In the United States Court of Federal Claims

OFFICE OF SPECIAL MASTERS
No. 15-005V
(not to be published)

MARION EUGENE HAYWARD, Petitioner,		Special Master Corcoran
v.		Filed: May 4, 2018
SECRETARY OF HEALTH AND HUMAN SERVICES, Respondent.		Motion to Dismiss; Ruling on the Record; Decision without Hearing; Influenza ("Flu") Vaccine; Left Brain Cerebrovascular Accident ("CVA"); Thromboembolic Condition; Significant Aggravation.

Howard Gold, Gold Law Firm, LLC, Wellesley Hills, MA, for Petitioner.

Sarah C. Duncan, U.S. Dep't of Justice, Washington, DC, for Respondent.

DECISION DISMISSING PETITION[1]

On January 5, 2015, Marion Eugene Hayward filed a petition seeking compensation under the National Vaccine Injury Compensation Program ("Vaccine Program").[2] In it, Mr. Hayward alleged that the influenza ("flu") vaccine he received on January 7, 2012, caused him either to experience a left brain cerebrovascular accident ("CVA"), plus stroke and a thromboembolic condition that same day, or that those conditions were significantly aggravated by the flu vaccine. Petition at 1, Mot. at 1.

[1] Although this Decision has been formally designated "not to be published," it will nevertheless be posted on the Court of Federal Claims's website in accordance with the E-Government Act of 2002, 44 U.S.C. § 3501 (2012)). **This means that the Decision will be available to anyone with access to the internet.** As provided by 42 U.S.C. § 300aa-12(d)(4)(B), however, the parties may object to the Decision's inclusion of certain kinds of confidential information. Specifically, under Vaccine Rule 18(b), each party has fourteen days within which to request redaction "of any information furnished by that party: (1) that is a trade secret or commercial or financial in substance and is privileged or confidential; or (2) that includes medical files or similar files, the disclosure of which would constitute a clearly unwarranted invasion of privacy." Vaccine Rule 18(b). Otherwise, the whole Decision will be available to the public. *Id*.

[2] The Vaccine Program comprises Part 2 of the National Childhood Vaccine Injury Act of 1986, Pub. L. No. 99-660, 100 Stat. 3758, codified as amended, 42 U.S.C. §§ 300aa-10 through 34 (2012) [hereinafter "Vaccine Act" or "the Act"]. Individual section references hereafter will be to § 300aa of the Act.

After the parties filed expert reports, and based upon my initial review of the case record and familiarity with central features of Petitioner's causation theory, I proposed (and the parties agreed) that the matter be decided without holding an evidentiary hearing, and I established a schedule for briefing the substantive merits of Petitioner's claim. To that end, Petitioner filed a motion in support of his claim, dated September 5, 2017 (ECF No. 34) ("Mot."), and Respondent requested dismissal of the claim by brief dated November 3, 2017 (ECF No. 36) ("Opp.").

Having completed my review of the evidentiary record and the parties' filings, I hereby **DENY** Petitioner's request for compensation, and dismiss the claim. The record strongly establishes that Petitioner had already experienced a thromboembolic condition and/or CVA before his vaccination. Petitioner has not otherwise established that the vaccine significantly aggravated his condition, nor has he persuasively established that the vaccine could do so in accordance with the components of his causation theory, and in so short a timeframe.

I. FACTUAL BACKGROUND

Vaccination and Alleged Immediate Reaction

Mr. Hayward received the flu vaccine on January 7, 2012, when he was 74 years old. Ex. 3 at 1. The vaccination record does not indicate the time of the vaccine's administration, but in an affidavit submitted in this case Petitioner averred that he received it at approximately 9:00 a.m. Ex. 10 at ¶ 2. Petitioner's pre-vaccination medical history was significant for benign prostatic hypertrophy,[3] pyelonephritis,[4] and childhood poliomyelitis. Ex. 4 at 1, 6. The records do not include any allegation of a reaction to the vaccine, and Petitioner has not asserted otherwise.

In the evening of that same day, Mr. Hayward went to the Emergency Room at Eaton Rapids Medical Center in Eaton Rapids, Michigan, complaining of sudden onset right-sided weakness starting around 7:00 p.m., during his dinner. Ex. 6 at 1-12. Petitioner specifically informed treaters that his right arm had become numb, and that the numbness had then spread to his leg. *Id.* at 5. He stated "I think I'm having a stroke," but did not inform treaters of having experienced a reaction to the vaccine earlier that day. *Id.* at 2. He was noted to have facial droop, weakness, tingling, impaired speech, and poor coordination. *Id.* Petitioner's bloodwork showed normal hematology counts, high glucose, and normal cardiac enzymes. *Id.* at 4. A head CT scan performed around 8:00 p.m. revealed a "somewhat wedge shaped area of edema within the right temporal occipital region," "lacunar infarct in the posterior left thalamus, *likely chronic*," and "mild diffuse cortical atrophy." *Id.* at 13 (emphasis added). A chest x-ray and EKG were unremarkable. *Id.* at 14-16. Based upon all of the above, Petitioner's initial treaters proposed he

[3] Benign prostatic hypertrophy is a condition involving enlargement of the prostate due to proliferation of both glandular and stromal elements, and is known to begin with males at age 50. *Dorland's Illustrated Medical Dictionary* at 894 (32nd ed. 2012) (hereinafter *Dorland's*).

[4] Pyelonephritis is inflammation of the kidney and renal pelvis due to a bacterial infection. *Dorland's* at 1559.

was experiencing a CVA or stroke, with cerebral artery thrombosis but without cerebral infarction.[5] *Id.* at 1.

Mr. Hayward was immediately transferred to Sparrow Hospital in Lansing, Michigan, where he was hospitalized for several days. Ex. 6 at 1, Ex. 7 at 384-85. Testing performed on Petitioner at this time provided additional details relevant to the symptoms that had resulted in his ER visit. Thus, a brain MRI performed at about 7:30 a.m. the following morning (January 8, 2012) revealed "right parietal and left thalamic stroke or infarct." *Id.* at 384. The radiologist performing the MRI noted "*some mild blood product formation* . . . as well as some minimal focal edema and enhancement following contrast administration. Primary consideration is given to a subacute infarct . . . . Given the bilaterally of lesions, *an embolic phenomenon is a consideration* . . ." Ex. 5 at 4-5 (emphasis added). In addition, a CT angiogram of the neck and brain performed the same day observed a "[r]ight saddle pulmonary embolism[6] with involvement of the right upper, middle, and lower lobes." *Id.* at 6-7; Ex. 7 at 452. A venous Doppler examination of both sides of his lower extremities, by contrast, did not show any evidence of deep vein thrombosis ("DVT"). Ex. 5 at 8. A CT of the thorax, abdomen, and pelvis on January 9, 2012, showed a pulmonary embolism in the right lung and coronary artery calcification. *Id.* at 10-12. And an echocardiogram performed the same day revealed diastolic dysfunction and a sclerotic aortic valve. Ex. 4 at 3.

On January 12, 2012, Petitioner was transferred to inpatient rehabilitation at Sparrow Health System, where he remained until January 25, 2012. Ex. 4 at 6-11. Petitioner was noted to be in a hypercoagulable state with cerebrovascular occlusions and a pulmonary embolus. *Id.* at 8-9. Petitioner gradually improved, however, with his pulmonary embolism resolving by January 23, 2012. *Id.* By his discharge, he was able to walk 400 feet and move from sitting to standing independently, jog 300 feet with standby assistance, climb up and down one flight of stairs with rail-modified independence, and complete a mental test with moderate verbal cues. *Id.*

Post-Hospitalization History

Petitioner was thereafter discharged home with a Coumadin[7] prescription. Ex. 4 at 8. He was deemed to be in stable condition and given a recommendation for outpatient occupational and physical therapy ("OT" and "PT"), along with instructions to follow up with his primary care physician and neurologist. *Id.* Between January 31 and April 11, 2012, Petitioner attended PT. *Id.* at 37. He reported overall improvement, with minimal loss of balance periodically, plus

[5] A cerebral infarction is "an ischemic condition of the brain, producing local tissue death and usually a persistent focal neurological deficit in the area of distribution of one of the cerebral arteries." *Dorland's* at 934.

[6] A saddle pulmonary embolism (PE) is a form of large pulmonary thromboembolism (blood clot causing blood vessel obstruction) that straddles the main pulmonary arterial trunk at its bifurcation. *Dorland's* at 606.

[7] Coumadin is the trademarked name for warfarin sodium, which is an anticoagulant used for the treatment and prophylaxis of thromboembolic disorder. *Dorland's* at 2074-75.

improvement in the "buzzing" sensation he had previously experienced in his right lower extremity. *Id.* He was also able to return to normal activities, though his "foot still fe[lt] like a block." *Id.*

Mr. Hayward saw his primary care physician, Peter Luea, M.D., three times in February 2012, for follow up. *See generally* Ex. 4 at 16-18, 20-23, 25-28. He informed Dr. Luea that he was experiencing about a twenty percent improvement in his right foot, thigh, and arm sensations. *Id.* at 16-18. He also saw a neurologist, Dr. Anmar Razak, on February 22, 2012. Ex. 5 at 19-22. Petitioner's hypercoagulable work-up was negative, and his neurologic exam was essentially normal. *Id.* Dr. Razak's assessment was "residual of mild right[-]sided paresthesias," and recommended another brain MRI in a month and a transesophageal echocardiogram ("TEE") to rule out patent foramen ovale.[8] *Id.*

On March 22, 2012, Mr. Hayward underwent the brain MRI Dr. Razak had recommended. Ex. 4 at 36. The ischemic infarcts previously identified in his January MRI were now seen to be in a "subacute-to-chronic state." *Id.* There were also a few small punctate T2 hyper-intensities in the white matter, and they were deemed age-related chronic ischemic changes. *Id.* At a follow-up visit in April, Dr. Razak noted that the MRI had confirmed the evolution of Petitioner's previous strokes with no new events, and that a TEE performed on him had been negative for heart disease. Ex. 5 at 23-26. Dr. Razak recommended that Petitioner continue taking Coumadin until August 2012 (before switching to an aspirin regimen) and encouraged Petitioner to maintain a healthy weight through exercise and diet. *Id.* at 26.

Petitioner followed up with Dr. Luea every month for the rest of 2012. *See generally* Ex. 4 at 38-41, 43-45, 47-51, 59-62, 65-68, 70-73, 82-84, and 89-92. Throughout this time, Mr. Hayward's health was described as "fair," although he variously reported difficulty walking, limb weakness, tingling, leg swelling, myalgias, nocturia, decreased sensation in the right cheek, right ankle joint pain, and benign prostatic hypertrophy. By August 2012, Petitioner reported itching and the return of sensation on his right side, and Dr. Luea instructed him to stop taking Coumadin and start instead on low dose aspirin. *Id.* at 70-73. He also saw Dr. Razak in September, informing him that he was still experiencing some continued right-sided paresthesias and problems walking because his right ankle and foot tingled. Pet. Ex. 5 at 29-32. To help with those symptoms, Dr. Razak prescribed Neurontin. *Id*. at 32.

Importantly, there is no evidence from any of Mr. Hayward's 2012 medical records revealing an instance in which any treater ever proposed or opined that the flu vaccine had anything to do with his subsequent medical conditions or problems.

[8] Patent foramen ovale, or PFO, is a type of heart septal defect consisting of abnormal persistence of the fetal foramen ovale cordis after birth, often resulting in a left-to-right or right-to-left shunt. *Dorland's* at 730.

Repeat Hospitalization in 2013

After a long period of relative quiescence, Mr. Hayward experienced another acute event requiring immediate intervention. On July 28, 2013 (now about eighteen months since Petitioner received the flu vaccine), he was admitted to Eaton Rapids Medical Center with a two-day history of right chest pain that had progressively worsened. Ex. 4 at 127-28. A chest CT showed a large embolus in the right pulmonary arterial tree, with an area suspicious for pulmonary infarction in the right lower lobe. *Id.* at 124. A head CT did not reveal any acute abnormality, however. *Id.* at 123. Petitioner was noted to have a longstanding history of CVA, a family history of a clotting disorder, and a history of pulmonary embolism. *Id.* at 127-28. A venous Doppler examination on July 29, 2013, revealed no evidence of DVT. *Id.* at 129. He was discharged on August 1, 2013, and again prescribed Coumadin. *Id.* at 130-31. At an August 8, 2013, follow-up visit with Dr. Luea, Mr. Hayward reported fatigue and some shortness of breath, plus chronic right-sided "woodiness," but no chest pain. *Id.* at 134-36.

On September 11, 2013, Mr. Hayward had an appointment with a hematologist. Ex. 4 at 157-59. In providing a medical history background, Petitioner related the following to a physician's assistant:

> [T]here was some concern that he had an influenza vaccine the day of his stroke and this was with a company who had used mercury for preservation and that there had actually been several other incidences where someone who had gotten that influenza vaccine with mercury had developed strokes so there is concern that the stroke this patient had may have been caused by the mercury.

Id. Neither the hematologist nor the physician's assistant commented on this statement, but the medical records also noted that "[t]here is an unknown reason why this patient has had recurrent pulmonary embolisms at this time." *Id.* This record does not detail which prior providers might have expressed to or shared with Petitioner any concern about the flu vaccine's purported role in his strokes or other injuries.

Besides the above, Petitioner filed other medical records pertaining to his subsequent treatment with Dr. Luea from the remainder of 2013 through August 2015, but these records do not bear on resolution of the issues in dispute, and therefore are not discussed herein. *See generally* Ex. 4 at 162-64, 168-70, 174-77, 184-86, 190-93, 196-99, 202-05, 208-11, 219-22, 229-32, 235-38, 242-45, 249-54, 264-68, 274-78, 281-85, 288-91, 295-98, 307-10; Pet. Ex. 8. No records detailing subsequent treatment were filed.

II. EXPERT REPORTS

A. Dr. David Axelrod

Petitioner submitted a single expert report from Dr. Axelrod, a clinical immunologist. *See* Report, dated March 24, 2016, filed as Ex. 9-A (ECF No. 21-1) ("Axelrod Rep.").

Dr. Axelrod graduated from the University of Michigan Medical School in 1974 (after obtaining his bachelor's degree at Michigan as well). Ex 19-B (ECF No. 21-2) ("Axelrod CV") at 1. He completed two residencies in internal medicine, one at the University of Toronto and one at William Beaumont Hospital, followed by additional residencies with a fellowship in allergy, immunology, and rheumatology at McGill University. Axelrod CV at 1. He then served as a fellow for the National Institutes of Health in the Clinical Immunology Laboratory. *Id*. Dr. Axelrod is board certified in medicine, allergy and immunology, adult rheumatology, and medical laboratory immunology. *Id*. He currently works in private practice, with the vast majority of his patients having allergies, immunologic conditions, or autoimmune rheumatic diseases. *Id*. He does not appear, however, to have conducted research in immunologic matters that bear on stroke or CVA causality, nor has he demonstrated expertise with respect to those specific conditions.

Dr. Axelrod proposes that immunologic processes initiated by receipt of the flu vaccine "caused or contributed to the acute infarction . . . and pulmonary emboli" Petitioner experienced. Axelrod Rep. at 3. First, he opined that the vaccines at issue could cause the production of certain proinflammatory cytokines[9] immediately upon administration. Axelrod Rep. at 2. As shown by Y. Kashiwagi, et al., *Production of Inflammatory Cytokines in Response to Diphtheria-Pertussis-Tetanus (DPT), Haemophilus Influenzae Type B (Hib), and 7-Valent Pneumococcal (PCV7) Vaccines*, 10 Human Vaccines & Immunotherapeutics 3:677-85 (2014), filed as Ex. 19-C (ECF No. 21-3) ("Kashiwagi"), vaccination results in elevated levels of four kinds of cytokines. *Id.* at 1; Kashiwagi at 678. Kashiwagi was an *in vitro* study comparing the levels of inflammatory cytokines in the blood sera of 61 vaccine recipients with febrile illness, against 18 recipients without febrile illness, 24 hours after vaccination. *Id.* at 677. The study's authors began with peripheral blood mononuclear cell cultures and then introduced different combinations (separately or concurrently) of the DTaP, Hib, and/or PCV7 vaccines in order to determine the levels of cytokine production in the cell cultures. *Id.*

Relying on Kashiwagi, Dr. Axelrod maintained that certain proinflammatory cytokines are produced beginning six hours after vaccination, and then continue to increase up to 24 hours following vaccination. Axelrod Rep. at 1. He also maintained that these elevated levels were found to persist beyond a 24-hour timeframe. *Id.*; *see also* B. Ferko, et al., *Immunogenicity and Protection Efficacy of Replication-deficient Influenza A Viruses with Altered NS1 Genes*, 78 J Virology 13037 (2004), filed as Ex. 19-D (ECF No. 21-4).

[9] A cytokine is a generic term for non-antibody proteins released by one cell population on contact with a specific antigen, which act as intercellular mediators in connection with an immune response. *Dorland's* at 466. The term "proinflammatory" signifies that these cytokines are capable of stimulating inflammation. *Id.* at 1523.

Yet there are reasons to distinguish Kashiwagi and articles like it from the present matter, and to find that its conclusions, however reliable, are less compelling than Dr. Axelrod proposes. The results showing increased cytokine production were mainly seen in connection with the PCV7 vaccine, which is not the relevant vaccine in this case. Kashiwagi at 679. More significantly, Kashiwagi found no real difference between the two compared serum groups, beyond the fact that one particular type of cytokine was elevated in individuals already experiencing a febrile illness. *Id.* at 680. Because Kashiwagi's authors admitted that "[v]accine-specific innate inflammatory responses . . . have not been sufficiently investigated regarding cytokine production using difference vaccines," they could not characterize this instance of cytokine elevation as significant (*id.* at 678), and ultimately concluded that more analysis was required. *Id.* at 683.

Besides asserting that the flu vaccine can cause the fast upregulation of cytokines, Dr. Axelrod's theory proposed that this increase in cytokines could in turn "cause blood clots within the blood vessels." Axelrod Rep. at 3. He cited several pieces of medical literature to support this point. *See, e.g.,* P. Bunce, *Pandemic H1N1 Influenza Infection and Vascular Thrombosis*, 52 Clinical Infectious Diseases e14-17 (2011), filed as Ex. 9-G (ECF No. 21-7)("Bunce"); S. Wiseman, et al., *Blood Markers of Coagulation, Fibrinolysis, Endothelial Dysfunction and Inflammation in Lacunar Stroke Versus Non-Lacunar Stroke and Non-Stroke: Systematic Review and Meta-analysis*, 37 Cerebrovascular Disease 64 (2014), filed as Ex. 9-H (ECF No. 21-8) ("Wiseman"); H. Kimura, et al., *Interleukin-1 Beta (IL-1 beta) Induces Thrombocytosis in Mice: Possible Implication of IL-6*, 76 Blood 2493 (1990), filed as Ex. 9-J (ECF No. 21-10) ("Kimura").

The first of the articles, Bunce, observed 119 patients who had been infected with the 2009 H1N1 wild virus, finding that nearly six percent of them had also suffered a thrombotic vascular event. *See* Bunce at e1. The conclusion of the study was that although infection with the H1N1 virus "did not appear to be associated with higher rates of vascular complications than has previously been reported among critically ill patients," nevertheless "the development of massive venous thrombotic events and clinically significant arterial thrombosis . . . suggests the possibility of pH1N1-associated hypercoagulability and endothelial activation and/or dysfunction in affected individuals." *Id.* at e3. The Wiseman article concluded that two types of cytokines (IL-6 and TNF alpha) are associated with acute stroke compared with lacunar strokes.[10] *See generally* Wiseman. And Kimura observed an increase in platelets (that contribute to blood clots) on the first day after a process of administration of IL-1beta in mice over a multi-day period had concluded. *See generally* Kimura.

Dr. Axelrod also attempted to distinguish literature suggesting the flu vaccine can actually *reduce* the risk of stroke. *See* H. Lin, et al., *Association of Influenza Vaccination and Reduced Risk of Stroke Hospitalization Among the Elderly: A Population-based Case-control Study*, 11 Int. J.

[10] Lacunar strokes are a result of lacunar (small pit or hollow cavity) infarcts, and most commonly cause "pure motor hemiparesis, ataxic hemiparesis, pure sensory stroke, sensorimotor stroke, and clumsy-hand dysarthria." *Dorland's* at 1786.

Environmental Research and Public Health 36369 (2014), filed as Ex. 9-F (ECF No. 21-6) ("Lin"). He did so by noting that individuals like Mr. Hayward who had suffered a stroke within two weeks of vaccination had been excluded from the Lin study, thus rendering it inapplicable given the short timeframe at issue. Lin at 3. Dr. Axelrod otherwise referred to Bunce, noting that it showed a statistically significant minority (slightly less than six percent) also suffered a thrombotic vascular event. *See* Bunce at e14. Accordingly, Dr. Axelrod concluded that Petitioner could have experienced an innate response to the flu vaccination resulting in an increased production of cytokines sufficient to have caused Petitioner's injuries. Axelrod Rep. at 3.

B. Dr. Marcel Kinsbourne

Dr. Kinsbourne prepared Petitioner's other expert report. *See* Report, dated March 24, 2017, filed as Ex. 11 (ECF No. 30-1) ("Kinsbourne Rep."). No CV was filed, but Dr. Kinsbourne has testified many times in the Program (and several times before me). Decisions from such cases consistently confirm that he is board certified in pediatrics, received his medical degree in England, and has been licensed to practice medicine in North Carolina since 1967. *See, e.g., Strong v. Sec'y of Health & Human Servs.*, No. 15-1108, 2018 WL 1125666, at *6 (Fed. Cl. Spec. Mstr. Jan. 12, 2018); *McCollum v. Sec'y of Health & Human Servs.,* No. 14-790V, 2017 WL 5386613, at *6 (Fed. Cl. Spec. Mstr. Sept. 15, 2017), *mot. for review den'd,* 133 Fed. Cl. 735 (2017), *appeal docketed*, No. 18-1623 (Fed. Cir. Feb. 28, 2018). From 1967 to 1974, Dr. Kinsbourne served as an associate professor in pediatrics and neurology and a senior research associate at Duke University Medical Center before holding a series of academic positions, including professorships in pediatrics, neurology, and psychology. His clinical experience includes serving as a senior staff physician in Ontario from 1974-1980, and a clinical associate in neurology at Massachusetts General Hospital from 1981-1991, although (as noted in other cases) many years have passed since he regularly saw patients. *Strong,* 2018 WL 1125666, at *6. It has not been demonstrated in this case that Dr. Kinsbourne has any more direct expertise with the injury at issue than Dr. Axelrod.

Dr. Kinsbourne's opinion begins with a review of Mr. Hayward's chronological medical history pertinent to the claim asserted herein. Kinsbourne Rep. at 1-2. He then proposes that prior to suffering from his first stroke, Petitioner had experienced an asymptomatic brain infarction, known as a "silent stroke." *Id*. at 3. Dr. Kinsbourne described silent strokes as occurring in about half of elderly patients, and causing no symptoms despite their presence on imaging tests. *Id*.; K. Karia, et al., *'Silent' Cerebral Infarction is Associated with Hypercoagulability, Endothelial Cell Damage and High Lp(a) Levels in Elderly Japanese,* 16 Arteriosclerosis, Thrombosis and Vascular Biology, 734 (1996), filed as Ex. 11-E (ECF No. 30-6); S. Kobayashi, et al., *Subcortical Silent Brain Infarction as a Risk Factor for Clinical Stroke*, 28 Stroke 1932 (1997), filed as Ex. 11-F (ECF No. 30-7); S. Vermeer, et al., *Silent Brain Infarcts And The Risk Of Dementia And Cognitive Decline*, 348 New England J. Medicine 1215 (2003), filed as Ex. 11-L (ECF No. 31-4). Evidence of Petitioner's prior brain infarctions could be seen from neuroimaging. Kinsbourne Rep. at 3; Ex. 6 at 13.

Relying on Dr. Axelrod's opinion about the harmful capacity of proinflammatory cytokines, Dr. Kinsbourne opined that Petitioner's underlying silent strokes were aggravated by the flu vaccine, causing him to suffer from his first "clinically overt" stroke hours after vaccination. Kinsbourne Rep. at 5. Dr. Kinsbourne reiterated the points made by Dr. Axelrod to distinguish the Lin article, and referenced several additional pieces of medical literature that supported the concept that the flu vaccine, through upregulation of cytokines, could create an inflammatory environment ripe for embolism sufficient to result in stroke. *Id*. at 5-6; *see also* M. Tsai, et al., *Effect of Influenza Vaccine on Markers of Inflammation and Lipid Profile*, 145 Translational Research 323 (2005), filed as Ex. 11-K (ECF No. 31-3); V. DiNapoli, et al., *Age Exaggerates Proinflammatory Cytokine Signaling and Truncates STAT3 Signaling Following Ischemic Stroke in the Rat*, 170 Neuroscience 633 (2010), filed as Ex. 11-B (ECF No. 30-3).

Although Dr. Kinsbourne cited medical literature that silent strokes can be exacerbated by infection, he was somewhat conclusory in proposing that the phenomenon was occurring in Petitioner. Rather, Dr. Kinsbourne relied heavily on the lack of evidence of an alternate cause, as well as the timing of Petitioner's stroke (occurring hours after vaccination) for his opinion that Petitioner's injury was vaccine-caused. Kinsbourne Rep. at 5.

C. Dr. Thomas Leist

Respondent filed two reports from Dr. Leist, Professor of Neurology at Thomas Jefferson University and Chief of the Division of Clinical Neuroimmunology at Jefferson University Hospitals. *See* Ex. A, filed June 28, 2016 (ECF No. 22-1) ("First Leist Rep."); Ex. C, filed June 20, 2017 (ECF No. 32-1) ("Second Leist Rep.").

Dr. Leist attended the University of Zurich, where he obtained his Ph.D. in immunology and biochemistry as well as a post-doctorate degree in experimental pathologies. Ex. B (Dr. Leist's CV), filed on June 28, 2016 (ECF No. 22-6). He also completed a post-doctorate at the University of California, Los Angeles and attended medical school in the United States at the University of Miami. *Id.* He then completed a residency in neurology at Cornell University before becoming a fellow at the National Institute of Health. *Id*. at 2. Dr. Leist is board certified in neurology and currently serves as a professor of neurology at Thomas Jefferson University in Philadelphia, Pennsylvania as well as directing the MS center and guiding the MS or the neuro-immunology fellowship program. *Id*. at 1.

Dr. Leist's overall opinion is that Petitioner was suffering from an ongoing prothrombotic condition that existed prior to his vaccination and was responsible for Petitioner's post-vaccination stroke. First Leist Rep. at 2-3. In support of this opinion, Dr. Leist referenced the imaging results from the CT scan performed the night of vaccination, and the MRI performed the day after vaccination (which in particular observed indicia suggesting that the preexisting "silent" stroke Petitioner had experienced was itself embolic in nature – something the radiologist performing the MRI had proposed). *Id*. at 2. It was therefore most likely that the preexisting abnormalities seen on Petitioner's imaging caused the strokes he suffered. *Id*. at 6, 7.

Dr. Leist addressed what he understood to be a cornerstone of Dr. Axelrod's opinion -- that vaccination can stimulate cytokine production that can in turn induce prothrombotic conditions. First Leist Rep. at 3. To rebut these points, Dr. Leist attempted to distinguish many of the articles cited by Dr. Axelrod, pointing out that they either did not involve the flu vaccine, or did not demonstrate a trustworthy causal connection between *any* kind of vaccination and thrombotic disease/stroke. *Id*. at 3-5.

Dr. Leist also discussed the relevance of certain literature, like Lin, suggesting that the flu vaccine actually diminished the likelihood of stroke. As Dr. Axelrod noted, Lin had excluded from the study those patients who had recently (within the last two weeks) suffered a stroke. But Dr. Leist pointed out that Lin actually indicated that this subset of individuals were not included because they likely were *not fully immunized* if they suffered a stroke within two weeks of vaccination – suggesting that the immunologic process involved could not be completed in as short a time as Petitioner herein alleges. First Leist Rep. at 4; Lin at 3. In addition, Lin's authors went so far as to state that although "[s]ome studies have suggested a link between influenza and stroke-related events . . . this relationship *has not been well* characterized." Lin at 3645 (emphasis added).

Besides challenging the cytokine upregulation aspect of Dr. Axelrod's theory, Dr. Leist also attacked the portion of the theory attempting to connect upregulation with a pro-thrombotic environment. To that end, Dr. Leist cited a study that showed that patients at risk for a thrombotic event who underwent treatments that induce the production of cytokines (such as peripheral blood stem cell mobilization with a stimulating factor) in fact displayed *no* evidence of any such events within their first 24 hours of treatment. First Leist Rep. at 6, *citing* H. Naina, et al., *Low Risk of Symptomatic Venous Thromboembolic Events During Growth Factor Administration for PBSC Mobilization*, 46 Bone Marrow Transplantation 291 (2011), filed as Ex. A.4 (ECF No. 22-5) ("Naina"). That timeframe is what Petitioner alleges herein is a medically acceptable period for the development of a vaccine-induced cytokine storm resulting in stroke.

Dr. Leist also noted deficiencies or limitations in the literature referenced by Dr. Axelrod in an effort to connect cytokines to stroke. For example, he noted that although Kimura had demonstrated an increase in platelets following an increase in the IL-1 beta cytokine day one after injection, the "one day after" was actually *four* days after the first cytokine injections in the experiment (as the tested mice were injected five times every 12 hours for several days). First Leist Rep. at 5. Dr. Leist also noted that Wiseman's authors did not make a causal connection between cytokines and stroke; rather Wiseman only measured the cytokine levels *after* the stroke occurred, thereby only establishing an association rather than a causal relationship. *Id*. at 4-5.

Dr. Leist's second report reacted to Dr. Kinsbourne's opinion. In particular, Dr. Leist discussed Dr. Kinsbourne's contentions that Petitioner's preexisting subacute stroke condition was ongoing but exacerbated by the flu vaccine. As Dr. Leist explained, the preexisting strokes discovered after vaccination were best understood not as a "subclinical" condition, but as

"asymptomatic" events attributable to a preexisting "procoagulant state." Second Leist Rep. at 5. The earlier strokes did not result in clinically obvious symptoms, he reasoned, due to "*the location* of the subacute strokes and *the nature of the brain function that these areas supported*." *Id.* (emphasis added).

Similar to his approach with the literature cited by Dr. Axelrod, Dr. Leist also listed each of the articles relied on by Dr. Kinsbourne to show that they were insufficient to support Petitioner's theory. Second Leist Rep. at 2-4. In particular, Dr. Leist noted that "[n]one of the articles referenced by Dr. Kinsbourne links influenza vaccine directly with a prothrombotic state and none of the articles supports petitioner's theory that immune mechanisms induced in response to influenza vaccination could cause blood clots within hours of immunization." *Id*. at 5.

Dr. Leist also reiterated the point from his first report that the flu vaccine was not reasonably associated with stroke generally. On the contrary – he stressed literature finding that the flu vaccine was associated with a *decreased* risk of stroke. Second Leist Rep. at 4; First Leist Rep. at 4; Pet. Ex. 4 at 157-59; P. Lavallée, et al., *Association Between Influenza Vaccination and Reduced Risk of Brain Infection*, 33 Stroke 513 (2001), filed as Ex. A.3 (ECF No. 22-4) (French case study of 90 patients older than 60 years of age admitted to hospital for brain infarction)("Lavallée"). He also noted that none of Petitioner's physicians attributed his stroke to the flu vaccine, even after Petitioner had specifically raised it with them as a potential explanation for his condition. Second Leist Rep. at 5.

III. PROCEDURAL HISTORY AND PARTIES' ARGUMENTS

As noted above, this action was initiated in January 2015. Petition at 1. Approximately six months later, the statement of completion was filed (ECF No. 12), followed not long thereafter by Respondent's Rule 4(c) Report on September 28, 2015 (ECF No. 13). The parties then began the process of obtaining expert reports, which was not completed until June 20, 2017.

At a status conference, I proposed (given the nature of the allegations and facts herein) that the matter could be most efficiently resolved on the papers rather than at a hearing. The parties subsequently filed a joint status report indicating that they would like to have the case decided on a motion for a ruling on the record, and proposed a briefing schedule to do so. *See* Joint Status Report, dated July 27, 2017 (ECF No. 33). Accordingly, I set the deadlines the parties suggested, and the briefs were timely filed. (ECF Nos. 34-37). The matter is now ripe for a decision.

Petitioner's Argument

Petitioner relies on the immunological conclusions of Dr. Axelrod that 1) proinflammatory cytokines increase within the first six hours of the flu vaccination; 2) the H1N1 flu vaccine can cause inflammation leading to heart conditions; and 3) certain cytokines (IL-1 beta, IL-6, and TNF-alpha) are associated with heart conditions and/or stroke due to thrombosis. *See* Mot. at 7. Those

conclusions, in concert with Dr. Kinsbourne's theory, thus support Petitioner's argument that his receipt of the flu vaccine caused inflammation (a risk factor for stroke), which in turn worsened his existing infarct in his right cerebral hemisphere (previously subclinical or a "silent stroke"), thereafter causing a full ischemic stroke within hours of his vaccination. *Id*. at 8.

Additional support for Petitioner's argument came from medical literature noting that one third of ischemic strokes are preceded by an infection. Mot. at 9; C. Hedley & S. Emsley, *Acute Ischemic Stroke and Infection: Recent and Emerging Concepts*, 7 Lancet Neurology 341 (2008), filed as Ex. 11-D (ECF No. 30-5). While an infection may not be directly responsible for the stroke, it *is* responsible for the inflammatory reaction triggered by the body that encourages a thrombotic environment. Mot. at 9. In his case, Petitioner alleges, he suffered an ischemic stroke as a result of an inflammatory response caused by his flu vaccination. Thus, his previously sub-acute "silent strokes" were significantly aggravated. *Id*. at 11.

Petitioner's reply restated the medical history and theory of causation set forth in the motion for a ruling, but added that the present case presents a rare vaccine injury, thereby excusing the lack of more direct evidence supportive of an association between the flu vaccine and stroke. *See* Petitioner's Reply, dated Nov. 12, 2017 (ECF No. 37) ("Reply"). The Reply also attempted to rebut some of Respondent's arguments about Dr. Kinsbourne's opinion, albeit mainly by recopying the summary Dr. Kinsbourne put in his expert report. *Id*. at 8.

Respondent's Argument

Respondent argues that Petitioner has failed to establish that he suffered a significant aggravation of his preexisting thromboembolic condition, and has not demonstrated that the flu vaccine, rather than the natural course of the preexisting condition, was responsible for his post-vaccination condition. Opp. at 15. In reaction to Petitioner's assertion that significant aggravation was shown by the mere fact that Petitioner's sub-acute "silent strokes" became symptomatic post-vaccination, Respondent pointed to Dr. Kinsbourne's own literature that silent strokes are usually associated with future strokes (*regardless* of intervening vaccination). *Id*. at 16, Second Leist Rep. at 3.

Respondent went on to dismiss the theory proposed by Drs. Axelrod and Kinsbourne, arguing that it was not adequately supported by reliable medical literature. Opp. at 16. Rather, the literature cited by Petitioner to support his theory at best showed associations between wild infections or *other* vaccinations and CVA – but not a flu vaccine comparable to that received by Petitioner. *Id*. at 16-17. Respondent also pointed to Dr. Leist's contention that infections are irrelevant to causation in this instance because Petitioner received a flu vaccine that was not live, making it incapable of infecting cells. *Id*. at 17; First Leist Rep. at 3. And Respondent noted that some literature had actually found that the flu vaccine was associated with a *reduced* risk of stroke hospitalization, because it lowered the incidence of infection that could be causal in the first place. Opp. at 18.

At bottom, Respondent maintained that it cannot be shown that Petitioner's vaccination was the cause of his CVA. Opp. at 19-20. Respondent instead relied on Dr. Leist's opinion that Petitioner had a preexisting propensity for pulmonary embolism, and that this was the most likely cause of the post-vaccination stroke that Petitioner experienced. *Id*. at 20. In addition, Respondent argued that onset occurring within 12 hours of vaccination was contrary to the findings of medical literature like Naina, which found *no* cases of stroke within 24 hours of a treatment that specifically induces cytokine production in at-risk individuals. *Id*. at 22.

IV. APPLICABLE LEGAL STANDARDS

A. Claimant's Burden in Vaccine Program Cases

To receive compensation in the Vaccine Program, a petitioner must prove either: (1) that he suffered a "Table Injury" – i.e., an injury falling within the Vaccine Injury Table – corresponding to one of the vaccinations in question within a statutorily prescribed period of time or, in the alternative, (2) that his illnesses were actually caused by a vaccine (a "Non-Table Injury"). *See* Sections 13(a)(1)(A), 11(c)(1), and 14(a), as amended by 42 C.F.R. § 100.3; § 11(c)(1)(C)(ii)(I); *see also Moberly v. Sec'y of Health & Human Servs*., 592 F.3d 1315, 1321 (Fed. Cir. 2010); *Capizzano v. Sec'y of Health & Human Servs*., 440 F.3d 1317, 1320 (Fed. Cir. 2006).[11] In this case, Petitioner does not assert a Table claim.

For both Table and Non-Table claims, Vaccine Program petitioners bear a "preponderance of the evidence" burden of proof. Section 13(1)(a). That is, a petitioner must offer evidence that leads the "trier of fact to believe that the existence of a fact is more probable than its nonexistence before [he] may find in favor of the party who has the burden to persuade the judge of the fact's existence." *Moberly*, 592 F.3d at 1322 n.2; *see also Snowbank Enter. v. United States*, 6 Cl. Ct. 476, 486 (1984) (mere conjecture or speculation is insufficient under a preponderance standard). Proof of medical certainty is not required. *Bunting v. Sec'y of Health & Human Servs*., 931 F.2d 867, 873 (Fed. Cir. 1991). In particular, a petitioner must demonstrate that the vaccine was "not only [the] but-for cause of the injury but also a substantial factor in bringing about the injury." *Moberly*, 592 F.3d at 1321 (quoting *Shyface v. Sec'y of Health & Human Servs*., 165 F.3d 1344, 1352-53 (Fed. Cir. 1999)); *Pafford v. Sec'y of Health & Human Servs*., 451 F.3d 1352, 1355 (Fed. Cir. 2006). A petitioner may not receive a Vaccine Program award based solely on his assertions; rather, the petition must be supported by either medical records or by the opinion of a competent physician. Section 13(a)(1).

In attempting to establish entitlement to a Vaccine Program award of compensation for a Non-Table claim (which is the kind of claim asserted in this matter), a petitioner must satisfy all

[11] Decisions of special masters (some of which I reference in this ruling) constitute persuasive but not binding authority. *Hanlon v. Sec'y of Health & Human Servs.*, 40 Fed. Cl. 625, 630 (1998). By contrast, Federal Circuit rulings concerning legal issues are binding on special masters. *Guillory v. Sec'y of Health & Human Servs.*, 59 Fed. Cl. 121, 124 (2003), *aff'd*, 104 F. App'x 712 (Fed. Cir. 2004); *see also Spooner v. Sec'y of Health & Human Servs.*, No. 13-159V, 2014 WL 504728, at *7 n.12 (Fed. Cl. Spec. Mstr. Jan. 16, 2014).

three of the elements established by the Federal Circuit in *Althen v. Sec'y of Health & Human Servs.*, 418 F.3d 1274, 1278 (Fed. Cir. 2005): "(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."

Each of the *Althen* prongs requires a different showing. Under *Althen* prong one, petitioners must provide a "reputable medical theory," demonstrating that the vaccine received *can cause* the type of injury alleged. *Pafford*, 451 F.3d at 1355-56 (citations omitted). To satisfy this prong, the petitioner's theory must be based on a "sound and reliable medical or scientific explanation." *Knudsen v. Sec'y of Health & Human Servs.*, 35 F.3d 543, 548 (Fed. Cir. 1994). Such a theory must only be "legally probable, not medically or scientifically certain." *Id*. at 549.

Petitioners may satisfy the first *Althen* prong without resort to medical literature, epidemiological studies, demonstration of a specific mechanism, or a generally accepted medical theory. *Andreu v. Sec'y of Health & Human Servs.*, 569 F.3d 1367, 1378-79 (Fed. Cir. 2009) (citing *Capizzano*, 440 F.3d at 1325-26). Special masters, despite their expertise, are not empowered by statute to conclusively resolve what are essentially thorny scientific and medical questions, and thus scientific evidence offered to establish *Althen* prong one is viewed "not through the lens of the laboratorian, but instead from the vantage point of the Vaccine Act's preponderant evidence standard." *Id.* at 1380. Accordingly, special masters must take care not to increase the burden placed on petitioners in offering a scientific theory linking vaccine to injury. *Contreras v. Sec'y of Health & Human Servs.*, 121 Fed. Cl. 230, 245 (2015) ("[p]lausibility . . . in many cases *may* be enough to satisfy *Althen* prong one" (emphasis in original)). But this does not negate or reduce a petitioner's ultimate burden to establish his overall entitlement to damages by preponderant evidence. *W.C. v. Sec'y of Health & Human Servs.*, 704 F.3d 1352, 1356 (Fed. Cir. 2013) (citations omitted).

The second *Althen* prong requires proof of a logical sequence of cause and effect, usually supported by facts derived from a petitioner's medical records. *Althen*, 418 F.3d at 1278; *Andreu*, 569 F.3d at 1375-77; *Capizzano*, 440 F.3d at 1326; *Grant v. Sec'y of Health & Human Servs.*, 956 F.2d 1144, 1148 (Fed. Cir. 1992). In establishing that a vaccine "did cause" injury, the opinions and views of the injured party's treating physicians are entitled to some weight. *Andreu*, 569 F.3d at 1367; *Capizzano*, 440 F.3d at 1326 ("medical records and medical opinion testimony are favored in vaccine cases, as treating physicians are likely to be in the best position to determine whether a 'logical sequence of cause and effect show[s] that the vaccination was the reason for the injury'") (quoting *Althen*, 418 F.3d at 1280). Medical records are generally viewed as particularly trustworthy evidence, since they are created contemporaneously with the treatment of the patient. *Cucuras v. Sec'y of Health & Human Servs.*, 993 F.2d 1525, 1528 (Fed. Cir. 1993).

However, medical records and/or statements of a treating physician's views do not *per se* bind the special master to adopt the conclusions of such an individual, even if they must be considered and carefully evaluated. Section 13(b)(1) (providing that "[a]ny such diagnosis,

conclusion, judgment, test result, report, or summary shall not be binding on the special master or court"); *Snyder v. Sec'y of Health & Human Servs.*, 88 Fed. Cl. 706, 746 n.67 (2009) ("there is nothing . . . that mandates that the testimony of a treating physician is sacrosanct—that it must be accepted in its entirety and cannot be rebutted"). As with expert testimony offered to establish a theory of causation, the opinions or diagnoses of treating physicians are only as trustworthy as the reasonableness of their suppositions or bases. The views of treating physicians should also be weighed against other, contrary evidence also present in the record – including conflicting opinions among such individuals. *Hibbard v. Sec'y of Health & Human Servs.*, 100 Fed. Cl. 742, 749 (2011) (not arbitrary or capricious for special master to weigh competing treating physicians' conclusions against each other), *aff'd*, 698 F.3d 1355 (Fed. Cir. 2012); *Caves v. Sec'y of Health & Human Servs.*, 100 Fed. Cl. 119, 136 (2011), *aff'd*, 463 F. App'x 932 (Fed. Cir. 2012); *Veryzer v. Sec'y of Health & Human Servs.*, No. 06-522V, 2011 WL 1935813, at *17 (Fed. Cl. Spec. Mstr. Apr. 29, 2011), *mot. for review den'd,* 100 Fed. Cl. 344, 356 (2011), *aff'd without opinion*, 475 Fed. App'x 765 (Fed. Cir. 2012).

The third *Althen* prong requires establishing a "proximate temporal relationship" between the vaccination and the injury alleged. *Althen*, 418 F.3d at 1281. That term has been equated to the phrase "medically-acceptable temporal relationship." *Id.* A petitioner must offer "preponderant proof that the onset of symptoms occurred within a timeframe which, given the medical understanding of the disorder's etiology, it is medically acceptable to infer causation." *Bazan v. Sec'y of Health & Human Servs.*, 539 F.3d 1347, 1352 (Fed. Cir. 2008). The explanation for what is a medically acceptable timeframe must also coincide with the theory of how the relevant vaccine can cause an injury (*Althen* prong one's requirement). *Id*. at 1352; *Shapiro v. Sec'y of Health & Human Servs.*, 101 Fed. Cl. 532, 542 (2011), *recons. den'd after remand*, 105 Fed. Cl. 353 (2012), *aff'd mem.*, 2013 WL 1896173 (Fed. Cir. 2013); *Koehn v. Sec'y of Health & Human Servs.*, No. 11-355V, 2013 WL 3214877 (Fed. Cl. Spec. Mstr. May 30, 2013), *mot. for review den'd* (Fed. Cl. Dec. 3, 2013), *aff'd*, 773 F.3d 1239 (Fed. Cir. 2014).

B. Standard for Significant Aggravation Claim

In this matter, Petitioner offers a parallel theory that the vaccines significantly aggravated a preexisting condition—CVA and a thromboembolic condition. Mot. at 1. Where a petitioner so alleges, the *Althen* test is expanded, and the petitioner has additional evidentiary burdens to satisfy. *See generally Loving v. Sec'y of Health & Human Servs*., 86 Fed. Cl. 135, 144 (2009). In *Loving*, the Court of Federal Claims combined the *Althen* test with the test from *Whitecotton v. Sec'y of Health & Human Servs*., 81 F.3d 1099, 1107 (Fed. Cir. 1996), which related to on-Table significant aggravation cases. The resultant "significant aggravation" test has six components, which are:

> (1) the person's condition prior to administration of the vaccine, (2) the person's current condition (or the condition following the vaccination if that is also pertinent), (3) whether the person's current condition constitutes a 'significant aggravation' of the person's condition prior to vaccination, (4) a medical theory causally connecting such a significantly worsened condition to the vaccination, (5) a logical sequence of cause and effect showing that the vaccination was the reason for the significant aggravation, and (6)

> a showing of a proximate temporal relationship between the vaccination and the significant aggravation.

Loving, 86 Fed. Cl. at 144; *see also W.C. v. Sec'y of Health & Human Servs*., 704 F.3d 1352, 1357 (Fed. Cir. 2013) (holding that "the *Loving* case provides the correct framework for evaluating off-table significant aggravation claims"). In effect, the last three prongs of the Loving test correspond to the three *Althen* prongs.

Within the *Loving* analysis, it is necessary to evaluate the likely natural course of the petitioner's preexisting disease, in order to determine whether the vaccine made the petitioner worse than he would have been but for the vaccination. *Locane v. Sec'y of Health & Human Servs.,* 685 F.3d 1375, 1381-82 (Fed. Cir. 2012) (upholding special master's determination that petitioner had failed to carry her burden of proof in establishing that her preexisting injury was worsened by the relevant vaccine); *Hennessey v. Sec'y of Health & Human Servs.*, No. 01-190V, 2009 WL 1709053, at *41-42 (Fed. Cl. Spec. Mstr. May 29, 2009), *mot. for review den'd*, 91 Fed. Cl 126 (2010). In other words, the critical point of examination is "whether the change for the worse in [petitioners] clinical presentation was aggravation or a natural progression" of the underlying condition. *Hennessey*, 2009 WL 1709053, at *42.[12]

The mere fact a vaccine might "trigger" a transitory negative response in an individual with an underlying condition is not proof of worsening if that individual would be expected to experience a similar course regardless. *Faoro v. Sec'y of Health &Human Servs.*, No. 10-704V, 2016 WL 675491, at *27 (Fed. Cl. Spec. Mstr. Jan. 29, 2016), *mot. rev. den'd*, 128 Fed. Cl. 61 (Fed. Cl. Apr. 11, 2016) (finding that "the vaccinations would not have changed her clinical course and thus, the vaccinations did not significantly aggravate her preexisting condition"). This point

[12] There is some ambiguity as to whether petitioner bears the burden of establishing this worsening. Prior to *Loving*, prevailing law required in part that the special master "assess the individual's current condition after the administration of the vaccine . . . predict the individual's condition had the vaccine not been administered, and . . . compare the individual's current condition with the predicted condition had the vaccine not been administered." *Misasi v. Sec'y of Health & Human Servs.*, 23 Cl. Ct. 322, 325 (1991). The Federal Circuit thereafter (in *O'Conner v. Sec'y of Health and Human Services*, 24 Cl. Ct. 428 (1991), *aff'd* 975 F.2d 868 (Fed. Cir. 1992)) clarified that *Misasi* was not to be interpreted as increasing Petitioner's burden, but that in significant aggravation cases Respondent's burden (once a petitioner had made her prima facie case) remained to show an alternative cause – and that this could be satisfied by demonstrating that the natural progression of the pre-existing condition accounted for the petitioner's post-vaccine condition. *Id*. at 430, n.2.

Although neither *Whitecotton* nor *Loving* addressed *Misasi* or *O'Connor* in their analyses, the *Loving* test appears to embrace the same overall approach. Nevertheless, the Federal Circuit has upheld the determinations of special masters that worsening was not demonstrated by a petitioner in connection with her overall preponderant burden of proof. *See, e.g., Snyder/Harris v. Sec'y of Health & Human Servs.*, 553 Fed. App'x 994, 999-1000 (Fed. Cir. 2014); *Locane*, 685 F.3d at 1381-82. This is consistent with the fact (well recognized by controlling precedent) that "worsening" evidence relevant to Respondent's alternative cause burden may reasonably by evaluated by a special master in determining the success of a petitioner's prima facie showing. *Snyder/Harris*, 553 Fed. App'x at 1000, *quoting Stone v. Sec'y of Health & Human Servs.*, 676 F.3d 1373, 1380 (Fed. Cir. 2012) ("no evidence should be embargoed from the special master's consideration simply because it is also relevant to another inquiry under the statute"); *see also de Bazan v. Sec'y of Health & Human Servs.*, 539 F.3d 1347, 1353 (Fed. Cir. 2008) ("[t]he government, like any defendant, is permitted to offer evidence to demonstrate the inadequacy of the petitioner's evidence on a requisite element of the petitioner's case-in-chief").

was emphasized in a subcategory of Program cases involving the claim that a child's Dravet syndrome (a rare seizure disorder now understood to be caused by the SCN1A gene mutation) was significantly aggravated by vaccination. *Faoro*, 2016 WL 675491, at *1. In such cases, special masters have repeatedly determined that petitioners failed to show that a child's expected outcome would have been different but-for the vaccination – even though it was not disputed that the child's first major seizure had in fact been triggered by vaccination. *Id.* at *2 ("[a]lthough H.E.F.'s vaccinations may have caused a low-grade fever or otherwise triggered her first seizure, neither the initial seizure nor her vaccinations caused or significantly aggravated her Dravet syndrome and resulting neurological complications"); *see also Snyder/Harris v. Sec'y of Health & Human Servs.*, 553 Fed. App'x 994 (Fed. Cir. 2014) (special master was not arbitrary in finding that petitioners' expert failed to show that the child's outcome would have been different had he not received the vaccinations at issue).

C. Law Governing Factual Determinations

The process for making determinations in Vaccine Program cases regarding factual issues begins with consideration of the medical records. Section 11(c)(2). The special master is required to consider "all [] relevant medical and scientific evidence contained in the record," including "any diagnosis, conclusion, medical judgment, or autopsy or coroner's report which is contained in the record regarding the nature, causation, and aggravation of the petitioner's illness, disability, injury, condition, or death," as well as "the results of any diagnostic or evaluative test which are contained in the record and the summaries and conclusions." Section 13(b)(1)(A). The special master is then required to weigh the evidence presented, including contemporaneous medical records and testimony. *See Burns v. Sec'y of Health & Human Servs*., 3 F.3d 415, 417 (Fed. Cir. 1993) (it is within the special master's discretion to determine whether to afford greater weight to contemporaneous medical records than to other evidence, such as oral testimony surrounding the events in question that was given at a later date, provided that such a determination is evidenced by a rational determination).

Medical records that are created contemporaneously with the events they describe are presumed to be accurate and "complete" (i.e., presenting all relevant information on a patient's health problems). *Cucuras*, 993 F.2d at 1528; *Doe/70 v. Sec'y of Health & Human Servs.*, 95 Fed. Cl. 598, 608 (2010) ("[g]iven the inconsistencies between petitioner's testimony and his contemporaneous medical records, the special master's decision to rely on petitioner's medical records was rational and consistent with applicable law"), *aff'd*, *Rickett v. Sec'y of Health & Human Servs*., 468 F. App'x 952 (Fed. Cir. 2011) (non-precedential opinion). This presumption is based on the linked propositions that (i) sick people visit medical professionals; (ii) sick people honestly report their health problems to those professionals; and (iii) medical professionals record what they are told or observe when examining their patients in as accurate a manner as possible, so that they are aware of enough relevant facts to make appropriate treatment decisions. *Sanchez v. Sec'y of Health & Human Servs*., No. 11-685V, 2013 WL 1880825, at *2 (Fed. Cl. Spec. Mstr. Apr. 10, 2013); *Cucuras v. Sec'y of Health & Human Servs*., 26 Cl. Ct. 537, 543 (1992), *aff'd*, 993 F.2d 1525 (Fed. Cir. 1993) ("[i]t strains reason to conclude that petitioners would fail to accurately

report the onset of their daughter's symptoms. It is equally unlikely that pediatric neurologists, who are trained in taking medical histories concerning the onset of neurologically significant symptoms, would consistently but erroneously report the onset of seizures a week after they in fact occurred").

Accordingly, if the medical records are clear, consistent, and complete, then they should be afforded substantial weight. *Lowrie v. Sec'y of Health & Human Servs*., No. 03-1585V, 2005 WL 6117475, at *20 (Fed. Cl. Spec. Mstr. Dec. 12, 2005). Indeed, contemporaneous medical records are generally found to be deserving of greater evidentiary weight than oral testimony – especially where such testimony conflicts with the record evidence. *Cucuras*, 993 F.2d at 1528; *see also Murphy v. Sec'y of Health & Human Servs.*, 23 Cl. Ct. 726, 733 (1991), *aff'd*, 968 F.2d 1226 (Fed. Cir.), *cert. den'd, Murphy v. Sullivan*, 506 U.S. 974 (1992) (citing *United States v. United States Gypsum Co.*, 333 U.S. 364, 396 (1947) ("[i]t has generally been held that oral testimony which is in conflict with contemporaneous documents is entitled to little evidentiary weight.")).

However, there are situations in which compelling oral testimony may be more persuasive than written records, such as where records are deemed to be incomplete or inaccurate. *Campbell v. Sec'y of Health & Human Servs*., 69 Fed. Cl. 775, 779 (2006) ("like any norm based upon common sense and experience, this rule should not be treated as an absolute and must yield where the factual predicates for its application are weak or lacking"); *Lowrie*, 2005 WL 6117475, at *19 ("[w]ritten records which are, themselves, inconsistent, should be accorded less deference than those which are internally consistent") (quoting *Murphy v. Sec'y of Health & Human Servs.*, 23 Cl. Ct. 726, 733 (1991), *aff'd per curiam*, 968 F.2d 1226 (Fed. Cir. 1992)). Ultimately, a determination regarding a witness's credibility is needed when determining the weight that such testimony should be afforded. *Andreu*, 569 F.3d at 1379; *Bradley v. Sec'y of Health & Human Servs.*, 991 F.2d 1570, 1575 (Fed. Cir. 1993).

When witness testimony is offered to overcome the presumption of accuracy afforded to contemporaneous medical records, such testimony must be "consistent, clear, cogent, and compelling." *Sanchez*, 2013 WL 1880825, at *3 (citing *Blutstein v. Sec'y of Health & Human Servs*., No. 90-2808V, 1998 WL 408611, at *5 (Fed. Cl. Spec. Mstr. June 30, 1998)). In determining the accuracy and completeness of medical records, the Court of Federal Claims has listed four possible explanations for inconsistencies between contemporaneously created medical records and later testimony: (1) a person's failure to recount to the medical professional everything that happened during the relevant time period; (2) the medical professional's failure to document everything reported to her or him; (3) a person's faulty recollection of the events when presenting testimony; or (4) a person's purposeful recounting of symptoms that did not exist. *La Londe v. Sec'y Health & Human Servs*., 110 Fed. Cl. 184, 203-04 (2013), *aff'd*, 746 F.3d 1334 (Fed. Cir. 2014). In making a determination regarding whether to afford greater weight to contemporaneous medical records over contrary testimony, there must be evidence that this decision was the result of a rational determination. *Burns*, 3 F.3d at 417.

D. Analysis of Expert Testimony

Establishing a sound and reliable medical theory often requires a petitioner to present expert testimony in support of his claim. *Lampe v. Sec'y of Health & Human Servs.*, 219 F.3d 1357, 1361 (Fed. Cir. 2000). Vaccine Program expert testimony is usually evaluated according to the factors for analyzing scientific reliability set forth in *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 594-96 (1993). *See Cedillo v. Sec'y of Health & Human Servs.*, 617 F.3d 1328, 1339 (Fed. Cir. 2010) (citing *Terran v. Sec'y of Health & Human Servs.*, 195 F.3d 1302, 1316 (Fed. Cir. 1999)). "The *Daubert* factors for analyzing the reliability of testimony are: (1) whether a theory or technique can be (and has been) tested; (2) whether the theory or technique has been subjected to peer review and publication; (3) whether there is a known or potential rate of error and whether there are standards for controlling the error; and (4) whether the theory or technique enjoys general acceptance within a relevant scientific community." *Terran*, 195 F.3d at 1316 n.2 (citing *Daubert*, 509 U.S. at 592-95).

The *Daubert* factors play a slightly different role in Vaccine Program cases than they do when applied in other federal judicial fora (such as the district courts). *Daubert* factors are usually employed by judges (in the performance of their evidentiary gatekeeper roles) to exclude evidence that is unreliable and/or could confuse a jury. In Vaccine Program cases, by contrast, these factors are used in the *weighing* of the reliability of scientific evidence proffered. *Davis v. Sec'y of Health & Human Servs.*, 94 Fed. Cl. 53, 66-67 (2010) ("uniquely in this Circuit, the *Daubert* factors have been employed also as an acceptable evidentiary-gauging tool with respect to persuasiveness of expert testimony already admitted"). The flexible use of the *Daubert* factors to evaluate the persuasiveness and reliability of expert testimony has routinely been upheld. *See, e.g.*, *Snyder*, 88 Fed. Cl. at 742-45. In this matter (as in numerous other Vaccine Program cases), *Daubert* has not been employed at the threshold, to determine what evidence should be admitted, but instead to determine whether expert testimony offered is reliable and/or persuasive.

Respondent frequently offers one or more experts of his own in order to rebut a petitioner's case. Where both sides offer expert testimony, a special master's decision may be "based on the credibility of the experts and the relative persuasiveness of their competing theories." *Broekelschen v. Sec'y of Health & Human Servs.*, 618 F.3d 1339, 1347 (Fed. Cir. 2010) (citing *Lampe*, 219 F.3d at 1362). However, 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*, 88 Fed. Cl. at 743 (quoting *Gen. Elec. Co. v. Joiner*, 522 U.S. 146 (1997)); *see also Isaac v. Sec'y of Health & Human Servs.*, No. 08-601V, 2012 WL 3609993, at *17 (Fed. Cl. Spec. Mstr. July 30, 2012), *mot. for review den'd*, 108 Fed. Cl. 743 (2013), *aff'd*, 540 Fed. App'x 999 (Fed. Cir. 2013) (citing *Cedillo*, 617 F.3d at 1339).

E. Consideration of Medical Literature

Both parties relied on several pieces of medical and scientific literature in this case in support of their respective positions. I have reviewed all of the medical literature submitted in this case, although my decision does not discuss each filed article in detail. *Moriarty v. Sec'y of Health & Human Servs.*, No. 2015-5072, 2016 WL 1358616, at *5 (Fed. Cir. Apr. 6, 2016) ("[w]e generally presume that a special master considered the relevant record evidence even though he does not explicitly reference such evidence in his decision") (citation omitted).

F. Determination to Resolve Case without Hearing

The parties accepted my proposal to resolve entitlement in this case based on written submissions and evidentiary filings, including the expert reports filed by each side. The Vaccine Act and Rules not only contemplate but encourage special masters to decide petitions on the papers rather than via evidentiary hearing, where (in the exercise of their discretion) they conclude that the former means of adjudication will properly and fairly resolve the case. Section 12(d)(2)(D); Vaccine Rule 8(d). The choice to do so has been affirmed on appeal. *See Hooker v. Sec'y of Health & Human Servs.*, No. 02-472V, 2016 WL 3456435, at *21 n.19 (Fed. Cl. Spec. Mstr. May 19, 2016) (citing numerous cases where special masters decided on the papers in lieu of hearing and that decision was upheld). I am simply not required to hold a hearing in every matter, no matter the preferences of the parties. *D'Toile v. Sec'y of Health & Human Servs.*, No. 15-85V, 2016 7664475 (Fed. Cl. Spec. Mstr. Nov. 28, 2016) (deciding entitlement without hearing), *mot. for review den'd,* 132 Fed. Cl. 421 (2017), *aff'd,* No. 2017-1982, 2018 WL 1750619 (Fed. Cir. 2018); *see also Hovey v. Sec'y of Health & Human Servs.*, 38 Fed. Cl. 397, 402-03 (1997) (special master acted within his discretion in denying evidentiary hearing); *Burns,* 3 F.3d at 417; *Murphy v. Sec'y of Health & Human Servs.*, No. 90-882V, 1991 WL 71500, at *2 (Ct. Cl. Spec. Mstr. Apr. 19, 1991).

ANALYSIS

After careful review of the expert reports, medical records, scientific and medical literature, and the arguments of both sides, and taking into account parallel decisions from other Vaccine Act cases, I conclude that Petitioner has not established preponderant evidence in favor of his claim. I address the deficiencies of his argument in the order of their significance to my determination.

A. Petitioner Has Not Shown that the Flu Vaccine More Likely Than Not Was the Cause of his Stroke and Other Injuries

Incontrovertible record evidence strongly suggests that, more likely than not, Petitioner's post-vaccination stroke/CVA was causally related to the subacute strokes he had experienced *before* receiving the flu vaccine, but which were only discovered thereafter (as evidenced by the January 8, 2012 brain MRI). I find that Petitioner has not offered a persuasive reading of that record suggesting the contrary, nor have his experts established reliable explanations of that record that minimize the likely impact of his preexisting condition. Indeed – Dr. Kinsbourne agrees that

the record *establishes* that Petitioner likely had experienced "silent strokes" prior to the incident at issue, and that they were related to his post-vaccination injuries. The record itself also does not include any treater speculation that the flu vaccine caused his first clinically-observed CVA. This record therefore does not support the conclusion that the flu vaccine itself "caused" the subsequent strokes.

B. Petitioner's Pre-Vaccination CVA Was Not Likely Significantly Aggravated By his Receipt of the Flu Vaccine

Although there are several additional elements of the *Loving* test that must be met for a claim of significant aggravation to succeed, this case – like many – turns on the third factor, which involves the evaluation whether a petitioner's preexisting condition was worsened by the vaccine. As discussed above, this does *not* merely entail determining that a petitioner was not facially "sick" before receiving the vaccine, but then was thereafter. *Hennessey*, 2009 WL 1709053, at *41-42. Rather (and stemming from the fact that a significant aggravation claimant inherently recognizes that his pre-vaccination condition has played some role in his post-vaccination state), the evidence must establish that the expected course of the Petitioner's condition was worsened due to vaccination. *Id*. The fact that a vaccine might transiently trigger a reaction that *exposes* the preexisting condition, or causes a temporary spike in symptoms, but does not otherwise cause the claimant's course to deviate from what would be expected, does not by itself establish that it has *worsened* the underlying condition overall. *Faoro*, 2016 WL 675491, at *2.

Here, the evidence does not support the conclusion that Petitioner's expected health outcome would have been more favorable absent vaccination than what he actually experienced. Petitioner relies heavily on the fact that he had his most serious stroke after (albeit on the same day as) vaccination – the temporal relationship. However, it is an established Program principle that timing alone is insufficient to show causation. *Grant v. Sec'y of Health & Human Servs.*, 956 F.2d 1144, 1148 (Fed. Cir. 1992) ("a proximate temporal association alone does not suffice to show a causal link between the vaccination and injury"). He offers little persuasive scientific or medical support for the proposition that a person with underlying "silent" strokes can be expected to be made worse by vaccination, and the scientific and medical evidence he offered was insufficient on this subject. At the same time, Dr. Leist cited some literature associating the flu vaccine with a *decreased* risk for stroke. First Leist Rep. at 4; Lavallée at 513.

The record also does not support the conclusion that the flu vaccine worsened Petitioner's subacute strokes/pro-thrombotic condition. None of Petitioner's treaters related his vaccination to his subsequent stroke in the first place – and those few references to the contrary in the record appear only to raise the association as a speculative possibility rather than as grounds for further evaluation or a basis for treatment.[13] The medical records otherwise do not establish a history that

[13] For example, one record references speculation by a treater that the flu vaccine's purported mercury content could have played a role in Petitioner's subsequent strokes (Ex. 4 at 157-59), but it is a fleeting reference. Beyond that, Petitioner has not embraced this concept in his causation theory – and for good reason too, given the poor treatment such an argument (that mercury in vaccines causes injury) has received in past cases. *See, e.g., Kolakowski v. Sec'y of*

could be persuasively argued stands in marked contrast to what Petitioner would have experienced but for the flu vaccine, and instead appears consistent with what a person who had experienced an initial, asymptomatic stroke would likely experience in the future.

Petitioner was unable to take advantage of his experts' opinions (as set forth in their respective reports) to remedy the evidentiary deficiencies that his literature could not satisfy. Although Drs. Axelrod and Kinsbourne have the backgrounds necessary to offer opinions in this case on the causation claim at issue, neither is a specialist in CVA or embolisms, and so their statements about what they personally deem likely in this case but for vaccination merit somewhat less weight than I would give to the statements of an expert with demonstrated experience with the illness in question. They could not draw upon personal experience treating stroke, for example, to opine that the flu vaccine would likely worsen a claimant's expected prognosis, or offer an interpretation of Mr. Hayward's record as revealing a course more negative than what would have been expected but for the vaccine.

C. Petitioner Has Not Demonstrated that the Flu Vaccine Can Cause Stroke or CVA

Petitioner's causation theory proposes that the flu vaccine can induce the production of cytokines, thereby causing inflammation sufficient to create a favorable environment for stroke. Mot. at 7. I was unable to find case law helpful on this point.[14] Petitioner's experts have offered reliable proof (particularly certain items of scientific literature) for some components of their theory. The problem with this evidence is that it does not go far enough, leaving unlinked propositions in the overall causation "chain", or overstating the findings for an otherwise-reliable item of medical/scientific literature.

For example, Dr. Axelrod relied heavily on Kashiwagi, a study whose central purpose (comparing the levels of inflammatory cytokines in the sera of vaccine recipients with febrile and non-febrile illnesses within 24 hours of vaccination) does not shed light on whether the particular kinds of cytokines observed in the study (and induced after receipt of *different* vaccines) could

Health & Human Servs., No. 99–625V, 2010 WL 5672753, at 140 (Fed. Cl. Spec. Mstr. Nov. 23, 2010) (concluding after extensive analysis that mercury-containing vaccines could not be shown to be sufficiently toxic to cause injury generally).

[14] There appear to be no decisions from the Vaccine Program favorable to a petitioner in which stroke was alleged to have been an aspect of the petitioner's injury. *See e.g.*, *Flores v. Sec'y of Health & Human Servs.*, No. 10-489V, 2013 WL 5587390 (Fed. Cl. Spec. Mstr. Sept. 12, 2013) (denying entitlement for a spinal cord infarction following the HPV vaccine because Petitioner did not have the "critical" genetic criteria to meet the causation theory), *mot. for rev. den'd*, 115 Fed. Cl. 157 (2014), *aff'd*, 586 Fed. App'x 588 (Fed. Cir. 2014); *Carrino v. Sec'y of Health & Human Servs.*, No. 08–266V, 2013 WL 3328903 (Fed. Cl. Spec. Mstr. June 6, 2013) (denying entitlement because Petitioner had not set forth a reliable theory to causally connect the flu vaccine to lateral medullary syndrome); *Francis v. Sec'y of Health & Human Servs.*, No. 99-286V 2000 WL 1517676 (Fed. Cl. Spec. Mstr. Aug. 31, 2000) (finding that petitioner had not met his burden in establishing that an encephalopathy occurred following the DTP vaccination administration precipitating a stroke); *Wilson v. Sec'y of Health & Human Servs.,* No. 90-795V, 1992 WL 118955 (Cl. Ct. May 15, 1992) (determining that there was not preponderant evidence that petitioner suffered an encephalopathy followed by a stroke and a brain injury after receiving the DTP vaccine).

cause the injury proposed herein (stroke/embolism/CVA). Kashiwagi at 677. Thus, however reliable Kashiwagi might be specifically when taken on its own terms, it alone does not provide the kind of preponderant evidence required for me to conclude that the flu vaccine could more likely than not induce a stroke via cytokine upregulation.

More broadly, and as I have noted in other cases in which the same theory (also espoused by Dr. Axelrod, and also supported by citation to Kashiwagi) was offered, the theory *itself* - that vaccine-induced cytokine upregulation can incite a disease process resulting in injury - has significant deficiencies. *See, e.g., Dean v. Sec'y of Health & Human Servs.,* No. 13-808V, 2017 WL 2926605 (Fed. Cl. Spec. Mstr. Jun. 9, 2017) (ruling on the record that the "cytokine storm" theory was not a persuasive causation theory explaining Petitioner's neurological deficits following the DTaP and Hib vaccines) *mot. for rev. den'd, slip op.* (Fed. Cl. Sept. 26, 2017); *Wolf v. Sec'y of Health & Human Servs.*, No. 14-342V, 2016 WL 6518581, at *13 (Fed. Cl. Spec. Mstr. Sept. 15, 2016) (dismissing claim on the record after determining that the proinflammatory cytokine expression theory was insufficiently reliable to explain how vaccination caused Petitioner's developmental impairments); *Godfrey v. Sec'y of Health & Human Servs.,* No. 10-565V, 2015 WL 10710961, at *10-14 (Fed. Cl. Spec. Mstr. Oct. 27, 2015) (insufficient reliable scientific evidence supported proposition that cytokine upregulation induced by HPV vaccine was pathogenic enough to cause juvenile ankylosing spondylitis), *mot. for review den'd, slip op.* (Fed. Cl. Apr. 29, 2016).

The concept that cytokine upregulation could encourage a disease process is rooted in the capacity of a vaccine to stimulate the innate immune system. For it to be persuasive from an evidentiary purpose, it would need to be linked to additional evidence showing *when* this occurs, with respect to *what* illnesses or diseases, and perhaps even that it has been observed with respect to *any* specific vaccine. It is not enough to twist the fact that increased numbers of inflammatory-associated cytokines have been measured in the context of certain injuries or illnesses (or are involved in the body's reaction to those illnesses) into a causal relationship, without the evidence required to do so.

Other literature was filed in this case in an attempt to support the argument that increased production of cytokines via the flu vaccination could cause a heart condition. As pointed out by Respondent's expert, Dr. Leist, however, much of it involves strokes following *infection* with the wild flu virus, or a live flu vaccine, and thus involves circumstances distinct from the killed-virus form of the flu vaccine that Petitioner received. First Leist Rep. at 4-5; Opp. at 17. Literature was also offered to support the contention that there was an observed increased level of cytokines following a stroke - although, as Dr. Leist correctly noted, the previously-undiscovered strokes Mr. Hayward experienced could also be responsible for the same inflammatory markers, and in any event there was no evidence *in this case* at all measuring these markers. First Leist Rep. at 4. And the evidence offered to link an increase in inflammatory cytokines to a prothrombotic environment was unpersuasive as well - not only because the cited studies did not draw a causal link between cytokines and strokes/blood clots, but also because the timelines proposed by the

studies (accepting arguendo that cytokines could cause a stroke) were actually longer than the timeframe at issue in this case. *See generally* Wiseman; Kimura at 1.

At the same time, *both sides* filed articles suggesting that the flu vaccine has been demonstrated to be *protective* against brain infarction, thereby further undermining Petitioner's overall showing. First Leist Rep. at 3; Lin; Lavallée. While I do not find that this concept was any "more likely than not" proven than Petitioner's causation theory, it raised points that needed to be rebutted or distinguished by Petitioner, since it tended to weaken his argument that the flu vaccine could be harmful to an individual who had already experienced a stroke. *McCollum v. Sec'y of Health & Human Servs.*, No. 14-790V, 2017 WL 5386613 (Fed. Cl. Spec. Mstr. Sept. 15, 2017) (even if petitioner was not required to submit epidemiological evidence in support of his claim, he nevertheless needed to rebut Respondent's relevant epidemiological evidence that was contrary to Petitioner's causation theory), *mot. for rev. den'd*, 35 Fed. Cl. 735 (Dec. 21, 2017), *appeal docketed*, Fed. Cir. (Feb. 28, 2018). If evidence exists establishing that the flu vaccine might be beneficial to similarly-situated individuals, it behooved Petitioner to deal with it persuasively.

Petitioner ultimately relies mostly on Petitioner's injury occurring so soon after vaccination to push his causation theory over the line. Dr. Axelrod's expertise, while sufficient to explain the theory, is not enough (based on his actual practice and experience) to give it the ballast needed for me to find it preponderantly supported. And while individual items of literature offered in support were scientifically reliable, the overall causation "chain" had too many missing, or weakly substantiated, links. Petitioner has not met the Program's preponderant evidentiary standard with respect to the first *Althen* prong.

D. Petitioner Cannot Satisfy the Remaining *Althen* Prongs.

Petitioner's obligation under the second and third *Althen* prongs is to demonstrate a logical sequence of cause and effect connecting the particular facts of his case to his medical theory, and to show that onset of his injury occurred in a medically appropriate timeframe consistent with his theory. *Sturdivant v. Sec'y of Health & Human Servs.*, No. 07-788V, 2016 WL 552529, at *18 (Fed. Cl. Spec. Mstr. Jan. 21, 2016) (discussing that *Althen* prong two requires a fact-based inquiry into whether the vaccine in question *did* cause the particular injury); *Bazan*, 539 F.3d at 1352 (discussing standards for prong three). Here, Petitioner failed to establish either prong, for several reasons.

With respect to the "did cause" prong, I have found that the overall record does not support the conclusion that the flu vaccine was causal of Petitioner's post-vaccination condition. Dr. Leist's reading of the relevant medical records on this point was persuasive; that record better supports the conclusion that Mr. Hayward's thromboembolic condition existed at the time of his vaccination, even if he had not yet experienced overt clinical symptoms. There is no evidence of the production of inflammatory cytokines either that would corroborate Petitioner's theory – and although Petitioner was admittedly never tested for such markers, even if he had been their presence could equally have been attributed to the prior strokes Petitioner had recently

experienced. In addition, none of Petitioner's treaters proposed his vaccination had any relationship to his stroke, and the medical record otherwise does not establish any immediate reaction to the vaccine, or evidence that Petitioner was experiencing a biologic reaction to the vaccine.

Regarding the third *Althen* prong, Petitioner hangs his hat on circular reasoning, concluding that the close timing of his injury (within 12 hours) to receipt of the flu vaccine establishes a reasonable timeframe. In fact the opposite is true - as the literature offered by Respondent (and discussed by Dr. Leist) established, it would likely take *longer* than half a day to generate sufficient cytokines to be pathologic in the manner proposed by Petitioner's theory. Dr. Leist also presented reliable medical literature establishing that even patients who are at-risk for CVA and exposed to agents that increase the production of cytokines do *not* experience a CVA event so close in time to their receipt of such treatment. *See generally*, Naina; First Leist Rep. at 6. This, plus the broader deficiencies with Petitioner's theory (which did not otherwise establish that the flu vaccine could either directly cause or exacerbate strokes), renders me unable to find that the timing at issue in this case of the alleged vaccine-induced stroke has been shown to be medically acceptable.

CONCLUSION

The record does not support Mr. Hayward's contention that the flu vaccine caused his CVA/stroke, that Petitioner's condition was significantly aggravated by the vaccine, or that the vaccine caused his injuries in a medically acceptable timeframe. Petitioner has not established entitlement to a damages award, and therefore I must **DISMISS** his claim.

In the absence of a timely-filed motion for review (see Appendix B to the Rules of the Court), the Clerk shall enter judgment in accordance with this decision.[15]

IT IS SO ORDERED.

/s/ Brian H. Corcoran
Brian H. Corcoran
Special Master

[15] Pursuant to Vaccine Rule 11(a), the parties may expedite entry of judgment by filing a joint notice renouncing their right to seek review.