaccine Program can recover in one of two ways: either by

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[20] Section 11(b)(1) requires that: (1) only the "person who sustained a vaccine-related injury . . . or the legal representative of any person who died as the result of the administration of a [Table vaccine] . . ." can bring an action for vaccine injury-related claims (so long as the requirements of subsection (c)(1) are satisfied) and (2) that no previous civil action was filed in the same matter. Petitioner is the appropriate person to maintain this action.

[21] Subsection (c)(1) requires, inter alia, that the following elements be satisfied: (1) that the vaccine in question is set forth in the Vaccine Injury Table; (2) that the vaccine was received in the United States or in its trust territories; (3) that petitioner either sustained an injury as a result of the administration of a Table-designated vaccine for a period of more than six months after the administration of the vaccine, suffered illness, disability, injury, or condition from the vaccine which resulted in inpatient hospitalization and surgical intervention, or died from the administration of the vaccine; and (4) that the petitioner has not previously collected an award or settlement of a civil action for damages arising from the alleged vaccine-related injury or death.

[22] Of course, the petition must also be filed within the statutory period. 42 U.S.C. § 300aa-16(a). The petition in this case was timely filed.

proving an injury listed on the Vaccine Injury Table ("Table")[23] or by proving causation in fact. In this case, petitioner cannot prove a Table injury because even though the hepatitis B vaccine is listed on the Table, petitioner's alleged injuries are not. Thus, petitioner proceeded on a causation-in-fact theory.

In order to prevail under a theory of causation in fact, petitioner must show by a preponderance of evidence that the vaccine in question caused the injury. Bunting v. Sec'y of HHS, 931 F.2d 867, 872 (Fed. Cir. 1991). The Federal Circuit has explained what is required to meet that burden. Specifically, petitioner must establish that the vaccine can cause the injury in question, as well as show that the vaccine is in fact the cause of the injury alleged. Hines ex rel. Sevier v. Sec'y of HHS, 940 F.2d 1518, 1525 (Fed. Cir. 1991). To make the requisite showing, petitioner must offer "proof of a logical sequence of cause and effect showing that the vaccination was the reason for the injury." Shyface v. Sec'y of HHS, 165 F.3d 1344, 1353 (Fed. Cir. 1999) (quoting Grant v. Sec'y of HHS, 956 F.2d 1144, 1148 (Fed. Cir. 1992)). Although petitioner need not demonstrate her theory of causation to medical or scientific certainty, Knudsen ex rel. Knudsen v. Secretary of HHS, 35 F.3d 543, 548-49 (Fed. Cir. 1994), causation in fact requires a reputable medical or scientific explanation supporting this logical sequence of cause and effect. Jay v. Sec'y of HHS, 998 F.2d 979, 984 (Fed. Cir. 1993) (quoting Grant, 956 F.2d at 1148). As Congress directed, "[E]vidence in the form of scientific studies or expert medical testimony is necessary to demonstrate causation" for a petitioner seeking to prove causation in fact. H.R. Rep. No. 99-908, at 15 (1986).

Without more, "evidence showing an absence of other causes does not meet petitioners' affirmative duty to show actual or legal causation." Grant, 956 F.2d at 1149. Petitioner must not only show that the vaccine was the but-for cause of the injury, but also that the vaccine was a substantial factor in bringing about the injury. Shyface, 165 F.3d at 1352. In essence, the special master is looking for a reputable medical explanation of a logical sequence of cause and effect (Grant, 956 F.2d at 1148), and medical probability rather than certainty (Knudsen, 35 F.3d at 548-49). As the Federal Circuit explained in Knudsen, medical probability means biologic credibility or plausibility: "Causation in fact under the Vaccine Act is thus based on the circumstances of the particular case, having no hard and fast per se scientific or medical rules." 35 F.3d at 547.

In a recent decision, the Federal Circuit instructed:

> Concisely stated, [petitioner's] burden is to show by preponderant evidence that the vaccination brought about her injury by providing: (1) a medical theory

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[23] Petitioners can prove a Table injury by showing that they received a vaccine listed on the Table and suffered an injury, or an acute complication or sequela of that injury, associated with that vaccine within the prescribed time period. 42 U.S.C. §§ 300aa-11(c)(1)(C)(i), -13(a)(1)(A). However, respondent can rebut the presumption by showing that a factor unrelated to the vaccine(s) caused the injury. Id. § 300aa-13(a)(1)(B).

> causally connecting the vaccination and the injury; (2) a logical sequence of cause and effect showing that the vaccination was the reason for the injury; and (3) a showing of a proximate temporal relationship between vaccination and injury. If [petitioner] satisfies this burden, she is "entitled to recover unless the [government] shows, also by a preponderance of evidence, that the injury was in fact caused by factors unrelated to the vaccine." Knudsen v. Sec'y of Health & Human Servs., 35 F.3d 543, 547 (Fed. Cir. 1994) (alteration in original) (citation omitted).

Althen v. Sec'y of HHS, 418 F.3d 1274, 1278 (Fed. Cir. 2005). The Federal Circuit further explained that the "heavy lifting" required to establish causation by a preponderance of evidence in causation-in-fact cases should not be misconstrued to indicate that the burden is higher than that required by statute:

> While it may be true that proof of causation by preponderant evidence is not as "easy" as proof of causation by operation of law, neither Hodges nor Lampe instructs that the preponderance standard itself is to be made more onerous in vaccine cases. Nor is it to be made more difficult merely because our cases have referred to it as "heavy lifting."

Id. at 1280. This directive notwithstanding, the evidence at hearing showed that petitioner cannot prevail because she did not present a logical sequence of cause and effect that demonstrated how her hepatitis B vaccination could have caused her nondemyelinating optic neuritis. To the contrary, petitioner's causation expert advanced a theory of causation based upon a diagnosis rejected by her treating expert ophthalmologist.

Hearing

The special master conducted a hearing in this matter on March 4, 2005, in Las Vegas, Nevada. Petitioner testified on her own behalf and presented two expert witnesses: William Cooper Stivelman, M.D., and Burton A. Waisbren, Sr., M.D. Respondent's sole witness was Thomas P. Leist, M.D., Ph.D.

Testimony of Petitioner

Most of petitioner's testimony did not add to or contradict her petition, affidavit, or medical records. Thus, the special master will not address the bulk of her testimony with respect to her medical history as it is discussed above. However, the special master will address that portion of her testimony that added relevant and necessary facts to the discussion.

In particular, petitioner described a trip she and her husband took to Mexico in November 2004.[24] Tr. at 25-26. She explained that they were hiking in Copper Canyon at an elevation of about 8,000 feet when she started tripping and falling, losing her vision, experiencing cloudy vision, and being unable to communicate properly. Id. at 25. Petitioner stated that it took a couple of months for her to recover from this incident. Id. at 26.

Petitioner further explained that subsequent to her initial injury, her vision became cloudy whenever she traveled by airplane. Id. at 26. Because of insufficient oxygen in an airplane cabin to accommodate her eye condition, petitioner requires supplemental oxygen to prevent cloudy vision when flying. Id. at 26, 32.

Testimony of Petitioner's Expert: William Cooper Stivelman, M.D.

1. Dr. Stivelman Is Qualified to Testify as an Expert Regarding Diseases Affecting the Optic Nerve

Dr. Stivelman is a practicing ophthalmologist in Ventura County, California. Id. at 36. He graduated from The Chicago Medical School of the Rosalind Franklin University of Health Sciences in 1982. Id.; Pet. Ex. 41 at 1. Dr. Stivelman is a Diplomate of the American Board of Ophthalmology and a Fellow of the American Academy of Ophthalmology. Tr. at 36. Since 1987, he has been an Assistant Clinical Professor of Ophthalmology at the Jules Stein Eye Institute at UCLA. Id. at 37. Previously, Dr. Stivelman served as a clinical instructor at two San Francisco hospitals: the Moffitt Hospital and Pacific Presbyterian Medical Center. Id.; Pet. Ex. 41 at 2.

Dr. Stivelman's ophthalmological interests include glaucoma, "glaucoma [] neuropathy,"[25] and eye care. Tr. at 38. He estimates that "over 70 percent of [his] patients have optic neuropathy in the form of glaucoma." Id. Further, on a daily basis, Dr. Stivelman receives referrals from other ophthalmologists and optometrists requesting his opinion regarding the appearance of a patient's optic nerve and how to treat the resulting problems. Id. at 38-39. Dr. Stivelman estimates that he sees "approximately 240" patients per week. Id. at 39.

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[24] All references to the Transcript of the March 4, 2005 proceedings shall be designated herein as "Tr. at __." All references to the pertinent Respondent's Exhibit shall be designated herein as "Resp't Ex. __ at __." The special master notes that the transcript is riddled with errors. Thus, when necessary for her decision, the special master identifies the errors and explains her corrections.

[25] The hearing transcript indicates that Dr. Stivelman said "glaucoma ossific neuropathy." Tr. at 38. The special master seriously doubts that this is what Dr. Stivelman actually said. It is more likely, given the remainder of Dr. Stivelman's testimony and his stated expertise, that he was referring to glaucomatous optic neuropathy or a similar condition.

This hearing was not the first time Dr. Stivelman has testified in court. He estimates that he has testified about 50 times, mostly on behalf of the defense. Id. This hearing was the third time that he has testified on behalf of a plaintiff/petitioner. Id.

2. Dr. Stivelman's Diagnosis of Petitioner's Condition Is the Most Credible Due to His Qualifications, Experience, and Long Term Treatment of Petitioner

The parties could not agree on petitioner's diagnosis. Dr. Stivelman's diagnosis of optic neuritis was disputed by respondent's expert, who advocated an alternate diagnosis of ischemic optic neuropathy.[26] Dr. Stivelman addressed both competing theories and explained how he reached his conclusion.

Dr. Stivelman has been petitioner's ophthalmologist since about 1991. Id. at 40, 56. Prior to 1991, petitioner was seen by Dr. Stivelman's partner. Id. at 57. In a record from 1984, Dr. Stivelman's partner made a notation of "drusen." Id. Dr. Stivelman explained that this notation, along with his similar notation of "drusen?" in 1993, likely referred to either the appearance or the questionable appearance of drusen in the head of the optic nerve. Id. at 57-58. He noted, however, that the presence of optic nerve drusen was never confirmed by diagnostic testing. Id. at 66.

When petitioner began experiencing symptoms of her optic neuropathy, her husband contacted Dr. Stivelman. Id. at 40. Dr. Stivelman arranged for an appointment with Dr. Arnold for the next morning. Id. at 40-41. Dr. Stivelman continues to treat petitioner and reviewed all of the medical records submitted in this case prior to hearing. Id. at 41, 57.

Dr. Stivelman stated that the medical records indicate that Ms. Katz suffered from bilateral optic disc edema, which is a type of optic neuropathy. Id. at 41, 66. He explained optic disc edema in the following manner:

> The optic nerve is a structure that looks something like a donut at the base of the back of the eye, and if you were to look straight in the eye with a patient fixating on your nose, you would see it about 13 degrees to the side of your direct head view.
>
> And it looks like a peach-covered donut with blood vessels emanating from it in different directions. That nerve is supposed to be flat as a pancake, or concave, or slightly convexed, but the margins of it, the edge of it, the perimeter of it is supposed to be flat, well-defined, and you can focus your ophthalmoscope sharply on it and see its margins clearly.

[26] Petitioner's causation expert put forth a third diagnosis of demyelinating optic neuritis.

> And in her case, while I did not see her at the time of the injury, Dr. Arnold described her as having markedly edematous or swollen optic nerves. It looked like bean pods sticking out into the back of the eye. Both did.

Id. at 41-42. Dr. Stivelman further explained that there were many causes of optic disc edema, including increased intracranial pressure and a decreased blood flow to the optic nerve. Id. at 42-43.

Optic neuropathy that is caused by decreased blood flow to the optic nerve's blood vessels is known as ischemic optic neuropathy, and is most common in patients over the age of 50. Id. at 43, 61, 64. Dr. Stivelman explained that "[t]he optic nerve is the cable that takes the information from the retina, which is like film in a camera, and it filters that information, and collates it, and sends it to the cerebral cortex so that we see what we see in [consciousness]." Id. at 62. He also explained, "Optic nerve fibers receive blood flow through very, very tiny vessels other than the central retinal artery, which profuses the retina." Id. Dr. Stivelman agreed that a loss of blood supply to the blood vessels of the optic nerve deprives the optic nerve of oxygen and other nutrients, which could result in damage to the optic nerve. Id.

Because respondent's expert based his opinion upon a diagnosis of ischemic optic neuropathy, Dr. Stivelman contrasted ischemic optic neuropathy with his diagnosis of optic neuritis, which he defined as the "inflammation of the optic nerve structure." Id. at 44; see also id. at 66. He explained that optic neuritis may or may not be demyelinating. Id. at 61. Dr. Stivelman described petitioner's symptoms and compared them with the characteristics of ischemic optic neuropathy and optic neuritis.

One aspect discussed by Dr. Stivelman was the presence of hemorrhages in petitioner's optic nerves. With respect to ischemic optic neuropathy, he agreed that a loss of blood supply can, but does not always, result in the swelling of the optic disc, which may result in hemorrhages. Id. at 62-63. He also agreed that hemorrhages are not typical in optic neuritis. Id. at 69. Dr. Stivelman noted, however, that the optic nerve edema and associated hemorrhages can be caused by "any process that causes a perturbation of blood flow," including compressive, inflammatory, and rarely, demyelinative processes.[27] Id. at 66.

Second, Dr. Stivelman explained that with noninflammatory ischemic optic neuropathy, there is an initial decrease in vision with about 43 percent of patients having vision improvements over time. Id. at 45, 51. However, the vision rarely recovers fully to its original state. Id. at 45, 51. Dr. Stivelman stated that it is more likely to observe a return of vision to its

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[27] Dr. Stivelman agreed that once any swelling and hemorrhages resolve, a patient may be left with optic atrophy. Tr. at 63. Optic atrophy is the wasting away of the optic disc "resulting from the degeneration of the nerve fibers of the optic nerve and optic tract." Dorland's Illustrated Medical Dictionary, supra note 2, at 175-76.

original state in cases of optic neuritis. Id. at 45, 52. According to Dr. Stivelman, petitioner in this case "had a dramatic return of vision over time to nearly 20-20." Id. at 45. Not only did petitioner's visual acuity improve, but there were subtle improvements in her visual field as well. Id. at 65.

The third difference between the two conditions is the nature of the visual field defect. Id. at 45. Dr. Stivelman explained that with ischemic optic neuropathy, the optic nerve has "a sector of paleness." Id. On the other hand, with optic neuritis, the entire temporal side of the optic nerve is pale. Id. In petitioner's case, her optic nerves were pale on their temporal sides. Id.

Fourth, Dr. Stivelman discussed how oxygen deprivation affects the two conditions. Id. at 46. He explained that lack of oxygen to the optic nerve can cause visual problems, such as occurred during petitioner's hike in Mexico and her airplane travel. Id. However, this symptom is not typical of an ischemic optic neuropathy. Id. at 46, 51-52. Instead, according to Dr. Stivelman, it is "very typical of the waxing or waning course of patients with optic neuritis." Id. at 46; see also id. at 52.

The fifth difference between the two conditions is the presence or absence of pain. Dr. Stivelman stated that a lack of pain is a normal feature of noninflammatory ischemic optic neuropathy, but is not a typical feature of optic neuritis. Id. at 46-47, 53, 64. In fact, patients with optic neuritis often, but not always, have pain with the upward movement and rotation of the eye. Id. at 47, 67. Petitioner experienced pain in the left side of her head, but not in her eyes. Id. at 17, 25.

Sixth, Dr. Stivelman discussed the manifestation of neurological symptoms subsequent to petitioner's ophthalmological injuries. Id. at 53-54. He opined that neurological symptoms seldom accompany ischemic optic neuropathy. Id. at 54. He stated that it was conceivable that all of the symptoms suffered by petitioner could "be grouped together as post-event phenomena." Id. at 53. Because he is not a neurologist, Dr. Stivelman was unwilling to speculate as to what other possible neurologic conditions petitioner might suffer. Id. He did explain, however, that he believed that petitioner sustained injury to "highly oxygen-sensitive tissues," including the retina, and that other areas of petitioner's central nervous system could have been similarly affected. Id. at 55.

Finally, Dr. Stivelman addressed the issue of onset of symptoms. He stated that ischemic optic neuropathy is characterized by a sudden onset of vision loss, affecting both visual acuity and the visual field, that can be followed by "fallout" lasting for days or weeks. Id. at 64. On the other hand, the onset of optic neuritis is not typically instantaneous, as it was in petitioner's case. Id. at 67. Dr. Stivelman also agreed that with optic neuritis, visual acuity is typically the worst about one week after the onset of symptoms. Id. Finally, Dr. Stivelman stated that patients with optic neuritis typically improve within a month of the onset of symptoms. Id.

In sum, Dr. Stivelman expressed his opinion that, contrary to respondent's assertion in the expert report submitted by Dr. Leist,[28] petitioner had an inflammatory optic neuritis and not an ischemic optic neuropathy. Id. at 43, 49-50. Dr. Stivelman conceded that while petitioner "resembles a patient with optic neuritis," her symptoms were not precisely consistent with any diagnosis.[29] Id. at 54, 61. However, in addition to petitioner's optic neuritis-like symptoms, Dr. Stivelman stated that it is close to impossible for an ischemic optic neuropathy to happen in both eyes at the same time. Id. at 43-44, 50. While it is possible for patients with ischemic optic neuropathy to have symptoms in both eyes, Dr. Stivelman asserted that it was statistically improbable for the ischemic optic neuropathy to affect both eyes at the same time. Id. at 50. And, in fact, despite his many years of practice, he had never seen a patient with that injury. Id. at 44, 51, 70.

Dr. Stivelman next discussed the possible causes of optic neuritis. He explained that certain diseases can cause optic neuritis, including vasculitis, lupus, Lyme disease, Wegener's granulomatosis, sarcoidosis, and tuberculosis. Id. at 47-48. However, petitioner was tested for these diseases and these causes were eliminated. Id. at 48. Optic neuritis can also be caused by a hereditary condition that is genetically identifiable through chromosome analysis. Id. at 48. Petitioner does not have a hereditary condition. Id. Other causes include cancer and HIV. Id. at 48, 61. Dr. Stivelman stated that there is no evidence that petitioner suffers from either of these illnesses. In addition, optic neuritis can be caused by trauma. Id. at 61. Finally, optic neuritis can have other "unspecific or nonspecific immunological and nonimmunological causes." Id. at 48. Dr. Stivelman testified that all but the immunological and vaccine-related causes had been ruled out in petitioner's case. Id. at 49, 56. He opined that petitioner suffered from "a form of immunologically-based inflammatory optic neuropathy that is not vascular. In other words, it is not ischemic, in the sense of it being a deprivation of blood flow." Id. at 61; see also id. at 69. However, it is significant that Dr. Stivelman did not opine that the hepatitis B vaccine was responsible for or connected to petitioner's injury.

The final aspect of Dr. Stivelman's testimony concerned petitioner's MRIs. Id. at 55-56. He noted that the MRIs did not reveal any abnormality with respect to petitioner's visual pathways. Id. at 55. No demyelinating lesions associated with an optic neuropathy were discovered. Id. at 68. Dr. Stivelman interpreted these results as demonstrating that "the nature of [petitioner's] symptomatology is at a level which is below the resolution of the scans. It is at the molecular or cell wall level, as opposed to either a macromolecular or structural level." Id. at 55.

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[28] Dr. Leist wrote: "[I]t is likely that Ms. Katz sustained a vascular event on September 3, 2001, and not an autoimmune reaction to the hepatitis B vaccine." Resp't Ex. A at 4; see also id. at 6 ("[C]haracteristics of Ms. Katz's clinical presentation indicated that she very likely suffered a non-arteritic, non inflammatory ischemic neuropathy.").

[29] Dr. Stivelman also stated that petitioner's symptoms were similar, but not identical, to a patient who suffers from optic neuritis associated with multiple sclerosis. Tr. at 55-56.

Of critical importance to the disposition of this case is Dr. Stivelman's opinion that petitioner did not suffer from a demyelinating disease. See id. at 68; see also id. at 169-70. This distinction is critical because, as will be explained below, petitioner's theory of causation is premised upon the hepatitis B vaccine causing a demyelinating injury.

Testimony of Petitioner's Expert: Burton A. Waisbren, Sr., M.D.

1. Dr. Waisbren Is Qualified to Testify as an Expert Regarding Infectious Diseases and Their Causes

Petitioner sought to present Dr. Waisbren as an expert in immunology and infectious disease. Id. at 80. Respondent did not object to admitting Dr. Waisbren as an expert in infectious disease. Id. at 81. However, respondent did object to Dr. Waisbren's admission as an expert in immunology due to his lack of board certification and formal training. Id. at 81, 86.

Dr. Waisbren graduated from medical school at the University of Wisconsin at Madison in 1946, and pursued a residency in internal medicine. Id. at 74. Specifically, Dr. Waisbren did his internship at the Harvard Service of Boston City Hospital, and after military service, completed his residency at the University of Minnesota, apparently focusing on infectious disease. Id. at 74, 86. As part of his military service, he was assigned to the Naval Medical Research Institute in Bethesda, Maryland, where he researched resistance to infections, particularly in diabetic mice. Id. at 77. He was then assigned to the Biological Warfare Center at Camp Dietrick, Maryland, where he researched a possible biological warfare weapon.[30] Id. at 77-78. Dr. Waisbren considers both his military service and his residency at the University of Minnesota to be formal training in immunology, and explained: "Immunology, or the immune process, always concerns the immunity of the host, the virulence of the host, and the dosage of the host. So all bacterial infections really have to take into consideration the immune system. So my entire career has been involved in immunology in that respect." Id. at 86; see also id. at 87.

Dr. Waisbren is board certified in internal medicine, but not in immunology or infectious disease. Id. at 75. Dr. Waisbren first explained that there was no true board certification in the field of immunology and that most physicians were instead certified as allergists.[31] Id. Then, Dr. Waisbren explained that he was not board certified in field of infectious disease because by the time the board was organized, he "had been teaching and in charge of infectious diseases for 20 years." Id. Further, he had already been recognized as a specialist by the Infectious Disease

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[30] Dr. Waisbren's curriculum vitae indicates that he first served at the Biological Warfare Center in 1947 and was then assigned to the Naval Medical Research Institute in 1948. Pet. Ex. 15 at 1.

[31] Dr. Waisbren's assertion is supported by information provided by the American Board of Allergy and Immunology. See ABAI - American Board of Allergy and Immunology, at http://www.abai.org/AboutAbai.html (last visited Oct. 18, 2005).

Society of America and became a Fellow of that same society. Id. at 75-76. Thus, Dr. Waisbren did not feel it necessary to seek board certification. Id. at 75.

Dr. Waisbren first taught medical students at the University of Minnesota while in the last year of his residency. Id. at 78; Pet. Ex. 15 at 1. He then taught the subjects of infectious disease and immunology to medical students at Marquette Medical School, later known as the Medical College of Wisconsin, from about 1952 to 1968.[32] Tr. at 76, 78. In addition, from 1951 to 1969, Dr. Waisbren was the director of the Infectious Disease Control Laboratory at Milwaukee County Hospital. Id. at 76-77; Pet. Ex. 15 at 1. He was responsible for evaluating patients with problematic infectious disease issues and made rounds with the interns and residents treating those patients. Tr. at 77.

In addition to his teaching duties, Dr. Waisbren has pursued medical research. As mentioned above, Dr. Waisbren performed medical research while serving in the military. In addition, throughout his career in medicine, Dr. Waisbren indicates that he has published about 135 peer-reviewed articles, including letters to the editor, of which about 20 to 30 percent of them relate to immunology. Id. at 80-82. In particular, Dr. Waisbren identified 11 articles listed on his curriculum vitae, and one article not listed, as relating to immunology.[33] Id. at 83-85. Dr. Waisbren asserts that he keeps current regarding immunology issues by scanning the Internet and reading all of the infectious disease journals, paying close attention to articles related to autoimmunity. Id. at 88.

In addition, Dr. Waisbren has other extensive practical experience. He was in charge of infections in the burn unit at St. Mary's Hospital from 1961 to 1982. Id. at 78; Pet. Ex. 15 at 1. Dr. Waisbren also started an immunotherapy clinic at St. Mary's Hospital, where he was the Director from 1974 to 1979. Tr. at 78; Pet. Ex. 15 at 1. Additionally, Dr. Waisbren, throughout "all these years," maintained his private practice at the Waisbren Clinic, where he continues to see patients. Tr. at 79. Dr. Waisbren sees "patients who have immunologic problems, or diseases in which the ordinary treatments have not been helpful," such as multiple sclerosis, chronic fatigue syndrome, Lyme diesease, autoimmune illnesses, and vaccine reactions. Id. He stated that he uses a variety of immunotherapy agents to treat patients. Id. at 88. Dr. Waisbren sees about 40 patients per week. Id. at 79.

Dr. Waisbren stated that he had testified at trial about 20 times. Id. at 80. The trials concerned the swine flu vaccine as well as "industrial injury due mostly to hepatitis B vaccine and other[]" vaccines. Id. Dr. Waisbren has also testified before Congress to protest Centers for

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[32] Dr. Waisbren's curriculum vitae indicates that he was an Assistant Clinical Professor of Medicine at Marquette Medical School from 1952 to 1958 and an Associate Clinical Professor of Medicine at the Medical College of Wisconsin from 1960 to 1986. Pet. Ex. 15 at 1.

[33] The special master notes that the time period from about 1961 to 1986 was not addressed at the hearing.

Disease Control and Prevention ("CDC") and Food and Drug Administration policies regarding hepatitis B vaccination. Id. at 106. In addition, Dr. Waisbren stated that he wrote and self-published a book that advocates a moratorium against universal hepatitis B vaccination, a position which he has also advocated on the website for his clinic.[34] Id. at 105-06; Resp't Ex. M.

The special master is satisfied that Dr. Waisbren's education, training, and experience qualify him to testify as an infectious disease expert, but not as an expert in allergy/immunology. Dr. Waisbren's lack of board certification, either in infectious disease or allergy/immunology, is not fatal to his qualification as a causation expert. The bulk of Dr. Waisbren's testimony concerned his interpretation of the medical literature, which does not require board certification. Instead, Dr. Waisbren's medical education, training, experience, and research allow him to discuss the medical literature and his theory of causation.

2. Dr. Waisbren's Theory of Causation, Molecular Mimicry, Is Based Upon an Erroneous Diagnosis and Therefore Cannot Explain Petitioner's Injuries

It is Dr. Waisbren's opinion that the hepatitis B vaccine can cause optic neuropathy. Tr. at 90. He stated that he has seen about 20 patients in his practice with optic neuritis and of those 20 patients, he could think of at least four who developed optic neuritis after hepatitis B vaccination. Id. at 102-03. Further, and contrary to Dr. Stivelman's testimony, Dr. Waisbren stated that petitioner suffered from a demyelinating optic neuritis, even though he acknowledged that petitioner's MRIs, images that can reveal demyelination, were normal. Id. at 109-10. He offered no medical evidence to demonstrate demyelination.

In support of his causation theory, Dr. Waisbren began his testimony with a basic explanation of how the body's immune system protects against foreign bacteria and viruses. He explained that the body produces antibodies, which he defined as "substances within the circulation that will affix themselves and destroy bacteria, and in some cases viruses and cancers." Id. at 90. He then explained that when antibodies work correctly, the antibodies' chemical configuration allows the antibodies to fit into receptor sites on foreign substances (also

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[34] In his posthearing brief, respondent vigorously asserts that Dr. Waisbren's congressional testimony, book, and website demonstrate his preconceived bias against the hepatitis B vaccine and should negatively affect the credibility of his testimony. Resp't Post-Hearing Br. at 8-9, 14-15. As respondent notes, however, Dr. Waisbren does not advocate against all administrations of the hepatitis B vaccine. Rather, Dr. Waisbren believes that the more prudent course is to end the practice of universal vaccination and vaccinate only high-risk individuals. See generally Tr. at 105-08; Resp't Ex. M. Dr. Waisbren defines "high-risk individuals" as health care workers, children from South Asia, and people with "unusual habits" such as alcoholism, intravenous drug use, or prostitution. Tr. at 107. At no point in his expert report or during his testimony did Dr. Waisbren indicate that petitioner should not have received the hepatitis B vaccination. Moreover, the special master finds that advocacy for a change in how a vaccine is administered does not equate to a bias against that particular vaccine.

known as antigens[35]), effectively destroying the foreign substance. Id. However, when antibodies act incorrectly, and, for example, attack the body's own tissue, autoimmunity results. Id. at 89-90. Dr. Waisbren stated that "in all probability," optic neuropathy is an autoimmune disease. Id. at 97. He further stated that, from an immunological standpoint, "there was no . . . definite time interval [between vaccination and onset of symptoms] that will indicate an autoimmune reaction." Id. at 111.

Next, Dr. Waisbren discussed that autoimmunity can occur through molecular mimicry.[36] Id. at 89. To illustrate the theory of molecular mimicry, Dr. Waisbren described the mechanism at work in rheumatic fever. Id. According to Dr. Waisbren, there is a substance within the heart that also exists in the bacteria that causes rheumatic fever. Id. When the body is presented with the bacteria, it creates antibodies against that substance. Id. When the immune system malfunctions, the antibodies attack both the bacteria and the normal heart tissue. Id. Dr. Wasibren stated that this phenomenon is called molecular mimicry "because there is mimicry between the molecular constituent of the bacteria or the virus, and the heart." Id. In more general terms, Dr. Waisbren explained:

> [T]here is a substance in common between an invading organism and the human tissue, and when the body's resistance sees this invading organism, it not only makes an antibody against the substance which is in the invading organism, but it is held in common within the body, and that is called molecular mimicry.

Id. at 91.

Dr. Waisbren stated that "there is molecular mimicry between the hepatitis B vaccine and human neurologic tissue." Id. at 90-91. In support of this proposition, Dr. Waisbren cited an article by Fujinami and Oldstone that he said found an amino acid homology between myelin[37]

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[35] An antigen is "any substance capable, under appropriate conditions, of inducing a specific immune response and of reacting with the products of that response, that is, with specific antibody or specifically sensitized T lymphocytes, or both." Dorland's Illustrated Medical Dictionary, supra note 2, at 103.

[36] Specifically, Dr. Waisbren cited a type of molecular mimicry called the MAMA theory–"multiple antigenic-mediated autoimmunity." Id. at 91-92. He explained that the MAMA theory is a hypothesis that implicates two antigens to trigger autoimmunity. Id. at 92, 111-12. Dr. Waisbren finds the MAMA theory, while not explicitly proven, to be a "rational and reasonable explanation" for hepatitis B vaccine reactions. Id. at 91-92, 111-12.

[37] Myelin coils together to form the myelin sheath. Dorland's Illustrated Medical Dictionary, supra note 2, at 1209. The myelin sheath is:

and the hepatitis B vaccine.[38] Id. at 93, 118-20; Pet. Ex. 42. This homology, he explained, revealed how the body's immune system might be triggered to attack its own optic nerves. Tr. at 93-94. Dr. Waisbren also cited an article by Gran et al.[39] Id. at 94-96; Pet. Ex. 25. He stated that the article was a case report that demonstrated that people who developed multiple sclerosis, a "prototype of an autoimmune disesase," after a hepatitis B vaccination had T lymphocytes ("T-cells")[40] circulating in their blood that attack the myelin. Tr. at 94-95, 113. This is evidence, according to Dr. Waisbren's reading of the article, that the T-cells mistake substances in the myelin for antigens in the hepatitis B virus and vaccine. Id. at 95-96. In sum, Dr. Waisbren asserted that molecular mimicry is generally accepted within the immunological community. Id. at 96.

After discussing the possible mechanism by which the hepatitis B vaccine could trigger an immune response against one's own nervous system, Dr. Waisbren addressed the literature supporting his contention that the hepatitis B vaccine can cause optic neuritis. The first article he

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> the cyndrical covering on the axons of some neurons; it consists of concentric layers of myelin, formed in the peripheral nervous system by the plasma membrane of Schwann cells, and in the central nervous system by oligodendrocytes. . . . Myelin is an electrical insulator that serves to speed the conduction of nerve impulses.

Id. at 1689.

[38] The article is Robert S. Fujinami & Michael B. A. Oldstone, Amino Acid Homology Between the Encephalitogenic Site of Myelin Basic Protein and Virus: Mechanism for Autoimmunity, 230 Science 1043-45 (1985). The article indicates that the authors used computer analysis to find that hepatitis B virus polymerase shared "six consecutive amino acids with the encephalitogenic site of rabbit [myelin basic protein]. Fujinami & Oldstone, supra, at 1044. Dr. Waisbren testified that the hepatitis B virus polymerase is a substance found in the hepatitis B vaccine. Tr. at 118-20. However, Dr. Leist later testified that neither the plasma-based nor the recombinant hepatitis B vaccine contain the hepatitis B virus polymerase; it is only found in a live virus infection. Id. at 146.

[39] Bruno Gran et al., Development of Multiple Sclerosis After Hepatitis B Vaccination: An Immunologic Case Report, 54 Neurology A164 (2000 Supp. 3).

[40] Lymphocytes are "any of the mononuclear, nonphagocytic leukocytes, found in the blood, lymph, and lymphoid tissues, that are the body's immunologically competent cells and their precursors. They are divided on the basis of ontogeny and function into two classes, B and T lymphocytes, responsible for humoral and cellular immunity, respectively." Dorland's Illustrated Medical Dictionary, supra note 2, at 1077.

described was an epidemiological study done by Shaw et al.[41] Id. at 96-97; Pet. Ex. 30. Dr. Waisbren explained that the study was requested and funded by the vaccine manufacturer to monitor and evaluate the use of the hepatitis B vaccine after it was released to the market. Tr. at 96. Despite their possible conflict of interest, Dr. Waisbren indicated that the researchers found an increased incidence rate of Guillain-Barré syndrome, an autoimmune disorder, in people who had been administered the hepatitis B vaccine. Id. at 97. Dr. Waisbren conceded that the study dealt with the plasma-based hepatitis B vaccine and not the recombinant hepatitis B vaccine received by petitioner, but argued that the two versions of the hepatitis B vaccine were "fundamentally the same."[42] Id. at 116-17.

Dr. Wasibren then explained the relevance of an article written by Hernán et al.[43] Id. at 97-100; Pet. Ex. 44. Dr. Waisbren noted that Hernán and his associates set out to discover whether, with statistical significance, there was a link between multiple sclerosis and the hepatitis B vaccine. Tr. at 97-98. According to Dr. Waisbren, the researchers discovered that people who received a hepatitis B vaccination were three times as likely to develop multiple sclerosis than people who were not so vaccinated.[44] Id. at 98, 116. Dr. Waisbren considers this article to be definitive proof that multiple sclerosis occurs with a higher frequency in people vaccinated against hepatitis B. Id. at 98-99. He then stated that 40 percent of people who develop multiple sclerosis also develop optic neuritis during the course of their disease and, therefore, one can assume that the increased incidence of multiple sclerosis also applies to optic neuritis. Id. at 99-100, 116.

That extrapolation aside, Dr. Waisbren agreed that no epidemiological study had been conducted about a possible link between the hepatitis B vaccine and optic neuritis.[45] Id. at 116, 122. Further, Dr. Waisbren agreed that in 2002, the Institute of Medicine ("IOM") found that the

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[41] F.E. Shaw Jr. et al., Postmarketing Surveillance for Neurologic Adverse Events Reported After Hepatitis B Vaccination, 127 Am. J. of Epidemiology 337-52 (1988).

[42] Dr. Leist explained the difference between the two forms of the hepatitis B vaccine during his testimony. With the plasma-based vaccine, the hepatitis B viral protein used in the vaccine is derived from human source material. Tr. at 149-50. In the recombinant vaccine, the hepatitis B viral protein used in the vaccine is not derived from human sources. Id.

[43] Miguel A. Hernán, M.D., Dr.P.H. et al., Recombinant Hepatitis B Vaccine and the Risk of Multiple Sclerosis, A Prospective Study, 63 Neurology 838-42 (2004).

[44] The article states: "The porportion of cases that received at least one hepatitis B immunization during the 3 years before the date of first symptoms was 6.7%, compared with 2.4% of controls . . . ." Hernán et al., supra note 43, at 839.

[45] Of course, epidemiological evidence is not required by the Vaccine Act to prove causation.

existing epidemiological evidence favored the rejection of a causal relationship between the hepatitis B vaccine and multiple sclerosis and that there was inadequate evidence to make a causal connection between the hepatitis B vaccine and optic neuritis. Id. at 120-21. But, Dr. Waisbren explained that the lack of any epidemiological evidence cannot be used as evidence against finding a causative relationship. Id. In addition, Dr. Waisbren confirmed that the IOM did review one study, by DeStefano, concerning the link between the hepatitis B vaccine and optic neuritis, which came to the conclusion that there was no causative link. Id. at 121. However, Dr. Waisbren criticized the study as lacking enough data to draw conclusions about causation. Id. at 121-22. Dr. Waisbren also was concerned about the conflict of interest resulting from the author's employment by the CDC. Id. at 122.

Next, Dr. Waisbren briefly addressed case reports linking autoimmunity in general, and optic neuropathies in particular, to the hepatitis B vaccine. He prefaced his comments with a statement regarding the utility of case reports–he stated that when enough case reports linking a cause and effect accrue, "it is a definite suggestion that something has happened." Id. at 100, 113. He also noted that case reports signaled to physicians how a certain event occurred. Id. at 100. However, he conceded that case reports do not prove a causal relationship between a vaccine and an injury or the presence of a particular biological mechanism. Id. at 113. With this background, Dr. Waisbren claimed that there were over 200 case reports of autoimmunity after hepatitis B vaccination, including reports of optic neuritis.[46] Id. at 100. According to Dr. Waisbren, the number of reports of autoimmunity following hepatitis B vaccination was greater than the number of reported cases of autoimmunity following any other vaccination. Id. Based upon the sheer number of adverse reports, Dr. Waisbren extrapolated that the hepatitis B vaccine can cause autoimmunity. However, Dr. Waisbren admitted that case reports alone do not support a causal relationship or explain a biological mechanism. Id. at 113. Further, Dr. Waisbren admitted that the MAMA theory, which he espoused, has never been studied with the recombinant hepatitis B vaccine. Id. at 112.

Dr. Waisbren concluded with his belief that the hepatitis B vaccination, more likely than not, caused petitioner's optic neuropathy by stimulating T-cells to attack her optic nerve. Id. at 103-04, 109. This opinion relied clearly on demyelinating injuries occurring as a result of the hepatitis B vaccine. Additionally, the fact that all other possible causes of petitioner's condition were effectively ruled out by her testifying treater was an important factor in his opinion. Id. at 104, 110. According to Dr. Waisbren, he based his opinion on petitioner's medical records, 52 years of observing adverse drug reactions, the fact that the swine flu vaccine causes

[46] Dr. Waisbren cited research by Dr. Geier and Mr. Geier in support of his contention. Tr. at 101-02; see also id. at 125-26. However, petitioner did not file any of the articles written by these authors that allegedly support this proposition.

autoimmunity,[47] personal experience with his own patients, the medical literature, and the agreement of "over 300 or 400 professors around the world." Id. at 104, 108. Dr. Waisbren offered no specific support for his claim that hundreds of academics worldwide support his theory of causation. The bulk of his testimony consisted of generalizations concerning molecular mimicry rather than an explanation of a logical sequence of cause and effect tying the hepatitis B vaccine to petitioner's injury. Indeed, the cornerstone of Dr. Waisbren's theory of causation was demyelination, a theory rejected by petitioner's other expert. Further, Dr. Waisbren failed to explain how he reached the conclusion that petitioner suffered a demyelinating injury. Notably, in his testimony, Dr. Waisbren stated that he agreed with Dr. Stivelman's assessment of petitioner's condition: "I would say that everything that was said by [Dr. Stivelman] would be what my opinion is based on, though I am not as brilliant an ophthalmologist as [Dr. Stivelman]." Id. at 108.

Testimony of Respondent's Expert: Thomas P. Leist, M.D., Ph.D.

1. Dr. Leist Is Qualified to Testify as an Expert Regarding the Causes of Neurological Illnesses, but Is Not Qualified to Render Ophthalmological Diagnoses

Dr. Leist received a Ph.D. in biochemistry and immunology from the University of Zurich in 1985.[48] Id. at 129-30; Resp't Ex. B at 1. After receiving his Ph.D., Dr. Leist did postdoctoral fellowships in viral immunology at the University of Zurich and at UCLA. Tr. at 130; Resp't Ex. B at 1. He then received his medical degree from the University of Miami in 1993. Tr. at 129; Resp't Ex. B at 1. Dr. Leist did his internship in internal medicine at the University of Miami and then did his residency in neurology at Cornell Medical Center/Sloan Kettering Memorial Cancer Center. Resp't Ex. B at 1. Subsequent to his residency, Dr. Leist had additional training as a senior staff associate in the immunology branch of the National Institutes of Health. Tr. at 129-30. Dr. Leist is board certified in neurology, but not immunology or ophthalmology. Id. at 133. He explained that he is not board certified in immunology because there is no board certification in the subspecialty of neuro-immunology. Id. Further, Dr. Leist has published approximately 42 or 43 research articles. Id. at 132.

While Dr. Leist was an intern at the University of Miami, he was a clinical instructor in pediatric infectious disease. Id. at 130. Presently, he is an Assistant Professor of Neurology at Thomas Jefferson University in Philadelphia. Id. at 129-30. At Thomas Jefferson University, Dr. Leist maintains a clinical practice with about 1,500 patients with multiple sclerosis, performs MRI and imaging research, and runs clinical trials. Id. at 131. Dr. Leist also supervises two

[47] In his testimony, Dr. Leist pointed out that the swine flu is a disease of the peripheral, not the central, nervous system, and that the swine flu vaccine is no longer on the market. Tr. at 148-49.

[48] Dr. Leist's curriculum vitae indicates that the Ph.D. he received from the University of Zurich was in biochemistry; immunology is not mentioned. Resp't Ex. B at 1.

residents and sees patients in the general neurology service as a function of his faculty position. Id. at 132. The majority of patients that Dr. Leist evaluates are those referred to him to confirm or rule out a diagnosis of multiple sclerosis or other diseases of the central nervous system, either of infectious or autoimmune origin. Id. at 131.

As to his ophthalmological experience, Dr. Leist states that he sees "a fair amount of patients" that he refers to the Wills Eye Institute, a large ophthalmological practice located across the street from his office at Thomas Jefferson University. Id. Additionally, he sees one to three patients each week with established diagnoses of optic neuritis who are seeking an opinion regarding possible multiple sclerosis. Id. at 131-32. Dr. Leist stated that his formal ophthalmological training consisted of a four-week rotation in neuro-ophthalmology during his residency. Id. at 133. He explained that if a patient with symptoms similar to petitioner's symptoms appeared in his clinic, either (1) she probably came as "a referral from the neuro-ophthalmologist to me for questions regarding the more complex diagnosis" or (2) if she were a new patient, he would refer her to neuro-ophthalmologist for a consultation. Id. at 133-34. The special master finds that Dr. Leist, although eminently qualified to testify as a neurologist, does not have sufficient credentials to diagnose ophthalmological conditions. However, he is highly qualified to testify as an expert regarding the causes of neurological illnesses, including those that affect the eye, and as such, he is highly qualified to address whether petitioner's symptoms are demyelinating or nondemyelinating, and to discuss the medical literature.

2. While Conceding that a Biological Mechanism Linking the Hepatitis B Vaccine to Demyelination Was Conceivable, Dr. Leist Argued that Petitioner Did Not Suffer a Demyelinating Injury

Dr. Leist reviewed all exhibits up to and through Petitioner's Exhibit 44[49] in preparation for his testimony, including petitioner's medical records, petitioner's original MRI films, the expert report of Dr. Waisbren, the expert affidavit of Dr. Stivelman, and the submitted medical literature. Id. at 136-37. Based upon all of this evidence, Dr. Leist concluded, to a reasonable degree of medical certainty, that petitioner did not suffer a demyelinating injury nor an adverse reaction to her hepatitis B vaccination. Id. at 137.

Dr. Leist first addressed petitioner's diagnosis. In his view, petitioner suffered from ischemic optic neuritis. Id. at 156, 159. He summarized petitioner's visual symptoms as occurring with a sudden onset without accompanying eye pain. Id. at 140. Subsequently, according to Dr. Leist, petitioner's visual deficit stabilized. Id. Further, he pointed out that petitioner's visual acuity after onset was the same as it was prior to the onset of her symptoms. Id.

[49] Dr. Leist did not state whether he had also reviewed Petitioner's Exhibit 45, excerpts from a textbook entitled Ocular Pathology, or Petitioner's Exhibit 46, an article from the Journal of Autoimmunity, which were filed prior to hearing.

In his review of the evidence, Dr. Leist, like Dr. Stivelman, found no evidence of a demyelinating disease. Id. at 140, 143-44, 159-60, 168-70. He also agreed with Dr. Stivelman that petitioner could suffer from an optic neuritis-like condition. Id. at 141. Dr. Leist pointed to several features of petitioner's disease course that differed from a typical optic neuritis presentation. Id. at 141-42. One, petitioner was older than the typical patient with optic neuritis. Id. Two, petitioner did not experience any eye pain. Id. at 141. Three, unlike petitioner's onset of symptoms, optic neuritis generally develops over a period of days. Id. at 142. Four, Dr. Leist implied that hemorrhaging, like that experienced by petitioner, was atypical for optic neuritis.[50] Id. Five, Dr. Leist asserted that, contrary to the testimony of Dr. Stivelman[51] and unlike the majority of patients with optic neuritis, petitioner's visual field defect did not recover. Id. at 142, 161.

In general, Dr. Leist did not have a "direct problem" with Dr. Stivelman's characterization of petitioner's symptoms as a nondemyelinating, nonarteritic[52] optic neuritis-like condition. Id. at 144-45, 168. But, Dr. Leist offered that petitioner could be suffering from a nonarteritic, ischemic optic neuropathy. Id. at 156, 159. In fact, he opined that there was a 50 percent chance that petitioner suffered from an ischemic optic neuropathy, based upon the factors that weighed against a diagnosis of optic neuritis.[53] Id. at 160-61. However, Dr. Leist did admit

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[50] In response to a question regarding whether hemorrhaging is typical with optic neuritis, Dr. Leist replied: "To my experience with the patients that I have seen, and I asked across the street, and obviously they are not here, and this is [Sergott] and Savino, how many cases of true optic neuritis they have seen with hemorrhaging and they could not recall." Tr. at 142. Drs. Sergott and Sarvino are physicians at Wills Eye Hospital, which is apparently across the street from Dr. Leist's office, and are Dr. Leist's main source of referred optic neuritis patients where there is a possibility of multiple sclerosis. Id. While the special master is not bound by the Federal Rules of Evidence, she cannot accept such blatant hearsay as evidence. See also Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 595 (1993) (noting that Rule 703 of the Federal Rules of Evidence "provides that expert opinions based on otherwise inadmissible hearsay are to be admitted only if the facts or data are 'of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject.'").

[51] Dr. Leist pointed out that Dr. Stivelman's opinion of the degree of petitioner's recovery was significantly qualified. Id. at 161.

[52] The transcript repeatedly refers to the term arteritic as "arthritic." Arteritic means having to do with the inflammation of arteries. Dorland's Illustrated Medical Dictionary, supra note 2, at 144.

[53] As petitioner notes in her posthearing brief, this statement by Dr. Leist backtracks from his opinion offered in his expert report. Pet'r Post-Hearing Br. at 13-14. Dr. Leist opined in his report that it was both "likely" and "very likely" that petitioner suffered from an ischemic optic neuropathy. Resp't Ex. A at 4, 6. It appears that once Dr. Leist heard a reasonable alternate

that petitioner's reaction to a lack of oxygen, the coincidence of her ophthalmological and neurological symptoms, and the type of visual field defect experienced by petitioner could weigh against the diagnosis of ischemic optic neuropathy, which he advanced. Id. at 161-62, 169. He also conceded that a person with a lazy eye, such as petitioner, would notice a visual impairment in her better eye as soon as the impairment occurred. Id. at 166-67. Ultimately, because no "underlying mechanistic explanation" for petitioner's symptoms was put forward, Dr. Leist indicated that he would defer to Dr. Stivelman's diagnosis. Id. at 158-59. Thus, petitioner's diagnosis was conceded effectively by respondent.

Turning to the issue of causation, Dr. Leist stated that he did not agree with Dr. Waisbren's assessment that petitioner suffered an autoimmune reaction to her hepatitis B vaccination. Id. at 145. He began by discussing molecular mimicry and explained that the concept has evolved greatly since the publication of the Oldstone and Fujinami article. Id. at 146-47. But, Dr. Leist stated, there is no evidence that the hepatitis B surface antigen, the antigen present in the hepatitis B vaccine, induces autoimmune disease.[54] Id. at 147-48. In fact, Dr. Leist was not aware of any biological mechanism that could explain how the hepatitis B vaccine could have caused petitioner's condition. Id. at 153.

Dr. Leist next discussed the articles cited by Dr. Waisbren in his testimony. With regard to the article by Gran et al., Dr. Leist explained that the article was merely an abstract for a poster, and that because the authors were unable to reproduce their work, they did not publish their results in a true peer-reviewed form. Id. at 150. Dr. Leist also expressed concerns about the article by Hernán et al. Id. at 151-52. He indicated that the people included in the study were drawn from the British population, and in Great Britain, only high-risk individuals are vaccinated against hepatitis B. Id. at 151. Thus, according to Dr. Leist, the people in the study were drawn from two different social and economic strata,[55] making it difficult to compare the two groups. Id. at 151-52. Finally, Dr. Leist emphasized that the article by Shaw et al. dealt with the plasma-derived hepatitis B vaccine and not the current, recombinant hepatitis B vaccine. Id. at 152-53. In sum, Dr. Leist stated that aside from the flawed article by Hernán et al. and certain French studies, there is no epidemiological evidence supporting a causative link between the hepatitis B vaccine and demyelinating injuries. Id. at 153.

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diagnosis from a well-credentialed ophthalmologist, he re-evaluated the appropriateness of his initial diagnosis. Dr. Leist's re-evaluation lends support to the special master's decision to give little weight to Dr. Leist's testimony regarding the diagnosis of petitioner's condition.

[54] Dr Leist added that the MAMA theory, which is now outdated, relies upon the concept of a superantigen. Tr. at 148. He stated that there was no evidence that the hepatitis B surface antigen acted as a superantigen. Id.

[55] Although he did not say so, the special master believes Dr. Leist is referring to health care providers versus people who engage in aberrant behavior such as alcohol abuse, intravenous drug use, or prostitution.

Finally, Dr. Leist addressed the 2002 IOM report regarding the hepatitis B vaccine and demyelinating injuries. He confirmed that the IOM, after reviewing epidemiological studies, cohort studies, and case reports, concluded that the evidence supported the rejection of a causal relationship between the hepatitis B vaccine and multiple sclerosis. Id. at 154. He also confirmed that the IOM concluded that there was insufficient evidence to support an acceptance or rejection of a causal relationship between the hepatitis B vaccine and optic neuritis. Id. But, based upon experimental evidence, Dr. Leist explained that the IOM concluded that it was possible to conceive a theoretical mechanism by which the hepatitis B vaccine could cause demyelination. Id. at 155, 164. Although the special master need not reach the ultimate issue of whether the vaccine can cause the demyelinating eye injury advanced by Dr. Waisbren, Dr. Leist was more familiar with and better able to discuss the medical literature and therefore, his testimony was more credible and convincing. Although medical literature is not necessary to prevail, petitioner must demonstrate a logical sequence of cause and effect. Althen, 418 F.3d at 1278.

Petitioner Has Not Met Her Burden

Petitioner argues that she has produced sufficient proof to prevail under a causation-in-fact theory because she offered expert testimony by credentialed physicians and medical literature that she believes supports her theory of causation. Unfortunately for petitioner, Dr. Waisbren's theory of causation was dependent upon a diagnosis of a demyelinating eye injury, a diagnosis effectively rebutted by petitioner's other expert, Dr. Stivelman and respondent's expert neurologist, Dr. Leist.

Dr. Stivelman, an expert in conditions of the optic nerve who has been petitioner's treating ophthalmologist for over 14 years, examined and diagnosed petitioner with a nondemyelinating inflammatory optic neuritis. On the other hand, Dr. Waisbren and Dr. Leist, neither of whom are trained or practicing ophthalmologists, offered alternate, competing diagnoses. However, only Dr. Waisbren diagnosed petitioner with a demyelinating illness; namely, demyelinating optic neuritis. But, Dr. Waisbren did not provide any evidence of a demyelinating process in petitioner's optic nerves and admitted that petitioner's MRIs were normal. Dr. Waisbren's suggestion that petitioner's disease process was present but could not be detected by her MRIs is nothing more than conjecture on his part. No matter how heartfelt Dr. Waisbren holds this view, it is not credible. An expert's theory of causation that is based upon personal opinion cannot be substituted for science. Daubert v. Merrell Dow Pharm., Inc., 43 F.3d 1311, 1319 (9th Cir. 1995). Ironically, Dr. Waisbren testified that he relied upon the diagnosis of Dr. Stivelman, "a brilliant ophthalmologist." That statement cannot be reconciled with his opinion that petitioner suffered from a demyelinating disease since Dr. Stivelman rejected that diagnosis. Dr. Leist's preferred assessment was an ischemic optic neuropathy, but he only could be 50 percent sure of that diagnosis. And, in the end, Dr. Leist deferred to Dr. Stivelman. Given Dr. Stivelman's education, experience, and actual examination and treatment of petitioner, the special master finds his cogent testimony regarding the diagnosis of petitioner's condition to be the most credible of the three experts.

Dr. Stivelman's testimony convinced the special master that petitioner, more likely than not, suffered from a nondemyelinating, inflammatory optic neuritis. Petitioner's burden was to prove, by a preponderance of evidence, "(1) a medical theory causally connecting the vaccination and the injury; (2) a logical sequence of cause and effect showing that the vaccination was the reason for the injury; and (3) a showing of a proximate temporal relationship between vaccination and injury." Althen, 418 F.3d at 1278. In this case, petitioner failed to make the requisite showing since her two experts were in conflict. Her injury is not demyelinating. Yet, her theory of causation presupposes a demyelinating injury.

Dr. Waisbren was charged with explaining how petitioner's hepatitis B vaccination can cause and did cause her optic neuritis. He offered the molecular mimicry theory to explain how the vaccine might have caused the production of antibodies, which then attacked healthy tissue. However, the molecular mimicry theory proposed by Dr. Waisbren relies upon a similarity between a substance in the hepatitis B vaccine and the myelin of the human nervous system. Thus, Dr. Waisbren contends that petitioner's body mistook its myelin for a hepatitis B antigen and began to attack its myelin. The fatal flaw with this proposed mechanism is that petitioner exhibited no evidence of demyelination. Dr. Stivelman and Dr. Leist both reviewed the MRI films and found no evidence of demyelination and even Dr. Waisbren, whose own theory required demyelination, acknowledged that petitioner's MRIs were normal. Without any evidence of demyelination, Dr. Waisbren's molecular mimicry proposal is of no use to explain how the hepatitis B vaccine may have caused petitioner's optic neuritis. Dr. Stivelman's diagnosis and Dr. Waisbren's theory of causation are mismatched.

In sum, petitioner's causation expert failed to offer a credible theory supported by the facts presented in this case. There is no evidence in the record indicating that petitioner suffered from a demyelinating disease. Indeed, her own expert/treater testified to the contrary. And, petitioner did not offer any explanation how the hepatitis B vaccine could cause a nondemyelinating optic neuritis. Therefore, petitioner has not met her burden of proving, by a preponderance of evidence, a logical sequence of cause and effect showing that her hepatitis B vaccination caused her optic neuritis.

CONCLUSION

Based upon a review of the medical records, medical literature, and expert reports, coupled with the testimony presented at hearing, the special master finds that the totality of evidence demonstrates that Ms. Katz's August 15, 2001 hepatitis B vaccination did not cause her optic neuropathy and its sequela. Petitioner failed to prove by a preponderance of the evidence that the hepatitis B vaccine was the cause in fact of her optic neuropathy and its sequela. In the absence of a motion for review filed pursuant to RCFC Appendix B, the Clerk of Court is directed to enter judgment accordingly.

IT IS SO ORDERED.

Margaret M. Sweeney
Special Master