In the United States Court of Federal Claims

OFFICE OF SPECIAL MASTERS
No. 16-1190V
Filed: July 29, 2024

ANNE MARIE BACHER, as executrix of the ESTATE OF JAMES BACHER, Petitioner, v. SECRETARY OF HEALTH AND HUMAN SERVICES, Respondent.	Special Master Horner

Michael Andrew London, Douglas & London, P.C. New York, NY, for petitioner
Nina Ren, U.S. Department of Justice, Washington, DC, for respondent

Decision[1]

On September 23, 2016, then-petitioner, Mr. Bacher, filed a petition under the National Childhood Vaccine Injury Act, 42 U.S.C. § 300aa-10, *et seq.* (2012),[2] alleging that a hepatitis B vaccination series that he received between September of 2013 and March of 2014 caused him to develop myasthenia gravis. (ECF No. 1.) Mr. Bacher subsequently passed away. Mrs. Bacher, the legal representative of his estate, was substituted as petitioner, and an amended petition was filed, alleging that Mr. Bacher's death was a further consequence of his allegedly vaccine-caused myasthenia gravis. (ECF No. 72.) For the reasons set forth below, I conclude that petitioner is *not* entitled to an award of compensation.

[1] Because this document contains a reasoned explanation for the action taken in this case, it must be made publicly accessible and will be posted on the United States Court of Federal Claims' website, and/or at https://www.govinfo.gov/app/collection/uscourts/national/cofc, in accordance with the E-Government Act of 2002. 44 U.S.C. § 3501 note (2018) (Federal Management and Promotion of Electronic Government Services). **This means the document will be available to anyone with access to the internet.** In accordance with Vaccine Rule 18(b), Petitioner has 14 days to identify and move to redact medical or other information, the disclosure of which would constitute an unwarranted invasion of privacy. If, upon review, I agree that the identified material fits within this definition, I will redact such material from public access.

[2] Within this decision, all citation to § 300aa will be the relevant sections of the Vaccine Act at 42 U.S.C. § 300aa-10-34.

I. Applicable Statutory Scheme

Under the National Vaccine Injury Compensation Program, compensation awards are made to individuals who have suffered injuries after receiving vaccines. In general, to gain an award, a petitioner must make a number of factual demonstrations, including showing that an individual received a vaccination covered by the statute; received it in the United States; suffered a serious, long-standing injury; and has received no previous award or settlement on account of the injury. Finally – and the key question in most cases under the Program – the petitioner must also establish a *causal link* between the vaccination and the injury.

In some cases, the petitioner may simply demonstrate the occurrence of what has been called a "Table Injury." That is, it may be shown that the vaccine recipient suffered an injury of the type enumerated in the "Vaccine Injury Table," corresponding to the vaccination in question, within an applicable time period following the vaccination also specified in the Table. If so, the Table Injury is presumed to have been caused by the vaccination, and the petitioner is automatically entitled to compensation, unless it is affirmatively shown that the injury was caused by some factor other than the vaccination. § 300aa-13(a)(1)(A)-(B); § 300aa-11(c)(1)(C)(i); § 300aa-14(a). In this case, petitioner's allegations do not implicate any Table Injury.

When the vaccine recipient suffered an injury *not* of the type covered in the Vaccine Injury Table, an alternative means exists to demonstrate entitlement to a Program award. That is, the petitioner may gain an award by showing that the recipient's injury was "caused-in-fact" by the vaccination in question. § 300aa-13(a)(1)(A); § 300aa-11(c)(1)(C)(ii). In such a situation, of course, the presumptions available under the Vaccine Injury Table are inoperative. The burden is on the petitioner to introduce evidence demonstrating that the vaccination actually caused the injury in question. *Althen v. Sec'y of Health & Human Servs.*, 418 F.3d 1274, 1278 (Fed. Cir. 2005); *Hines ex rel. Sevier v. Sec'y of Health & Human Servs.*, 940 F.2d 1518, 1525 (Fed. Cir. 1991). In this case, petitioner must meet this burden of proof for establishing causation-in-fact.

The showing of "causation-in-fact" must satisfy the "preponderance of the evidence" standard, the same standard ordinarily used in tort litigation. § 300aa-13(a)(1)(A); *see also Althen*, 418 F.3d at 1279; *Hines*, 940 F.2d at 1525. Under that standard, the petitioner must show that it is "more probable than not" that the vaccination was the cause of the injury. *Althen*, 418 F.3d at 1279. The petitioner need not show that the vaccination was the sole cause but must demonstrate that the vaccination was at least a "substantial factor" in causing the condition, and was a "but for" cause. *Shyface v. Sec'y of Health & Human Servs.*, 165 F.3d 1344, 1352 (Fed. Cir. 1999). Thus, the petitioner must supply "proof of a logical sequence of cause and effect showing that the vaccination was the reason for the injury[,]" with the logical sequence being supported by "reputable medical or scientific explanation, *i.e.*, evidence in the form of scientific studies or expert medical testimony." *Althen*, 418 F.3d at 1278; *Grant v. Sec'y of Health & Human Servs.*, 956 F.2d 1144, 1148 (Fed. Cir. 1992). A petitioner

may not receive a Vaccine Program award based solely on his or her assertions; rather, the petition must be supported by either medical records or by the opinion of a competent physician. § 300aa-13(a)(1).

In what has become the predominant framing of this burden of proof, the *Althen* court described the "causation-in-fact" standard, as follows:

> Concisely stated, Althen's burden is to show by preponderant evidence that the vaccination brought about her injury by providing: (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 proximate temporal relationship between vaccination and injury. If Althen satisfies this burden, she is "entitled to recover unless the [government] shows, also by a preponderance of the evidence, that the injury was in fact caused by factors unrelated to the vaccine."

Althen, 418 F.3d at 1278 (citations omitted). The *Althen* court noted that a petitioner need not necessarily supply evidence from medical literature supporting a causation contention, so long as the petitioner supplies the medical opinion of an expert. *Id*. at 1279-80. The court also indicated that, in finding causation, a Program fact-finder may rely upon "circumstantial evidence," which the court found to be consistent with the "system created by Congress, in which close calls regarding causation are resolved in favor of injured claimants." *Id*. at 1280.

II. Procedural History

This case was initially assigned to another special master. (ECF No. 3.) Thereafter, petitioner filed medical records marked as Exhibits 1-5, employment records marked as Exhibit 6, and an affidavit marked as Exhibit 7. (ECF Nos. 6, 9, 13.) Additionally, two amended petitions were filed seeking to clarify petitioner's allegations as to onset of his condition. (ECF Nos. 11, 18.) Respondent filed his Rule 4 Report in May of 2017, disputing that petitioner's hepatitis B vaccination either caused or aggravated his myasthenia gravis. (ECF No. 19.)

In July of 2017, petitioner filed expert opinions by neurologist Thomas Morgan, M.D., and ophthalmologist Sylvia Norton, M.D. (ECF Nos. 22-23; Exs. 8-15.) Respondent filed a responsive report by neurologist Timothy Vartanian, M.D., Ph.D., in October of 2017. (ECF Nos. 27, 29; Exs. A-B.) Petitioner then filed additional medical records (Exhibits 16-17) and a supplemental report by Dr. Morgan (Exhibit 18) in January of 2018. (ECF Nos. 31-32.) Respondent filed a further report by Dr. Vartanian in April of 2018. (ECF No. 35; Ex. C.)

Thereafter, the previously-assigned special master paused proceedings pending transfer to another special master following her retirement. (ECF No. 36.) The case was later reassigned to the undersigned in June of 2019. (ECF No. 38.) The parties

were prompted to begin scheduling an entitlement hearing; however, petitioner advised that Dr. Morgan had become unavailable to continue the case. (ECF No. 40; Non-PDF Scheduling Order, filed Mar. 3, 2020.) Petitioner filed a report by another neurologist, Dr. Salvatore Napoli, M.D., in April of 2020, and respondent filed a responsive report from Dr. Vartanian in August of 2020. (ECF Nos. 44, 47; Exs. 19-25, Ex. D.)

An entitlement hearing was then scheduled to be held in April of 2021. (ECF No. 48.) However, in March of 2021, petitioner's counsel advised that Mr. Bacher had passed away. There was insufficient time for a legal representative to be substituted as petitioner prior to the hearing date and so the hearing was cancelled. (ECF Nos. 50, 54.) Mrs. Bacher was substituted as petitioner as of August 5, 2021. (ECF No. 59.) Further medical records, letters testamentary, and a death certificate were filed. (ECF Nos. 53, 57, 61, 64; Exs. 26-46.)

In an attempt to expedite the case, a fact hearing was scheduled while petitioner investigated with Dr. Napoli whether he would support myasthenia gravis as a cause of Mr. Bacher's death. (ECF No. 71.) In July of 2022, petitioner filed an amended petition alleging that Mr. Bacher's death was related to his myasthenia gravis and a report by Dr. Napoli supporting that allegation. (ECF Nos. 72-73; Ex. 47.) Subsequently, a fact hearing was held on September 15, 2022. (ECF Nos. 75-76 (Transcript of Proceedings ("Tr."), filed Nov. 16, 2022).) Mrs. Bacher was the only witness. (*Id*.)

Respondent initially intended to seek a response by Dr. Vartanian to Dr. Napoli's final report, but he determined that Dr. Vartanian was unable to continue participating in the case for medical reasons. (ECF No. 77.) At my urging, the parties agreed to proceed to resolution of this case on the written record without any expert testimony. (ECF No. 78.)

Petitioner filed a motion for a ruling on the written record on May 17, 2023. (ECF No. 80.) Respondent filed his response on July 17, 2023. (ECF No. 81.) Petitioner filed her reply on September 8, 2023. (ECF No. 84.) Accordingly, this matter is now ripe for resolution. I have concluded that the parties have had a full and fair opportunity to develop the record and that it is appropriate to resolve this case without an entitlement hearing. S*ee Kreizenbeck ex rel. C.J.K. v. Sec'y of Health & Human Servs.*, 945 F.3d 1362, 1366 (Fed. Cir. 2020) (citing *Simanski v. Sec'y of Health & Human Servs.*, 671 F.3d 1368, 1385 (Fed. Cir. 2012)); *see also* Vaccine Rule 8(d); Vaccine Rule 3(b)(2).

Although the parties have extensively litigated the timing of onset of Mr. Bacher's myasthenia gravis through their experts and within their briefs, this issue is not addressed in depth because I have concluded, for the reasons discussed below, that this case turns on petitioner's failure to support a medical theory of general causation by preponderant evidence. Thus, while I have reviewed all of the information filed in this case, only those aspects of the filings and records that are most relevant to the decision will be discussed. *Moriarty ex rel. Moriarty v. Sec'y of Health & Human Servs.*, 844 F.3d 1322, 1328 (Fed. Cir. 2016) ("We generally presume that a special master considered

the relevant record evidence even though he does not explicitly reference such evidence in his decision."); *see also Paterek v. Sec'y of Health & Human Servs.*, 527 F. App'x 875, 884 (Fed. Cir. 2013) ("Finding certain information not relevant does not lead to—and likely undermines—the conclusion that it was not considered.").

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III. Factual History

a. Medical Records

Mr. Bacher was born on September 5, 1947. (Ex. 1, p. 1.) He received the subject vaccinations at the age of sixty-six. (*Id.*) Prior to vaccination, Mr. Bacher's medical history was significant for diabetes mellitus, hypertension, hyperlipidemia, cataract syndrome, and dry eye syndrome. (Ex. 2, pp. 58-64; Ex. 3, pp. 20-31; Ex. 5, p. 1.)

On September 6, 2013, Mr. Bacher presented to his primary care physician, Alfred Belding, M.D., for the first of the three-part series of hepatitis B vaccinations without any apparent issues. (Ex. 1, p. 1.) On October 2, 2013, Mr. Bacher returned to Dr. Belding with complaints of poor memory, right-sided hand tremor, dizziness, poor balance, and anxiety. (Ex. 2, p. 44.) There is no indication of onset or duration of these symptoms. On examination, Dr. Belding noted Mr. Bacher's flat affect and diagnosed him with memory decline. (*Id.* at 45.) Dr. Belding ordered lab work and a brain MRI, and he referred Mr. Bacher for a neurology consultation. (*Id.*) During this encounter, Mr. Bacher received the second shot in the hepatitis B series, as well as an annual influenza vaccination. (*Id.*; Ex. 1, p. 2.) Mr. Bacher underwent a brain MRI on October 9, 2013, that showed minimal chronic microvascular ischemic change without acute infarct. (Ex. 2, pp. 50-51.) Mr. Bacher lab results revealed low lymphocytes and elevated neutrophils, glucose, hemoglobin A1C, cholesterol, and triglyceride. (*Id.* at 53-56.)

Five months later, on March 14, 2013, Mr. Bacher returned to Dr. Belding, reporting a two-day history of conjunctivitis. (Ex. 1, p. 3.) During this encounter, Mr. Bacher received the final hepatitis B vaccination in the series. (*Id.*)

Following the third hepatitis B vaccination, Mr. Bacher reported that he began to experience double vision at night, which continued for approximately three months before he sought treatment. (Ex. 7, p. 3; Ex. 3, p. 13; Ex. 2, p. 47.) On May 19, 2014, Mr. Bacher presented for an ophthalmology appointment. (Ex. 3, p. 13.) He described double vision in both eyes, which was worse in the left eye and associated with blurry vision, and a traumatic head injury, nearly resulting in a loss of consciousness, that occurred about three weeks prior. (*Id.*) Mr. Bacher was believed to be suffering from cranial nerve IV palsy with probable microvascular etiology and a repeat brain MRI was ordered. (*Id.* at 15; Ex. 2, p. 47.) Distance vision only glasses were recommended to alleviate the double vision. (Ex. 3, p. 15.)

The following day, on May 20, 2013, petitioner returned to Dr. Belding with reports of a five-day history of intermittent double vision and poor depth perception. (Ex. 2, p. 46.) Dr. Belding ordered a repeat brain MRI, as well as updated lab work and a carotid artery study. (*Id.*) Mr. Bacher's lab results were unremarkable, and his carotid artery study showed no evidence of significant atherosclerotic disease or hemodynamically significant carotid arterial stenosis. (*Id.* at 14-17, 52.) Mr. Bacher's repeat brain MRI was similarly unrevealing. (*Id.* at 42.)

On June 3, 2014, Mr. Bacher presented to neurologist Cecily Anto, M.D., with complaints of double vision for two-to-three weeks, ptosis for one year, and chronic hand tremors in both hands.[3] (Ex. 4, p. 4.) Dr. Anto noticed ptosis of the left eye without fatigue; distal sensory loss in both feet, which was suggestive of diabetic neuropathy; nystagmus on lateral gaze; and diplopia upon looking down and to the right, but Mr. Bacher's examination was otherwise normal. (*Id.* at 4-5.) Dr. Anto assessed diplopia, ptosis, diabetes with neurological manifestations, and polyneuropathy in diabetes. (*Id.* at 5.) Dr. Anto opined that the lack of fatigue in association with the left eye ptosis counseled against ocular myasthenia and ordered lab work. (*Id.*) Mr. Bacher's lab results showed positive acetylcholine receptor ("AChR") antibodies. (Ex. 5, pp. 51-52.)

Mr. Bacher returned for a follow up ophthalmology appointment on June 10, 2014. (Ex. 3, pp. 10-12.) He reported that the prescription glasses he received during his last encounter were causing dizziness and loss of depth perception. (*Id.*) It was noted that Mr. Bacher's double vision had been constant for a month and was significant in severity; however, it was alleviated by closing one eye. (*Id.*) It was further noted: "Ptosis OS. With ? New onset. And ? Restriction of [extraocular movements]." (Id. at 12.) Mr. Bacher was advised to follow up with his neurologist. (*Id.*)

On June 13, 2014, Mr. Bacher returned to Dr. Anto for a follow up visit. (Ex. 4, pp. 7-8.) It was noted that Mr. Bacher was believed to be suffering from left 6th nerve palsy and had been referred for testing to rule out cavernous sine thrombosis. (*Id.* at 7.) Mr. Bacher complained of a four-week history of double vision and a one-year history of left eye droopiness that had gotten worse over the last three weeks. (*Id.*) Upon examination, ptosis of the left eye when looking down and to the right was again observed. (*Id.*) Intermittent tremors in all extremities were also observed, and Mr. Bacher's diabetes was noted to be poorly controlled. (*Id.* at 7-8.) Dr. Anto ordered an MRI of the brain and carotids to rule out cavernous sinus disease and posterior common artery aneurysm resulting in ptosis, an MRA of the brain to rule out vasculitis and aneurysm, and an MRA of the neck to rule out carotid and vertebral stenosis. (*Id.* at 8.) Her assessment remained the same; however, she noted that she contacted Dr.

[3] Petitioner disputes the credibility of Dr. Anto's notation to the extent that she observed a one-year history of left eye ptosis. (ECF No. 80, pp. 6, 38.) While this contention is relevant to respondent's expert's opinion regarding onset, as explained above, this case turns on petitioner's failure to carry her burden of proof on *Althen* prong one. Accordingly, it is not necessary to resolve whether and to what extent Dr. Anto's notation of a one-year history of left eye ptosis should be credited.

Belding to discuss Mr. Bacher's diet "as all these cranial neuropathies could be the result of poorly controlled [diabetes myelitis]." (*Id.*)

Mr. Bacher's MRI and MRA results were unremarkable, and he was referred to neurologist Nurcan Gursoy, M.D., for a second opinion. (Ex. 4, pp. 1-3; Ex. 5, pp. 51-56.) Mr. Bacher presented to Dr. Gursoy on June 27, 2014, for an evaluation for myasthenia gravis. (Ex. 5, pp. 51-56.) He was accompanied by Mrs. Bacher and, together, they described his condition as including weakness, fatigue, memory loss, confusion, unsteadiness, shortness of breath, and difficulty walking, speaking, swallowing, and chewing. (*Id.* at 51.) His neurology examination revealed mild bilateral ptosis. (*Id.* at 54.) Dr. Gursoy assessed myasthenia gravis and prescribed a progressive dose of Mestinon.[4] (*Id.* at 55.) He further noted that he would monitor Mr. Bacher's condition for Parkinson's disease, which was also on the differential due to other observations on examination. (*Id.*)

On August 8, 2014, petitioner returned for a follow up appointment with Dr. Gursoy. (Ex. 5, pp. 32-38.) It was noted that Mr. Bacher's symptoms "began 4-5 months ago with diplopia" that progressed to included blurred vision, generalized muscle weakness, speech changes, difficulty swallowing, and fatigue. (*Id.* at 32.) Since his last visit, Mr. Bacher reported an improvement in his double vision, ptosis, speech, and swallowing, but mild shortness of breath with exertion. (*Id.*) Mild bilateral ptosis was again observed on examination. (*Id.* at 35.) Dr. Gursoy assessed myasthenia gravis and noted that Mr. Bacher's double vision and ptosis had improved after treatment with Mestinon and Prednisone. (*Id.* at 37.) However, Dr. Gursoy advised that Mr. Bacher decrease his Prednisone dosage to avoid diabetic complications. (*Id.*) He ordered additional lab work, a transthoracic echocardiogram ("TTE"), and a stress test to rule out any cardiac conditions that would prevent treatment with IVIg therapy or plasma exchange if needed and to rule out a cardiac etiology for Mr. Bacher's shortness of breath. (*Id.* at 37-38.) Dr. Gursoy further noted that Parkinson's disease remained on the differential, but additional testing was necessary to definitively diagnose. (*Id.* at 37.)

Mr. Bacher saw ophthalmologist Patrick Sibony, M.D., for a second opinion regarding his variable ptosis. (Ex. 2, pp. 27-29.) At that point, Mr. Bacher's double vision was resolved; however, he complained of intermittent twitching and blurred vision. (*Id.* at 27.) Mr. Bacher's examination was normal with the exception of mild ptosis on the left. (*Id.* at 28-29.) Dr. Sibony descried how Mr. Bacher's symptoms were significant improved, but he continued to have "quite a bit of fluctuation during the day with episodes of ptosis and occasional blurry double vision." (*Id.* at 29.) He assessed myogenic ptosis, myoneural disorders (myasthenia gravis), and diabetes mellitus without mention of complications. (*Id.*)

[4] Mestinon inhibits destruction of acetylcholine and facilitates transmission of impulses across the neuromuscular junction for symptomatic treatment of myasthenia gravis. *Mestinon*, DORLAND'S MEDICAL DICTIONARY ONLINE, https://www.dorlandsonline.com/dorland/definition?id=30704 (last visited July 16, 2024); *Pyridostigmine bromide*, DORLAND'S MEDICAL DICTIONARY ONLINE, https://www.dorlandsonline.com/dorland/definition?id=42398 (last visited July 16, 2024).

Mr. Bacher continued to see Dr. Gursoy for treatment of his myasthenia gravis until 2019. (Exs. 5, 16, 40.) During this time, Mr. Bacher was diagnosed with "Parkinsonism," a group of brain conditions that have symptoms that are similar to what would be expected in patients with Parkinson's disease. (Ex. 5, p. 7.) In 2019, Mr. Bacher transferred treatment of his myasthenia gravis to neurologist Scott McWilliams, M.D. (Ex. 35, p. 5.) Mr. Bacher's health began to decline in 2020. (Ex. 44, pp. 11-12.) He experienced progressive weakness in the extremities with leaning to the left, diplopia, and ptosis. (*Id.*)

In 2021, Mr. Bacher was found unresponsive in his home and rushed to the emergency room, where he suffered another cardiac arrest. (Ex. 45, pp. 28, 55-56.) Mrs. Bacher informed the attending physician that Mr. Bacher's health had been deteriorating for several years, including a gradual neurological decline, resulting in extreme weakness, that was especially pronounced over the past 24 hours. (*Id.*) Mr. Bacher ultimately passed away on February 28, 2021. (*Id.* at 72; Ex. 46.) His final diagnosis was cardiac arrest with severe anoxic brain injury, and his death certificate lists myasthenia gravis as the immediate cause of his death. (Ex. 45, p. 72; Ex. 46.)

b. Mr. Bacher's Affidavit

In his affidavit, Mr. Bacher described his health prior to his vaccination, stating that "all was going well." (Ex. 7, p. 1.) He worked as a pharmacist for 46 years before retiring in 2014 due to health complications. (*Id.* at 1-2.) In 2013, he was informed that he needed to receive the three-part series of hepatitis B vaccinations. (*Id.* at 1.) He received the first shot on September 6, 2013, and immediately started to notice adverse effects. (*Id.* at 2.) He described difficulty walking and poor balance. (*Id.*) He also described how his voice was "weak" and his "sentences would trail off." (*Id.*) His primary care physician could not figure out what the issue was. (*Id.*) Mr. Bacher received his second shot during the same encounter in which he complained of these symptoms. (*Id.*) He stated, "My walking and balance issues continued after I received these vaccines, but because no one could tell me or my wife what was going on and because my tests had come back normal, we thought that everything I was experiencing would eventually clear up and go away." (*Id.*)

Mr. Bacher received the final shot in March of 2014. (Ex. 7, p. 3.) He reported that he continued to experience issues with walking, balance, and fatigue. (*Id.*) He stated that, for the first time, he began to experience double vision. (*Id.*) He described presenting to the ophthalmologist where three doctors examined him without avail. (*Id.*) He was prescribed prism glass, but he suffered a fall while wearing them. (*Id.*) He was referred to Dr. Anto for a neurology evaluation. (*Id.*) Dr. Anto ordered testing that "came back positive for myasthenia gravis." (*Id.*) However, Mr. Bacher disputed Dr. Anto's notation that his eye droopiness preceded his vaccinations. (*Id.* at 4.) He stated, "I had never seen Dr. Anto prior to 2014, nor had I ever suffered eye droopiness prior to May/June 2014. I only first experience my eye droopiness after my double vision began." (*Id.*)

Since his vaccination, Mr. Bacher described continued balance issues and double vision affecting his activities of daily living. (Ex. 7, pp. 3-4.) He stated that he could no longer work, drive, or participate in any of his prior hobbies. (*Id.*) He stated, "My wife and I feel very strongly that it was the vaccines that caused my myasthenia gravis." (*Id.* at 4.)

c. Mrs. Bacher's Hearing Testimony

Petitioner, Mrs. Bacher, provided testimony during the one-day fact hearing. (Tr. 5.) She and Mr. Bacher were married for nearly 53 years. (*Id.* at 6-7.) She confirmed the statements made in Mr. Bacher's affidavit. (*Id.* at 11-12; 14-16, 47-48.) She denied that Mr. Bacher had been experiencing eye droopiness for a year prior to his appointment with Dr. Anto. (*Id.* at 16-18.) She described Mr. Bacher's health prior to his vaccination. Mr. Bacher worked 12-hour days as a pharmacist. (*Id.* at 8, 32-33.) When not working, Mr. Bacher was constantly doing projects at home and playing with his grandchildren. (*Id.*) Regarding Mr. Bacher's hand tremor, Mrs. Bacher explained that he experienced an accident that resulted in a severe injury to his right arm, rotator cuff, elbow, and scaphoid ligament. (*Id.* at 18.) After five surgeries, Mrs. Bacher stated that Mr. Bacher continued to experience weakness that was limited to his right arm and hand. (*Id.* at 18-19.) She stated that Mr. Bacher's diabetes was "pretty much controlled before he started with the prednisone," which he started after being diagnosed with myasthenia gravis. (*Id.* at 31-32.)

Mrs. Bacher detailed an incident following vaccination, during which Mr. Bacher had to pull over while driving because his double vision was impeding his ability to drive. (Tr. 13.) Mrs. Bacher explained that this was when she and Mr. Bacher first noticed the symptoms, but they did not know what was wrong. (*Id.* at 13-14, 44.) She stated that the left eye droopiness began after the third hepatitis B shot and, specifically, after the incident wherein Mr. Bacher's double vision prevented him from driving. (*Id.* at 19-21, 44.) Mrs. Bacher explained that Mr. Bacher's myasthenia gravis diagnosis was confirmed by lab testing. (*Id.* at 23-24.)

Mrs. Bacher described the progression of Mr. Bacher's myasthenia gravis. (Tr. 24.) She stated that "[h]is whole life changed, and slowly but surely, every day, his capabilities were being diminished." (*Id.*) She described how he was stronger in the morning and able to speak and eat without difficulty, but he would gradually get weaker throughout the day. (*Id.* at 24-25.) Mrs. Bacher stated that, as the day went on, he could hardly speak. (*Id.* at 25.) He would choke on his food, and he had poor balance while walking. (*Id.*) He was prescribed prism glasses, but they ended up effecting his depth perception and causing falls. (*Id.*) Mrs. Bacher further described how Mr. Bacher's leg muscle would suddenly give way without notice. (*Id.* at 25-26, 35.) She stated, "It was a nightmare to watch my husband deteriorate like that every single day." (*Id.* at 26.)

Regarding Mr. Bacher's memory issues and confusion, Mrs. Bacher stated that the symptoms began after the first and second shots. (Tr. 26.) After the myasthenia gravis diagnosis, Mr. Bacher experienced general muscle weakness and difficulty walking. (*Id.* at 26-27.) She said that, towards the end of the evening, "[t]here was no power to his voice" and he would choke while eating. (*Id.* at 27-28.) Mr. Bacher improved with medication. (*Id.* at 28-29.) He was eventually diagnosed with "Parkinsonian" symptoms, despite there being no conclusive diagnosis. (*Id.* at 29.) Mrs. Bacher described the different medications that Mr. Bacher was prescribed to combat his symptoms, but indicated that nothing seemed to work. (*Id.* at 29-31.)

IV. Expert Opinions

a. Petitioner's Neurology Experts, Drs. Morgan and Napoli

Initially, petitioner relied on the expert opinion of neurologist Thomas Morgan, M.D.,[5] who later became unavailable to continue the case. Dr. Morgan submitted two reports. (Exs. 8, 18.) After Dr. Morgan became unavailable, petitioner filed two further reports by neurologist Salvatore Napoli, M.D.[6] (Exs. 19, 47.)

Dr. Morgan opined that Mr. Bacher was correctly diagnosed with ocular myasthenia gravis following the vaccination at issue. (Ex. 8, p. 4.) Further, he opined that the onset of Mr. Bacher's condition, occurring between one-to-four weeks post-vaccination, is consistent with the medical literature discussing myasthenia gravis as potentially vaccine caused. (*Id*. at 5.) He acknowledged that there was a report of ptosis in 2013 that could, if credited, suggest an onset of myasthenia gravis prior to vaccination. (*Id*. at 5 (citing Ex. 4, p. 4).) However, he opined that a single reported episode of ptosis is inadequate to diagnose myasthenia gravis and, if Mr. Bacher did have occasional ptosis attributable to myasthenia gravis pre-vaccination, then it would still be the case that his post-vaccination presentation represented a significant aggravation of his condition. (*Id*.) Dr. Morgan explained,

[5] Dr. Morgan received his medical degree from Meharry Medical College in 1970, before going on to complete a residency in internal medicine and neurology at Brown University School Medicine in 1972 and 1975, respectively. (Ex. 9, pp. 1-2.) At the time he submitted an expert report on behalf of petitioner, Dr. Morgan was a board certified neurologist and independent medical examiner. (*Id.* at 3.) He had been an associate professor in the Department of Clinical Neurosciences at Brown University School of Medicine since 1978 and a member of the Rhode Island Neurological Association since 1997. (*Id.* at 3-4.)

[6] Dr. Napoli received his medical degree from Albany Medical College in 1999, before going on to complete an internship in medicine and a residency in neurology at Albany Medical College in 2000 and 2003, respectively. (Ex. 20, p. 3.) He also completed a three-year fellowship in clinical neuroimmunology at the Partners Harvard Multiple Sclerosis Center at Brigham and Women's Hospital in Boston, Massachusetts. (Ex. 19, p. 1; Ex. 20, pp. 3-4.) He is a board certified neurologist, and he maintains a medical license in Massachusetts. (Ex. 20, p. 3.) He is also a member of the American Association of Neuromuscular and Electrodiagnostic Medicine, the American Medical Association, the American Society of Neuroimaging, and the American Academy of Neurology. (*Id.* at 3-4.) Dr. Napoli maintains hospital affiliations at Beth Israel at Milton Hospital and Steward Norwood Hospital, and he is the president and medical director of the Neurology Center of New England. (*Id.* at 2.)

> Adult onset myasthenia gravis is a neuromuscular transmission disorder involving the formation of antibodies to the acetylcholine receptors at the neuromuscular junction. This autoimmune disorder through the mechanism of molecular mimicry was caused or aggravated by the cross reaction of Hepatitis vaccine antibodies with the acetylcholine receptors at the neuromuscular junction to give Mr. Bacher a diagnosis of myasthenia gravis.

(*Id.* at 4.)

Dr. Morgan's report was accompanied by four citations. First, he cited Adam and Victor's Principles of Neurology with respect to diagnostic methodology. (Ex. 8, p. 1 (citing ALLAN H. ROPPER ET AL., ADAMS AND VICTOR'S PRINCIPLES OF NEUROLOGY (10th ed. 2014) (Ex. 12)).) Second, he cited a single case report of myasthenia gravis following a hepatitis B vaccine. (*Id*. at 4 (M.E. Bahri et al., *Myasthenia Gravis After Hepatitis B Vaccine. Report of One Case*, 60 ANNALS RHEUMATIC DISEASES A226 (2001) (Ex. 13)).) Third, he cited a review paper addressing molecular mimicry as a cause of autoimmune neurologic disease. (*Id*. (citing S. Lee & M.C. Levin, *Molecular Mimicry in Neurological Disease: What Is the Evidence?*, 65 CELLULAR & MOLECULAR LIFE SCIS. 1161 (2008) (Ex. 14)).) It should be noted, however, that this paper does not reference myasthenia gravis. And, fourth, he cited a review paper by Joerg-Patrick Stübgen examining neuromuscular disorders associated with the hepatitis B vaccine. (*Id*. at 5 (citing Joerg-Patrick Stübgen, *Neuromuscular Disorders Associated with Hepatitis B Vaccination*, 292 J. NEUROLOGICAL SCIS. 1 (2010) (Ex. 15)).) With regard to myasthenia gravis, Stübgen describes four case reports.

In response to Dr. Vartanian, Dr. Morgan opined that the case reports he cited are "based on a clinical neurologic diagnosis and support[], to a reasonable degree of medical probability, a causal relationship" between the hepatitis B vaccine and myasthenia gravis and, coupled with Mr. Bacher's own clinical history, support that Mr. Bacher's myasthenia gravis was vaccine caused. (Ex. 18, pp. 1-2.) He explains that his opinion is based on "clinical findings of myasthenia gravis, the autoimmune nature of myasthenia gravis, and the time onset of [Mr. Bacher's] myasthenia gravis diagnosis following vaccination." (*Id*. at 2.) Dr. Morgan opines,

> I respectfully disagree with Dr. Vartanian that molecular mimicry has nothing to do with hepatitis B vaccine and post vaccinal syndromes. The medical literature supports that molecular mimicry is a biologically plausible theory to explain post vaccinal autoimmune diseases associated with hepatitis B surface antigen epitopes in susceptible adult recipients.

(*Id*. at 2 (citing ROPPER ET AL., *supra*, at Ex. 12; Bahri et al., *supra*, at Ex. 13).) Dr. Morgan also discussed a publication by Lane et al., cited by Dr. Vartanian. According to Dr. Morgan, that publication indicates that myasthenia gravis can follow trauma or wasp stings, which he argues supports a similar mechanism of molecular mimicry for vaccination. (*Id.* at 3.)

Dr. Napoli concurred with Dr. Morgan's assessment that Mr. Bacher suffered myasthenia gravis between one to four weeks after his hepatitis B vaccination and that the vaccination did trigger his symptoms. (Ex. 19, p. 4.) Like Dr. Morgan, Dr. Napoli invoked molecular mimicry to explain the casual relationship at issue. He indicated,

> It is my opinion that cross reactivity through the concept of molecular mimicry triggered by the Hepatitis B vaccine caused the diagnosis and syndrome of [myasthenia gravis] along with his residual and now chronic deficits. Even though there are no case control studies that can prove an association of hepatitis-B with the development of [myasthenia gravis] from an epidemiological perspective, there are numerous case studies and reports that have implicated the use of Hepatitis B vaccine with neuromuscular disorders and syndromes. These include and are not limited to case reports implicating Hepatitis B with [myasthenia gravis], myopathy, neuropathy and polyarteritis nodosa. There have also been numerous case reports of Hepatitis B vaccine triggering central nervous system syndromes such as multiple sclerosis and neuromyelitis optica.

(*Id*. at 4-5.)

In addition to the literature cited by Dr. Morgan, Dr. Napoli cites a review paper by Cohen and Shoenfeld regarding vaccine-induced autoimmunity. (Arnon Dov Cohen & Yehuda Shoenfeld, *Vaccine-Induced Autoimmunity*, 9 J. AUTOIMMUNITY 699 (1996) (Ex. 21).) That paper purports to identify myasthenia gravis as among autoimmune conditions attributable to vaccination based on a single case report of myasthenia gravis following administration of both a hepatitis B vaccine and general anesthesia. (*Id*. at 2 tbl.1.) The authors identify molecular mimicry as one of twelve potential mechanisms of autoimmunity. (*Id*. at 2 tbl.2.) He also cites Lehesmaa et al., which discusses molecular mimicry vis-à-vis a potential molecular mimic not at issue in this case. (Ex. 19, p. 4 (citing R. Lahesmaa et al., *Molecular Mimickry Between HLA B27 and* Yersinia*,* Salmonella*,* Shigella *and* Klebsiella *Within the Same Region of HLA* α_1*-helix*, 86 CLINICAL & EXPERIMENTAL IMMUNOLOGY 399 (1991) (Ex. 22)).) Dr. Napoli further contends that, because Guillain-Barré syndrome ("GBS") has been associated with various vaccines, including Hepatitis B vaccine, this evidences the ability of vaccination to cause myasthenia gravis, because GBS "falls under the realm of a neuromuscular syndrome, in many ways similar to [myasthenia gravis]." (*Id*. at 5 (citing Lawrence B. Schonberger et al., *Guillain-Barre Syndrome Following Vaccination in the National Influenza Immunization Program, United States, 1976-1977*, 110 A. J. EPIDEMIOLOGY 105 (1979) (Ex. 23); Penina Haber et al., *Vaccines and Guillain-Barré Syndrome*, 32 DRUG SAFETY 309 (2009) (Ex. 24))).)

In his second report, Dr. Napoli reviewed Mr. Bacher's subsequent history to confirm that, in his opinion, Mr. Bacher's death was due at least in part to his myasthenia gravis. (Ex. 47.)

b. Petitioner's Ophthalmology Expert, Dr. Norton

In addition to the reports by Drs. Morgan and Napoli, petitioner filed a report by ophthalmologist Sylvia Norton, M.D.[7] (Ex. 10.) Dr. Norton's report serves largely to associate Mr. Bacher's ocular symptoms to his later diagnosed myasthenia gravis, and to interpret those symptoms as placing the onset of Mr. Bacher's myasthenia gravis within the weeks following his third hepatitis B vaccine. (Ex. 10, pp. 3-5.) Dr. Norton opines:

> Based upon the clinical findings, chief complaints, examinations and laboratory results of AChR antibodies, this particular case is not speculative, but casually connects the hepatitis B vaccination to his [myasthenia gravis]. There is a logical sequence of cause and effect between the vaccination and/or significantly exacerbated [myasthenia gravis], as well as an appropriate temporal relationship to the vaccination the petitioner received in March 2014.
>
> In the Journal of Neurological Science there is an article titled: Neuromuscular disorders associated with Hepatitis B vaccination by J. Stubgen from the Dept. of Neurology and Neuroscience at NY Presbyterian Hospital, published March 8, 2010 which reports that Hepatitis B . . . vaccination in adults has been linked to neuromuscular disorders which include Myasthenia Gravis . . . . Series of cases indicate a temporal relationship between [hepatitis B] vaccination and [myasthenia gravis] confirming the fact that [hepatitis B] vaccine can potentially trigger the onset of [myasthenia gravis].

(*Id*. at 4.)

c. Respondent's Neurology Expert, Dr. Vartanian

Respondent filed three reports by neurologist Timothy Vartanian, M.D., Ph.D.[8] (Exs. A, C, D.) Dr. Vartanian agrees on respondent's behalf that the diagnosis of

[7] Dr. Norton received her medical degree from Upstate Medical Center State University of N.Y. in 1975, before going on to complete an internship in internal medicine at Rochester General Hospital in 1976 and a residency in ophthalmology at Upstate Medical Center in 1979. (Ex. 9, pp. 1-2.) She has been a diplomat and fellow with the American Board of Ophthalmology since 1980, and she maintains a medical license in the State of New York. (*Id.* at 2; Ex. 10, p. 1.) She is the president and owner of Cornea, Consultative and Refractive Surgery for Sylvia W. Norton, M.D., P.C., in Syracuse, New York. (Ex. 9, p. 3.)

[8] Dr. Vartanian received his Ph.D. in biochemistry and molecular biology, as well as his medical degree, from the University of Chicago in 1987 and 1988, respectively. (Ex. B, p. 1.) He went on to complete an internship in internal medicine at Brigham and Women's Hospital in 1989 and a residency in neurology at Massachusetts's General Hospital in 1992. (*Id.* at 2.) He is a board certified neurologist and an active member of the American Society of Neuroscientists. (*Id.* at 3.) He maintains a medical license in the State of the New York. (*Id.*) He is an assistant professor of neurology at Weill Cornell Medical College and an assistant attending neurologist at New York Presbyterian Hospital. (*Id.* at 2.)

myasthenia gravis is not in question. (Ex. A, p. 6.) Consistent with petitioner's experts' reports, Dr. Vartanian explains that myasthenia gravis is an autoimmune disease of the neuromuscular joint that results in fatigable weakness and can also present with ocular involvement, namely ptosis and/or double vision. (*Id*.) Dr. Vartanian stresses, however, that myasthenia gravis is one among very few autoimmune diseases for which the antigen and pathogenic antibody are known. (*Id*. at 6-7 (citing Bianca M. Conti-Fine et al., *Myasthenia Gravis: Past, Present, and Future*, 116 J. CLINICAL INVESTIGATION 2843 (2006) (Ex. A, Tab 2)).) Dr. Vartanian explains that all voluntary muscle movement is dependent on the neuromuscular junction, which is a synapse that joins the motor neuron and muscle. That junction operates via a neurotransmitter, known as acetylcholine, and its receptor, known as acetylcholine receptor (*i.e.*, AChR). (*Id.*) In myasthenia gravis, antibodies develop that ultimately either reduce the number of available receptors for acetylcholine or prevent binding, thereby interfering with muscle function.[9] (*Id*. at 7.)

Dr. Vartanian charges that petitioner's experts (Drs. Morgan and Norton, initially) rely solely on temporal association to implicate Mr. Bacher's hepatitis B vaccine as a cause of his condition. (Ex. A, p. 10.) He explains that Dr. Morgan's molecular mimicry theory is unsupported by either (1) any evidence that would show any component of the vaccine at issue having significant molecular structure in common with the acetylcholine receptor or (2) any evidence from an animal model study. (*Id*.) Dr. Vartanian stresses that case reports, as relied upon by Dr. Morgan, are the weakest form of evidence. (Ex. C, pp. 1-2.) Dr. Vartanian opines that the theory of trauma-triggered myasthenia gravis proposed by Lane et al. is a hypothesis only, not well supported. In any event, he indicates it is not a theory of molecular mimicry. (*Id*. at 3-5.)

In response to Dr. Napoli, Dr. Vartanian disagrees that GBS is an informative comparison with respect to the proposed molecular mimicry. (Ex. D, p. 2.) Otherwise, Dr. Napoli's opinion likewise lacks evidence of a mechanism by which the hepatitis B vaccine might cause myasthenia gravis. He stresses that, although he does not dispute molecular mimicry as a general concept, it requires supporting evidence that is lacking here. (*Id*.)

V. Analysis

As discussed above, petitioner's burden of proof in a cause-in-fact claim is to meet the three-part *Althen* test, which includes (1) a general theory of causation implicating the vaccine as a cause of the alleged condition, (2) a logical sequence of cause and effect implicating the vaccination as a cause of petitioner's own condition, and (3) appropriate timing of onset based on the theory of causation. 418 F.3d at 1278.

[9] Dr. Vartanian further explains that most myasthenia gravis patients have high affinity antibodies against AChR antibodies discussed below; however, some other neuromuscular junction proteins have been suspected among myasthenia gravis patients found to be seronegative for anti-AChR antibodies. (Ex. A, p. 9.)

In this case, the parties present issues with respect to all three *Althen* prongs.[10] However, for the reasons discussed below, the outcome of this case turns on the first *Althen* prong, petitioner's general theory of causation.

a. Petitioner has not met her burden of proof under *Althen* prong one

Under *Althen* prong one, petitioner must provide a "reputable medical theory," demonstrating that the vaccine received can cause the type of injury alleged. *Pafford v. Sec'y of Health & Human Servs.*, 451 F.3d 1352, 1355-56 (Fed. Cir. 2006) (quoting *Pafford v. Sec'y of Health & Human Servs.*, No. 01-0165V, 2004 WL 1717359, at *4 (Fed. Cl. Spec. Mstr. July 16, 2004)). Such a theory must only be "legally probable, not medically or scientifically certain." *Knudsen ex rel. Knudsen v. Sec'y of Health & Human Servs.*, 35 F.3d 543, 548-49 (Fed. Cir. 1994). Petitioner may satisfy the first *Althen* prong without resort to medical literature, epidemiological studies, demonstration of a specific mechanism, or a generally accepted medical theory. *See Andreu ex rel. Andreu v. Sec'y of Health & Human Servs.*, 569 F.3d 1367, 1378-79 (Fed. Cir. 2009) (citing *Capizzano v. Sec'y of Health & Human Servs.*, 440 F.3d 1317, 1325-26 (Fed. Cir. 2006)). However, "[a] petitioner must provide a 'reputable medical or scientific explanation' for [her] theory. While it does not require medical or scientific certainty, it must still be 'sound and reliable.'" *Boatmon v. Sec'y of Health & Human Servs.*, 941 F.3d 1351, 1359 (Fed. Cir. 2019) (citation omitted) (quoting *Knudsen*, 35 F.3d at 548-49).

Petitioner and her three experts theorize that the hepatitis B vaccine can cause myasthenia gravis via molecular mimicry. (ECF No. 80, pp. 30-34; ECF No. 84, pp. 5-9; Ex. 8, p. 4; Ex. 10, p. 4; Ex. 19, p. 4.) There is no dispute that Mr. Bacher suffered myasthenia gravis, that myasthenia gravis is an autoimmune condition, or that molecular mimicry is one viable explanation for at least some autoimmune conditions. Importantly, however, these points present only an initial starting premise from which vaccine causation *might* then be substantiated. Many prior program petitioners have failed to demonstrate that various vaccines have caused various autoimmune conditions via molecular mimicry even where the condition at issue is otherwise accepted as autoimmune. *See, e.g.*, *Dennington v. Sec'y of Health & Human Servs.*, No. 18-1303V, 2023 WL 2965239, at *19-20 (Fed. Cl. Spec. Mstr. Apr. 17, 2023), *mot. for rev. den'd*, 167 Fed. Cl. 640 (2023) (finding that petitioner had not preponderantly shown that the tetanus, diphtheria, and acellular pertussis vaccine can cause GBS via molecular mimicry); *McGill v. Sec'y of Health & Human Servs.*, No. 15-1485V, 2023 WL 3813524, at *28-29 (Fed. Cl. Spec. Mstr. May 11, 2023) (finding that petitioner had not

[10] If one were to assume that Mr. Bacher's myasthenia gravis pre-dated the vaccinations at issue (*see* ECF No. 81, pp. 19-20), then arguably this case should be evaluated under the *Loving* test for significant aggravation. *Loving v. Sec'y of Health & Human Servs.*, 86 Fed. Cl. 135, 144 (2009). However, respondent concedes that "Mr. Bacher's records make clear that his most disabling symptoms that caused him to seek medical care was double vision, which most likely began in May 2014, six weeks or more after vaccination." (ECF No. 81, p. 20.) Accordingly, any analysis under *Loving* prongs one through three would readily identify a worsening of Mr. Bacher's condition occurring post-vaccination. The remaining elements of the *Loving* test would remain the same as the *Althen* analysis below. Thus, conceptualizing this case as one of significant aggravation would not change the outcome.

preponderantly shown that either the 13-valent pneumococcal conjugate vaccine or influenza vaccine can cause small fiber neuropathy via molecular mimicry); *Tullio v. Sec'y of Health & Human Servs.*, No. 15-51V, 2019 WL 7580149 (Fed. Cl. Spec. Mstr. Dec. 19, 2019) (finding that petitioner had not preponderantly shown that the influenza vaccine can cause rheumatoid arthritis via molecular mimicry), *aff'd*, 149 Fed. Cl. 448 (2020); *Bender v. Sec'y of Health & Human Servs.*, No. 11-693V, 2018 WL 3679637, at *24-29 (Fed. Cl. Spec. Mstr. July 2, 2018) (finding that petitioner had not preponderantly shown that the hepatitis A or meningococcal vaccines can cause transverse myelitis via molecular mimicry), *mot. for rev. den'd*, 141 Fed. Cl. 262 (2019); *Isaac v. Sec'y of Health & Human Servs.*, No. 08-601V, 2012 WL 3609993, at *21-22 (Fed. Cl. Spec. Mstr. July 30, 2012) (finding that petitioner had not preponderantly shown that the tetanus-diphtheria vaccine can cause GBS via molecular mimicry), *mot. for rev. den'd*, 108 Fed. Cl. 743 (2013), *aff'd*, 540 Fed. App'x 999 (Fed. Cir. 2013); *W.C. v. Sec'y of Health & Human Servs.*, No. 07-456V, 2011 WL 4537877, at *16 (Fed. Cl. Spec. Mstr. Feb. 22, 2011) (finding that petitioner had not preponderantly shown that the influenza vaccine can cause or significantly aggravate multiple sclerosis via molecular mimicry), *mot. for rev. den'd*, 100 Fed. Cl. 440 (2011), *aff'd*, 704 F.3d 1352 (Fed. Cir. 2013).

Molecular mimicry "is a generally accepted scientific principle, [but] mere invocation of the scientific term does not carry a petitioner's burden in a Program case." *Deshler v. Sec'y of Health & Human Servs*., No. 16-1070V, 2020 WL 4593162, at *20 (Fed. Cl. Spec. Mstr. July 1, 2020) (citing *Forrest v. Sec'y of Health & Human Servs.*, No. 14-1046V, 2019 WL 925495, at *3 (Fed. Cl. Spec. Mstr. Jan. 28, 2019)). Even accounting for the fact that petitioners are not obligated to demonstrate scientific certainty, prior cases have expressed with regard to the application of molecular mimicry that "[t]he line must be drawn somewhere between speculation and certainty." *Brayboy v. Sec'y of Health & Human Servs.*, No. 15-183V, 2021 WL 4453146, at *19 (Fed. Cl. Spec. Mstr. Aug. 30, 2021). Without requiring direct, testable evidence, this still generally requires some showing of cross-reactive potential affecting the health and productivity of a bodily tissue or organ. *Id.*; *see also, e.g.*, *Arredondo v. Sec'y of Health & Human Servs.*, No. 18-1782V, 2023 WL 8181138, at *26-29 (Fed. Cl. Spec. Mstr. Oct. 31, 2023) (finding that petitioner had preponderantly shown that the influenza vaccine can cause Bell's palsy via molecular mimicry based on Dr. Steinman's identification of influenza vaccine components that could initiate the development of antibodies that could cross-react with peripheral nerve myelin and trigger an autoimmune response, as supported by the cited medical literature); *Smith v. Sec'y of Health & Human Servs.*, No. 08-864V, 2016 WL 27772194, at *15-18 (Fed. Cl. Spec. Mstr. Apr. 18, 2016) (finding that petitioner had preponderantly shown that the hepatitis B vaccine can cause multiple sclerosis via molecular mimicry between components of the vaccine and myelin oligodendrocyte protein, as recognized in the cited medical literature).

Molecular mimicry was first raised in Dr. Morgan's initial report. He suggested that molecular mimicry may explain how the hepatitis B vaccine could be responsible for cross-reaction of hepatitis B antibodies with AChR at the neuromuscular junction. (Ex. 8, p. 4.) However, he provided no explanation or supporting evidence that would identify components of the hepatitis B vaccine to serve as candidates for the molecular

mimic that would explain such a cross-reaction. Nor did he alternatively point to any epidemiology that might otherwise implicate the hepatitis B vaccine as a cause of myasthenia gravis or any type of experimental evidence that would tend to suggest the hepatitis B vaccine as a driver of AChR autoimmunity. Dr. Morgan cited a review paper addressing molecular mimicry as a cause of neurologic disease generally. (*Id.* (citing Lee & Levin, *supra*, at Ex. 14).) However, that paper does not even discuss myasthenia gravis, let alone evidence vaccination as a trigger of molecular mimicry for that condition. Consistent with the discussion herein, the authors merely explain that

> it has become clear that it is unlikely that a single antibody:antigen interaction results in molecular mimicry but, instead, a number of target antigens (both infectious and host) are relevant to the pathogenesis of immune-mediated neurological disease in humans. Future experiments will continue to evaluate which immune target responses are relevant . . . ."

(Lee & Levin, *supra*, at Ex. 14, p. 7.)

Even after Dr. Vartanian challenged Dr. Morgan regarding his failure to substantiate his reliance on molecular mimicry, Dr. Morgan did not meaningfully supplement his initial opinion. He expressed broadly that the medical literature he previously cited supported molecular mimicry with hepatitis B surface antigen as "biologically plausible," but provided no support for the idea that invoking that mechanism relative to this condition and this vaccination is anything more than speculation. (Ex. 18, p. 2.) Dr. Napoli likewise invoked molecular mimicry as a broad concept, but was even less specific than Dr. Morgan in that he did not even acknowledge myasthenia gravis to have a known autoimmune target in AChR. (Ex. 19.) Dr. Napoli has cited literature explaining that many different autoimmune processes are believed to exist (Cohen & Shoenfeld, *supra*, at Ex. 21), and none of the publications cited by Dr. Napoli support the proposition that molecular mimicry in particular is a viable explanation for myasthenia gravis at all, let alone that the hepatitis B vaccine can trigger it.

Dr. Napoli's reliance on comparison to other neuromuscular diseases, most notably GBS, is especially unpersuasive. Dr. Napoli seems to suggest that, because they are both neuromuscular diseases, GBS and myasthenia gravis can be analogized with respect to their causes. (Ex. 19, p. 5.) But this is not so. Dr. Napoli highlights literature explaining that, to the extent molecular mimicry is considered an explanation for GBS, it is attributed to cross-reaction with epitopes of either myelin or axons affecting the peripheral nerves. (Haber et al., *supra*, at Ex. 24, p. 5.) Dr. Vartanian explains on respondent's behalf, however, that myasthenia gravis is a condition for which the autoimmune pathway affecting AChR is established. (Ex. A, pp. 6-7.) Petitioner's other two experts likewise invoke AChR antibodies as key to the pathophysiology of myasthenia gravis and as a basis for invoking the concept of molecular mimicry. (Ex. 8, p. 4; Ex. 10, p. 4.) Nothing in any of the literature cited by either party offers any suggestion that myasthenia gravis results from nerve damage comparable to what is seen in GBS or, conversely, that GBS involves the

neuromuscular junction in the same manner as seen in myasthenia gravis. Even if the hepatitis B vaccine contained a molecular mimic capable of cross reacting against the type of myelin and/or axonal targets that would lead to GBS, this would say nothing of whether it contains an entirely unrelated molecular mimic that would potentially cross react with the AChR implicated as the cause of myasthenia gravis. Dr. Napoli, though he acknowledges that petitioner's own myasthenia gravis was diagnosed in part based on a positive finding of anti-AChR antibodies (Ex 19, p. 3), otherwise fails to engage with this known aspect of myasthenia gravis pathophysiology within his discussion of general causation.

Ultimately then, the only available evidence potentially supporting petitioner's experts' theory are case reports. Petitioners in this program often highlight the usefulness of case reports in cases of rare diseases or unusual occurrences. *E.g.*, *Patton v. Sec'y of Health & Human Servs.*, 157 Fed. Cl. 159, 166-68 (2021). However, case reports "do not purport to establish causation definitively, and this deficiency does indeed reduce their evidentiary value," even though they are not entirely devoid of evidentiary value. *Paluck ex rel. Paluck v. Sec'y of Health & Human Servs.*, 104 Fed. Cl. 457, 475 (2012) (quoting *Campbell v. Sec'y of Health & Human Servs.*, 97 Fed. Cl. 650, 668 (2011)); *see also Crutchfield v. Sec'y of Health & Human Servs.*, No. 09-0039V, 2014 WL 1665227, at *19 (Fed. Cl. Spec. Mstr. Apr. 7, 2014) ("[S]ingle case reports of Disease X occurring after Factor Y . . . do not offer strong evidence that the *temporal* relationship is a *causal* one—the temporal relationship could be pure random chance."), *aff'd*, 125 Fed. Cl. 251 (2014). Petitioner's experts make reference to six case reports, but only one of the six has actually been filed into evidence. The remaining five are discussed indirectly in review papers. I have considered all six case reports; however, without dismissing any of these case reports out of hand, the record of this case does not establish any of these case reports to be significant evidence.

Four of the six case reports are included in the review paper by Stübgen, which has been cited by all three of petitioner's experts. (Stübgen, *supra*, at Ex. 15.) These case reports have not been separately filed and the experts' references to the case reports are limited to noting that they were included within Stübgen's review. Accordingly, on this record, nothing refutes Stübgen's assessment of the value of these case reports. For his review, Stübgen begins with the premise that it is "conceivable," but not established, that a hepatitis B vaccine could cause autoimmunity similar to the manner in which a natural infection may. (*Id*. at 1-2.) He therefore set out to critically analyze all relevant medical literature from 1966 through 2009. (*Id*.) Based on his review, he indicates that the hepatitis B vaccine has "very rarely associated" with onset or exacerbation of myasthenia gravis. (*Id*. at 3.) In that regard, Stübgen identifies four case reports and does not discuss them in detail. (*Id*. at 3.) However, he is clear in indicating that the reported association "appeared temporal only" and that molecular mimicry is "unlikely." (*Id*.) In conclusion, he states "weak case report evidence often cited in obscure journals points almost exclusively to a mere temporal association between such events, and offers no proof of a cause-effect relationship." (*Id*. at 4.) Considered as a whole, the Stübgen paper does not meaningfully support petitioner's theory.

A fifth case report was included in the review paper by Cohen and Shoenfeld that was first cited by Dr. Napoli. (Cohen & Shoenfeld, *supra*, at Ex. 21.) Again, as with the case reports noted by Stübgen, this case report is not separately in evidence in this case. Cohen and Shoenfeld's discussion of this case report is limited to noting that onset of myasthenia gravis occurred sometime between 2-4 weeks post-vaccination. (*Id*. at 1.) However, looking at Cohen and Shoenfeld's bibliography, the title of the case report publication is *Myasthenia Gravis After General Anesthesia and Hepatitis B Vaccine*. (*Id*. at 5.) Without access to the case report itself, this title strongly suggests that general anesthesia was not ruled out as causal. Finally, one additional case report was filed into evidence. (Bahri et al., *supra*, at Ex. 13.) Bahri et al. reported the case of a 46-year-old woman who presented one month after her second hepatitis B vaccine dose with symptoms ultimately diagnosed as myasthenia gravis despite being negative for AChR antibodies. The authors declined to include any conclusion in the report. (*Id.* at 1-2.) Especially given the other shortcomings of petitioner's experts' opinions, these case reports do not provide significant evidence supporting those opinions.

Other than by citing the above-discussed case reports and by merely invoking the unsubstantiated possibility of molecular mimicry, petitioner's experts have not otherwise articulated any basis for concluding that the hepatitis B vaccine can cause or aggravate myasthenia gravis. Nothing requires the acceptance of an expert's conclusion "connected to existing data only by the *ipse dixit* of the expert," especially if "there is simply too great an analytical gap between the data and the opinion proffered." *Snyder v. Sec'y of Health & Human Servs.*, 88 Fed. Cl. 706, 743 (2009) (quoting *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997)); *see also Isaac*, 2012 WL 3609993, at *17 ("The weight to be given to an expert's opinion is based in part on the size of the gap between the science and the opinion proffered.").

b. *Althen* prong one is dispositive

Because I have concluded that petitioner has not demonstrated that the hepatitis B vaccine at issue in this case likely can cause myasthenia gravis, it is not necessary to address in detail whether the vaccine did so in this particular case. Given the outcome regarding *Althen* prong one, by definition it likely did not. Thus, I do not separately reach *Althen* prongs two and three in this decision. However, I note briefly that the evidence regarding *Althen* prongs two and three is not so robust as to otherwise influence the analysis under *Althen* prong one.

Much of petitioner's argumentation with respect to the second *Althen* prong is devoted to disputing respondent's position that the evidence regarding onset is unclear. (ECF No. 80, pp. 34-41.) Apart from timing of onset, petitioner has not pointed to any particular aspect of Mr. Bacher's own medical history as evidencing vaccine causation. Nor has petitioner pointed to any treating physician opinion that supports this claim. (*Id*.) Ultimately, petitioner argues that a logical sequence of cause and effect implicates the vaccination based on (1) a "strong temporal association," and (2) the fact that no other cause is implicated. (*Id*. at 40.)

Even granting petitioner the benefit of all of the factual disputes, the Federal Circuit has explained that, "[a]lthough probative, neither a mere showing of a proximate temporal relationship between vaccination and injury, nor a simplistic elimination of other potential causes of the injury suffices, without more, to meet the burden of showing actual causation." *Althen*, 418 F.3d at 1278 (citing *Grant*, 956 F.2d at 1149). Therefore, the fact that Mr. Bacher's myasthenia gravis may have manifested weeks following his vaccinations does not in itself lend any further credence to petitioner's theory under *Althen* prong one. *Capizzano*, 440 F.3d at 1326 (evidence used to satisfy one of the *Althen* prongs can be used to satisfy another *Althen* prong). *But see Althen*, 418 F.3d at 1278 (temporal association alone is insufficient to establish causation).

VI. Conclusion

Of course, Mr. Bacher's passing is unfortunate. Petitioner has my condolences on her loss. However, for all the reasons discussed above, I cannot conclude that hepatitis B vaccination had any causal role in the development of Mr. Bacher's myasthenia gravis and/or his death. Accordingly, this case is dismissed.[11]

IT IS SO ORDERED.

s/Daniel T. Horner
Daniel T. Horner
Special Master

[11] In the absence of a timely-filed motion for review of this Decision, the Clerk of the Court shall enter judgment accordingly.