ANC10MA068
MEDICAL RECORDS INFORMATION

SUMMARY: The pilot's FAA medical records documented that the pilot experienced an intracerebral hemorrhage in the right basal ganglia on March 22, 2006. The hemorrhage was noted on CT scan to reach a size of 2.7 x 3 x 3 cm with intraventricular extension. The pilot was hospitalized and initially had left sided weakness, confusion, disorientation, and sleepiness, but recovered quickly and was discharged home 6 days later. The pilot noted to a neurologist that for the summer following the hemorrhage "he just found his performance subpar … in the simulator … would feel like he was having to work unusually hard … situational awareness in the car was off …." No specific etiology was identified, though the pilot was noted to have "an extensive history of intracranial hemorrhages at young ages in the patient's father and several other family members." The pilot's blood pressure was normal. The pilot underwent a clinical neurology evaluation, and MRI scan and MR angiography, but no conventional angiography, no neuropsychiatric evaluation, no cognitive testing, and no cardiovascular evaluation prior to being granted an unrestricted Class 1 airman medical certificate by the Alaska FAA Regional Flight Surgeon in conjunction with an FAA aviation medical examination performed on March 26, 2008. There was no documentation of any internal FAA neurology consultation and no additional followup was required, though the pilot was cautioned that "operation of aircraft is prohibited at any time new symptoms or adverse changes occur."

Personal medical records that were not provided to the FAA included discharge notes from occupational and speech therapy immediately following the intracerebral hemorrhage that suggested "higher level cognitive testing via speech and neuropsych" and "speech therapy follow-up … prior to returning to work" and an outpatient neurology followup in which the pilot "was instructed to try and investigate into his family history more – obtaining whatever records he can, for further evaluation into the pathology of his family history." The pilot's applications for FAA medical certificate in October 2008 and December 2009 did not note a series of visits to a naturopathic practitioner in September 2008 for a left-sided facial twitch that was reported to have begun about a month prior to the stroke, and to get worse with stress or fatigue. The pilot noted to that practitioner that he had undergone "dental work" before the onset of the twitch.

The pilot's most recent New Zealand Civil Aviation Authority Application for a Medical Certificate dated 3/30/2009 did not note the pilot's personal or family history of intracerebral hemorrhage, and specifically denied any history of stroke in the pilot.

The Alaska State Medical Examiner's autopsy report noted "evidence of old hemorrhage and necrosis involving the right lateral ventricle extending focally into the caudate and posterior into the basal ganglia" and "no acute hemorrhage … identified," as well as "ballooning and thickening of the mitral valve with underlying subendocardial fibrosis." The cause of death was noted as "multiple blunt force injuries." A report of a second autopsy performed on the pilot by a private forensic pathologist at the request of the pilot's family noted that "many sections of brain are examined, and all are normal without evidence of old or recent hemorrhage or infarction" and identified microscopic evidence of "focal fatty infiltration in the superior interventricular septum" and "two large arterioles" with "marked fibromuscular hyperplasia." A report of a third autopsy

conducted by the Armed Forces Institute of Pathology at the request of the NTSB concluded that "no specific anatomic derangement was identified as a potential contributing factor to this mishap."

The following information was extracted by Dr. Mitchell A. Garber, NTSB Medical Officer, from the pilot's medical records maintained by the FAA Aerospace Medical Certification Division:

> 10/18/2005 – An application for 1st class Airman Medical Certificate noted "11. Occupation" as "Pilot" and "12. Employer" as "Alaska Airlines." Total Pilot Time was noted as "24,000+" hours "14. To Date" and "200+" for "15. Past 6 Months." The application indicated "No" in response to "17.a. Do You Currently Use Any Medication," to all items under "18. Medical History," and to "19. Visits to Health Professional Within Last 3 Years." The application indicated "No" for "60. Significant Medical History" and indicated "62. Has Been Issued Medical Certificate."
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> 3/25/2006 – A report of CT scan noted, in part, "There is essentially no change in size of intraparenchymal hemorrhage in the right basal ganglia, now measuring 2.7 x 3 x 3 cm (previously approximately 2.7 x 3 x 3). Ventricular size and configuration is unchanged, with intraventricular hemorrhage extension into the lateral, third, and fourth ventricles. There is likely mild hydrocephalus, unchanged. There is minimal leftward midline shift and mild mass effect on the right lateral ventricle that is also unchanged. …"
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> 3/28/2006 – Hospital discharge summary indicated, in part:
>
> > HISTORY OF PRESENT ILLNESS:
> > This 58-year-old right-handed man had left sided weakness. The wife reported they had intercourse around midnight and she was unsure if the symptoms started then because both of them were tired. The patient got up around 2 in the morning and appeared to be sleeping and bumped into the bathroom wall, was incontinent of urine. The wife helped him to the toilet. The patient was rubbing the right side of his neck and not responding to voice. He was talking gibberish. He has no history of stroke, hypertension or headache. He did vomit. …
> >
> > FAMILY HISTORY:
> > There is an extensive history of intracranial hemorrhages at young ages in the patient's father and several other family members. …
> >
> > HOSPITAL COURSE:
> > Right basal ganglia intracranial hemorrhage, which was post-coital and possibly secondary to transient hypertension. The patient does

> not have a history of hypertension and blood pressure was very well controlled while the patient was here. It is very concerning that there have been a number of family members with intracranial hemorrhages and there is possibly some underlying disorder. The patient was admitted to the ICU … initially quite sleepy but arousable for the first several days … continued to improve and CT scans did not demonstrate any progression … transferred to the acute care floor … continued to improve … was sleepy but had fairly preserved mental status ….
>
> DISPOSITION AND FOLLOW-UP:
> … discharged home to Alaska with his wife. He will follow up with his primary care provider within the next week or two, and also has plans to obtain a neurologist, who is a friend of his, for close follow-up. …will also return to Stroke Clinic … and prior to that appointment he will have an MRI of the brain and MR angiogram of the brain looking for an underlying etiology of his bleed. …

The discharge summary did not address the pilot's medical fitness for flight duties.

7/21/2006 – A report of MRI indicated, in part, "… There is a hyperintense area involving the right caudate nucleus and the right lentiform nucleus on T1 weighted image and GRE images measuring approximately 1.8 x 2.3 cm, which demonstrates peripheral hypointense rim on T2 weighted images, representing old parenchymal hemorrhage, compatible with the previously noted parenchymal hematoma on 3/25/06. Otherwise there is no abnormal parenchymal signal. No abnormal enhancement is present. There is no acute hemorrhage or acute infarction. … "

3/26/2007 – An outpatient neurology evaluation in Seattle indicated, in part:

> "[From neurology resident's note]… Patient is a 59-year-old gentleman with no previous past medical history who had a right-sided basal ganglia intracerebral hemorrhage back in March 2006. … returns today to the Neurology Outpatient Clinic for routine followup and reports that he has been doing well in the interval without any significant changes or complaints. … underwent repeat MRI of the brain with and without contrast on 7/21/2006. The brain MRI at that time showed an old parenchymal hemorrhage in the right basal ganglia … denies any history of strokes, seizures, changes to his vision, urinary incontinence, bowel incontinence, or significant changes to ambulation, gait, or other difficulties since he was last seen …
> IMPRESSION: … has recovered well, with no significant lasting neurologic complications, as evidenced in neurologic testing in

> previous followup and in today's followup … repeat MRI … negative for any changes. Patient denies any significant changes with regards to his vision, cognition … does not have a history of hypertension that would require the use of hypertensives and does not have a history indicative of hyperlipidemia or hypercholesterolemia which would warrant the use of statins. …
> RECOMMENDATIONS: … followup will be deferred to the patient's primary care provider. … There were no significant neurologic deficits or other concerns noted in today's followup … Patient was seen and discussed in detail with … attending neurologist.
>
> [From attending neurologist's note] … patient was last seen in May 2006 for followup of the intracerebral hemorrhage … no new neurologic symptoms since last seen. …
> IMPRESSION: … has no evidence of underlying vascular abnormality and has no hypertension or hypercholesterolemia at this point, and is neurologically asymptomatic. We have recommended no further followup or evaluation at this point …"

The outpatient neurology evaluation did not address the pilot's medical fitness for flight duties.

An application for 1st class Airman Medical Certificate dated the same date as the neurology evaluation indicated: "11. Occupation" as "Pilot" and "12. Employer" as "Alaska Airlines." Total Pilot Time was noted as 25,300 hours "14. To Date" with no entry for "15. Past 6 Months." The application indicated "No" in response to "17.a. Do You Currently Use Any Medication." It indicated "Yes" to "18.g. Heart or vascular trouble," to "18.l. Neurological disorders; epilepsy, seizures, stroke, paralysis, etc.," and to "18.u. Admission to hospital," and "No" to all other items under "18. Medical History." Under "19. Visits to Health Professional Within Last 3 Years" was indicated "Harborview Medical Center. Hemorrhagic Stroke." Under "60. Comments on History and Findings" was noted "Spontaneous intracranial hemorrhage 3/22/06 due to single aneurysm. Fully recovered. No other aneurysms found, see enclosed …." The application noted "No" for "60. Significant Medical History" and indicated "62. No Certificate Issued – Deferred for Further Evaluation." The aviation medical examiner location was noted as being in Anchorage (Item 64.).
4/4/2007 – A letter to the pilot from the Manager of the FAA Aerospace Medical Certification Division stated, in its entirety between the salutation and the closing:

> Your FAA application dated <u>March 28, 2007</u> was received in our office on <u>April 03, 2007</u>.
>
> We will begin processing your application once we have received the supporting documentation, annotated by your Aviation Medical

> Examiner (AME), which would be forwarded to our office by regular mail.
>
> If the information is not received within the next thirty (30) days, we will then process your file and notify you regarding what additional information is required, if any.
>
> Use of the above reference number(s) and your complete name on any correspondence or reports will aid us in locating your file.

4/16/2007 – an internal FAA electronic memo from a legal instrument examiner (non-physician reviewer) in the General Review section of the FAA Aerospace Medical Certification Division noted, in its entirety, "(physical examination 03-28-07) unissued. Commercial pilot. History of hemorrhagic stroke, 03-22-06. Received some medical records. To doctor."

5/7/2007 – an internal FAA electronic memo from the Alaska Regional Flight Surgeon noted, in its entirety, "airman with history of basal ganglia cerebrovascular accident in March 2006. Not hypertensive and no etiology for the cerebrovascular accident. Has family history of CVAs at relatively young ages. Has made good recovery but needs 2 year recovery period. Deny for history of cerebrovascular accident."

5/8/2007 – an internal FAA electronic memo from a legal instrument examiner (non-physician reviewer) in the General Review section of the FAA Aerospace Medical Certification Division noted, in its entirety, "(physical examination 03-28-07) Sending general denial cover and general denial; denying due to history of cerebrovascular accident, 2 year recovery period (03-08)."

5/10/2007 – A letter to the pilot from the FAA Alaska Regional Flight Surgeon stated, in its entirety between the salutation and the closing:

> We regret that due to your neurological condition (cerebral vascular accident), we have no alternative other than to deny your application for airman medical certification. Should you desire to request reconsideration of your case by the Federal Air Surgeon, the enclosed denial letter outlines the procedure.
>
> On advice of our consultants, our policy is to require an adequate recovery and rehabilitation period. The recommended recovery period is two years (March 2008).
>
> Use of the above reference numbers on future correspondence and/or reports will aid us in locating your file.

A second letter on the same date to the pilot from the FAA Alaska Regional Flight Surgeon stated, in part:

> Consideration of your application for airman medical certification and report of medical examination completed on March 28, 2007, discloses that you do not meet the medical standards as prescribed in Title 14 of the Code of Federal Regulations (CFR) , Section 67. Specifically under paragraph(s) or section(s) 67.109(b), 67.209(b), 67.309(b), Medical Standards and Certification, due to your neurological condition (cerebral vascular accident).
>
> Therefore, pursuant to the authority delegated to me by the Administrator of the Federal Aviation Administration (FAA), your application for issuance of an airman medical certificate is hereby denied. …

3/3/2008 – A local neurologist evaluation noted, in part:

> … Chief Complaint: Needs neuro evaluation for flight physical … very strongly right-hand dominant gentleman … events of interest started about two years ago in Seattle. … was fine about 1 a.m. … laid down and went to sleep and about an hour later he got up … but apparently was completely disoriented … very little recall of this entire day, which was a Wednesday. … apparently urinated on the floor and vomited … recalls being dizzy or disoriented. … wife summoned aid and the paramedics took him to Harborview. … got an MRI there and he recalls they started calling it a stroke. It was actually a hemorrhage. As part of the followup he had an MRI here April 7, 2006. We were able to pull that up and it did show a right basal ganglion intracranial hemorrhage. He reports he was worked up for vascular malformations in Seattle and that he had additional workup here, but Seattle was not satisfied with the images, so he went back down to Seattle … Apparently he had an MRA. … reports that his wife tells him that on that Wednesday his entire left side was not working very well. … By Thursday morning, however, he was doing a lot better. … He did not require any surgery. He was in the hospital for four to five days and sent home on no medications. He thinks they found his cholesterol was up slightly. He flew back to Anchorage and saw …[his primary care physician] a high school classmate of his. He got some blood work and a new MRI scan. That was apparently the MRI, the report of which I have in front of me, that Harborview was not satisfied with so he went back down to get additional images. He reports they looked very carefully at the blood vessels due to concern over an aneurysm.
>
> He does report that for the summer following this he just found his performance subpar. He would fly left seat in the simulator and he

would feel like he was having to work unusually hard and was a little more distractible, although apparently there was never any problem with his performance. He also felt his situational awareness in the car was off a little bit. He generally is aware of all the vehicles around him, but for several months when he would have to make a lane change real quick he would check to make sure there was not a vehicle in the way and there was sometimes a vehicle that he normally would have been aware of but was not. That has cleared up and he reports he has been back to normal for quite some time now. …

Family History: Father … several small strokes …

Social History: … retired from Alaska Airlines and eventually went to work for Conoco Phillips as a pilot and flight operations manager. … He talked about doing some contract flying for the fishing lodge on their Otter, but I was a little unclear on exactly when that transpired. …

Physical Examination …
Gait/Station: … no ataxia … no drift …
Motor: … no abnormal movements … Strength [noted as 5 for right and left in deltoid, biceps, triceps, wrist extensors, wrist flexors, interossei, iliopsoas, knee flexors, foot dorsiflexors and extensor hallucis longus]
Fine motor was intact, and there was no dyspraxia. There was praxis asymmetry in the hands consistent with his reported strong right-handedness.
Mental Status: The patient is awake, alert and oriented x 3. Recent and remote memory were intact. Attention span and concentration were intact. Language was without evidence of an aphasia. Fund of knowledge was appropriate for age and educational level.
Cranial Nerves: Visual fields full to confrontation. Discs sharp. Pupils equally round and reactive to light and accommodation. Extracoular movements full range and conjugate. Corneals intact. Facial sensation intact to pinprick and light touch. Masseter and temporalis muscles contract equally. Face moved strongly symmetrically. Hearing intact to finger tap and finger rub. Palate elevated in the midline, and gag was present bilaterally. Sternocleidomastoid and trapezius were 5 bilaterally. Tongue protruded in the midline and was strong on lateral deviations.
Sensation intact to pinprick and light touch in all four extremities.
Reflexes … [noted as 2+ right and left for biceps, triceps, brachioradialis, finger jerks, thigh adductors, ankle jerks, 3+ right and left for knee jerks] Toes downgoing.
Cerebellar: Without dysmetria in all four extremities.

> Assessment/Plan: A 60-year-old gentleman status post right basal ganglion intracerebral hemorrhage according to the MRI report I have from not quite two years ago. Per his report, he has been thoroughly evaluated with no clear etiology found. On examination today he appears entirely normal. I see no neurological deficits whatsoever, even knowing the location of the bleed and looking closely. The bleed itself apparently has been thoroughly evaluated. It is certainly in the location consistent with a hypertensive hemorrhage, but he is not hypertensive today and tells me has never been. We will have him sign an information release to get a copy of today's report to both his aviation medical examiner, … as well as to the FAA's district flight surgeon, …. Followup as needed.

The local neurology evaluation did not address the pilot's medical fitness for flight duties.

3/26/2008 – An application for 1st class Airman Medical Certificate indicated "11. Occupation" as "Pilot/Manager" and "12. Employer" as "Conoco Phillips Alaska." "Total Pilot Time" was noted as 28,600 hours "14. To Date" and 0 hours in the "15. Past 6 Months." The application indicated"No" in response to "17.a. Do You Currently Use Any Medication." The application indicated "Yes" to "18.g. Heart or vascular trouble," to "18.1. Neurological disorders; epilepsy, seizures, stroke, paralysis, etc.," and to "18.u. Admission to hospital," and "No" to all other items under "18. Medical History." Under "18. Explanations" was noted "Cerebral Vascular Event 3-21-06. Reapplied after 12 months in error and medical certificate denied due to applicability of 24 month requirement following event." The application noted "Yes" to "19. Visits to Health Professional Within Last 3 Years," and indicated "See above." Under "60. Comments on History and Findings" was noted "Patient had a tiny CVA [cerebrovascular accident] 2 years ago (3-21-06). He has fully recovered. Recent neurological evaluation by [local neurologist] was completely normal. See enclosed report. Recommend patient be granted 1st Class Medical." The application noted "Yes" for "60. Significant Medical History" and indicated "62. No Certificate Issued – Deferred for Further Evaluation."

4/7/2008 – A letter to the pilot from the Manager of the FAA Aerospace Medical Certification Division stated, in its entirety between the salutation and the closing:

> Your FAA application dated March 26, 2008 was received in our office on April 03, 2008.
>
> We will begin processing your application once we have received the supporting documentation, annotated by your Aviation Medical Examiner (AME), which would be forwarded to our office by regular mail.

> If the information is not received within the next thirty (30) days, we will then process your file and notify you regarding what additional information is required, if any.
>
> Use of the above reference number(s) and your complete name on any correspondence or reports will aid us in locating your file.

4/8/2008 – an internal FAA electronic memo from the Alaska Regional Flight Surgeon noted, in its entirety, "60 year old airman status post cerebrovascular accident as noted, now 2 years out from the incident. No recurrence and neurology report entirely normal. OK to issue with warning."

4/9/2008 – A letter to the pilot from the FAA Alaska Regional Flight Surgeon stated, in its entirety between the salutation and the closing:

> Our review of your medical records has established that you are eligible for a first-class medical certificate.
>
> Enclosed is your certificate which requires your signature.
>
> You are cautioned to abide by Title 14 of the Code of Federal Regulations (CFR's), Section 61.53, relating to physical deficiency. Because of your cerebrovascular accident, operation of aircraft is prohibited at any time new symptoms or adverse changes occur.
>
> Use of the above reference numbers on future correspondence and/or reports will aid us in locating your file.

10/14/2008 – An application for 1st class Airman Medical Certificate indicated "11. Occupation" as "Pilot" and "12. Employer" as "Conoco Phillips Alaska." "Total Pilot Time" was noted as 28,900 hours "14. To Date" and 300 hours in the "15. Past 6 Months." The application indicated "No" in response to "17.a. Do You Currently Use Any Medication." and "No" to all items under "18. Medical History," including specifically "18.g. Heart or vascular trouble," "18.1. Neurological disorders; epilepsy, seizures, stroke, paralysis, etc.," and "18.u. Admission to hospital." Under "18. Explanations" was noted "No change." The application noted "Yes" to "19. Visits to Health Professional Within Last 3 Years," and indicated "Detailed on application 3/26/2008 No Change." The electronic version of the application submitted to the FAA indicated "No" to "19. Visits to Health Professional Within Last 3 Years." Under "60. Comments on History and Findings" was noted "Patient had a tiny CVA 3/21/06. Completely resolved. No further surgery. Work up with [local neurologist] is normal and patient was granted full flying privileges April 9, 2008" The application noted "Yes" for "60. Significant Medical History" and indicated that the pilot "62. Has Been Issued Medical Certificate."

12/1/2009 – The pilot's most recent application for 1st class Airman Medical Certificate indicated "11. Occupation" as "Pilot/Manager" and "12. Employer" as "Conoco Phillips." "Total Pilot Time" was noted as 29,580 hours "14. To Date" and 45 hours in the "15. Past 6 Months." The application indicated "No" in response to "17.a. Do You Currently Use Any Medication." It indicated "Yes" to "18.1. Neurological disorders; epilepsy, seizures, stroke, paralysis, etc." and "No" to all other items under "18. Medical History," including specifically "18.g. Heart or vascular trouble" and "18.u. Admission to hospital." Under "18. Explanations" was noted "No change." The application noted "Yes" to "19. Visits to Health Professional Within Last 3 Years," and indicated only a June 2009 visit to an orthopedic surgeon to "Repair torn Achilles tendon." Under "60. Comments on History and Findings" was noted "3+ years status post minor stroke. Fully recovered. No further problems. Seen for torn Achilles tendon repair 06/2009." Height was noted as 68 inches and weight as 173 pounds. Distant vision was noted as 20/100 in the right eye, 20/70 in the left eye, and 20/70 in both eyes together, all corrected to 20/20. Near vision was noted as 20/60 in the right eye, 20/60 in the left eye, and 20/60 in both eyes together, all corrected to 20/40. Intermediate vision was noted as 20/70 in the right eye, 20/70 in the left eye, and 20/70 in both eyes together, all corrected to 20/40. The type of lenses used for correction during the examination were not noted. The application noted "Yes" for "60. Significant Medical History" and that the pilot "62. Has Been Issued Medical Certificate." The Medical Certificate noted the limitation: "Holder shall wear lenses that correct for distant vision and possess glasses that correct for near and intermediate vision."

The FAA records did not contain complete hospitalization records, any documentation of or requests for formal cognitive or psychomotor testing, any documentation of or requests for electroencephalography (EEG), any documentation of or requests for imaging performed after July 2007 or neurology evaluation performed after March 2008, any FAA neurology consultation, any documentation of or requests for reports from the pilot's magnetic resonance angiography study, or any documentation of or requests for conventional angiography evaluation. There were no indications in the FAA medical records of any electrocardiographic abnormalities or cardiac symptoms.

The following information was extracted by Dr. Mitchell A. Garber, NTSB Medical Officer, from the pilot's medical records maintained by the New Zealand Civil Aviation Authority Medical Unit:

1/9/2006 – An Application for a Medical Certificate had "N" circled for all items under "20. Medical History." Under the inquiry "26. Family History: Have any members of your family had vascular disease, hypertension, diabetes, heart disease, psychiatric disease or neurological disease? (Please mention age)" is noted "Father – Cerebral Hemorrhage (1982) 64." For "29. VISIT to health

professional within last 3 years?" is noted "No." Above the pilot's signature is, in part, the statement:

> I acknowledge and understand the following: … That I have obligations under the Civil Aviation Act 1990, in relation to … advising a medical examiner or reporting to the Director if I become aware of, or suspect that there is any change in my medical condition or the existence of a previously undetected medical condition that may interfere with the safe exercise of the privileges to which my medical certificate relates, I understand that … The making or causing to be made of any fraudulent, misleading, or intentionally false statement for the purpose of obtaining a medical certificate constitutes an offence under section 46B of the Civil Aviation Act 1990, and is subject, in the case of an individual, to imprisonment for a term not exceeding 12 months or to a fine not exceeding $10,000. … The failure to notify Director of any change in medical condition or the existence of a previously undetected medical condition constitutes an offence under section 46C of the Civil Aviation Act 1990, and is subject, in the case of an individual, to imprisonment for a term not exceeding 12 months or to a fine not exceeding $5,000. I have read this application form, familiarised myself with it and understood its contents, including the consent and acknowledgement … I confirm that all the information that I have entered onto this form is true and accurate in all respects:

A "New Zealand Civil Aviation Authority Class 2 Medical Certificate" was noted as having been signed by the Medical Examiner on 1/9/2006 and a Class 2 Expiry Date was noted as 1/8/2007.

3/30/2009 – An Application for a Medical Certificate had neither "Y" nor "N" circled under "20. Medical History: Have you ever experienced any of the following?" for "20.35 Any other neurological disorder," "20.55 Rejection or premium loading for life or health insurance," and "20.57 Admission to hospital, psychiatric, or inpatient facility." The application had "N" circled for all other items under "Medical History: Have you ever experienced any of the following?," including specifically "20.18 Vascular problem," "20.33 Stroke," "20.60 Investigation for any disorder," and "20.63 Any other illness, disability, debility, infirmity, treatment or surgery." Under the inquiry "24. Family History: Have any members of your family had vascular disease, hypertension, diabetes, heart disease, psychiatric disease or neurological disease? (Please mention age)" is noted "No." For "27. Have you VISITED a health professional within last 3 years?" is noted visits only to a physician (identified in records submitted to the FAA as the pilot's primary care provider) on 4/10/2006 for "check up and blood work" and to a physician (identified in FAA medical records as the pilot's most recent aviation medical examiner) on 10/14/2008 for "FAA medicals and EKGs for first class certificate." Above the pilot's signature is, in part, the statement:

> I acknowledge and understand the following: … That I have obligations under the Civil Aviation Act 1990, in relation to … advising a medical examiner or reporting to the Director if I become aware of, or suspect that there is any change in my medical condition or the existence of a previously undetected medical condition that may interfere with the safe exercise of the privileges to which my medical certificate relates, and … the making or causing to be made of any fraudulent, misleading, or intentionally false statement for the purpose of obtaining a medical certificate constitutes an offence under section 46B of the Civil Aviation Act 1990, and is subject, in the case of an individual, to imprisonment for a term not exceeding 12 months or to a fine not exceeding $10,000, and … the failure to notify Director of any change in medical condition or the existence of a previously undetected medical condition constitutes an offence under section 46C of the Civil Aviation Act 1990, and is subject, in the case of an individual, to imprisonment for a term not exceeding 12 months or to a fine not exceeding $5,000. I have read this application form, familiarised myself with it and understand its contents, including the consent and acknowledgement … I confirm that all the information that I have entered onto this form is true and accurate in all respects:
>
> A "New Zealand Civil Aviation Authority Class 2 Medical Certificate" was noted as having been signed by the Medical Examiner on 4/1/2009 and a Class 2 Expiry Date was noted as 4/1/2011.

The following information was extracted by Dr. Mitchell A. Garber, NTSB Medical Officer, from the pilot's personal medical records:

> 3/29/2006 – Occupational Therapy Discharge Summary and Recommendation noted, in part, "… At this time, patient performs basic activities of daily living such as dressing and bathing with stand-by assistance and set-up, patient requires stand by assistance with minimum verbal cues for simple meal preparation secondary to decreased attention/concentration, visual/perceptual skills, reaction time, and ability to multi-task. Anticipate patient would benefit from 24 hour supervision at home with outpatient occupational therapy vs. short stay daily intensive. Anticipate patient would also benefit from higher level cognitive testing via speech and neuropsych."
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> Speech Pathology Discharge Summary and Recommendation noted, in part, "… Patient presents with mild cognitive-communication impairment characterized by deficits in attention/concentration, verbal fluency, and problem-solving. Recommend patient discharge home with 24-hour supervision with outpatient speech therapy follow-up. Given patient's high-level occupation, recommend speech therapy follow-up occur prior to returning to work …"

There are no indications that the pilot had any Occupational Therapy or Speech Pathology follow-up after discharge or that he had any formal cognitive or neuropsychiatric testing prior to returning to work. The Occupational Therapy and Speech Pathology Discharge Summaries and Recommendations were not present in the pilot's FAA medical records.

4/7/2006 – A report of magnetic resonance angiography requested by the pilot's primary care physician and performed at a center in Anchorage noted:

> TECHNIQUE: An MR angiogram was performed through the circle of Willis, using noncontrast time of flight technique. 3D MIP images are also submitted for interpretation.
>
> FINDINGS: There is a 4 cm diameter focus of intense signal on the axial diffusion weighted images centered in the right basal ganglia. This would be consistent with the patient's known history of cerebral hemorrhage. Internal carotid arteries, distal vertebral arteries, basilar artery and anterior, middle and posterior cerebral arteries are normal in caliber without evidence of stenosis or aneurysm.
>
> IMPRESSION: RIGHT BASAL GANGLIA INTRACRANIAL HEMORRHAGE. NO VISIBLE ANEURYSM.

The report of magnetic resonance angiography was not present in the pilot's FAA medical records.

5/2/2006 – Outpatient neurology evaluation in Seattle noted, in part, "… very pleasant man who was admitted … for a post-coital right sided basal ganglia intracerebral hemorrhage of unclear etiology. He states that he has been doing very well in the interim, with no residual neurologic deficits or complaints. He had a magnetic resonance angiogram performed in Anchorage, where he and his wife travelled from today, in early April to assess for vascular abnormalities that may have caused the bleed, especially given his strong family history of intracerebral hemorrhage – his paternal uncle died at 36 years old in 1964 of an intracerebral hemorrhage and his father also had an intracerebral hemorrhage at 65 years old in 1963, with several subsequent strokes. It is unclear if these were caused by aneurysms vs. other structural abnormalities or whether there is a genetic component to this. The patient and his wife are concerned today regarding prevention of further events and whether their children are at any risk given the seeming family predilection for intracerebral hemorrhages. … patient is doing quite well without remaining neurologic deficit. His main concern is the potential genetic component of his event and what to do for prevention in himself and his children. Given the location of his event, aneurysm is less likely, and none were seen on magnetic resonance angiography. Some sort of cavernous abnormality may be present, which could have a genetic component and may explain his intracerebral hemorrhage in the setting of no risk factors (he is

normotensive with normal lipids, nonsmoker, etc). He was instructed to try and investigate into his family history more – obtaining whatever records he can, for further evaluation into the pathology of his family history. In the meantime, he will also get an MRI of his brain to further evaluate any potential parenchymal abnormalities that may be an underlying cause of his bleed. He can discontinue the atenolol given his normotensive state and lack of any documented hypertension before or during his course. The atorvastatin may also be stopped as it is unclear of the acute benefit of this in relation to prevention of intracerebral hemorrhage rather than ischemic stroke. …" This outpatient neurology evaluation was not present in the pilot's FAA medical records.

8/4/2006 – Primary care physician's notes indicate, in part, "Discussed via phone with [neurologist in Seattle] – MRI repeated shows no new findings – discussed followup primarily in Anchorage … family history: … father – 77, cerebral hemorrhage at 63 – 3 hemorrhages since … other relatives – paternal uncle died of cerebral hemorrhage at 36. Paternal aunt had cerebral hemorrhage at 65, okay now. …" There are no subsequent primary care physician's notes in the records reviewed.

3/3/2008 – Local neurologist's records consisted entirely of the evaluation noted above in the pilot's FAA medical records.

9/3/2008 – Naturopathic practitioner notes indicated, in part, "Wife sent him to be looked at … 2 years ago … cerebral hemorrhage … in Seattle … within 2 days could talk again … back up to Alaska … 2 year FAA took class 1 license away – now has it back. Could not scan instruments in cockpit – did not have good situational awareness driving – constant surprises. Slowly got better and better. Simulator check last spring – went well. Chief complaint: Facial twitches, left cheek probably started before hemorrhage – persists. Work at Alaska Air not good – chief pilot micromanaging him – stress. Worse with stress, tired, loss of focus. Now working as aviation manager for Conoco Phillips. In contentious argument, will start to fire. High frequency twitch. If open eyes really wide it can stop. Also by pinning the muscle. Will make eye closed. Onset a month before hemorrhage – no change at all since then. No change with cold – has had frost bite 20 years ago flying Iditarod. Never at night – at least does not wake him. Usually only when eyes open – can stop if relax face, close eye. Worse if smile. … with stroke – no indication of cause … family history – dad had hemorrhage in 83 at 65 years of age and temporal headache, then subsequent strokes. His brother died of hemorrhage. Blood pressure issues? – not aware of any … cholesterol at 129 … put on Lipitor [atorvastatin] and atenolol – never took them, never has. No medications. … had dental work … before twitch started. Energy is usually good unless bogged down. Tinnitus – a high frequency – loss on testing – not bothersome. One time bad left ear issue flying with cold – since then difficulty clearing x 10 years. … Assessment: fasciculation, fatigue, history of stroke … Multi System Examination … increased masseter muscle tone left compared with right. … good balance eyes open/eyes closed right foot, poor

balance eyes open/eyes closed left foot. No spasm noted in cheek during exam – at end of talking – slight contraction of left eye – squint."

9/5/2008 – Naturopathic practitioner notes indicated, in part, "Facial spasm – still notices it's worse with fatigue and concentration. Sometimes but not always smiling will trigger if late in the evening. … facial spasm, muscle spasm, restricted range of motion upper back … craniosacral therapy x 60 minutes to relieve restrictions …"

9/11/2008 – Naturopathic practitioner notes indicated, in part, "Chief complaint – Twitches. No huge changes. On afternoon after treatment – less tendency for cheek to twitch but changes based on fatigue/confrontation and smiling. … facial spasm, limited range of motion T-spine, muscle spasm … craniosacral therapy x 55 minutes to relieve restriction … slight twitch following treatment left cheek. …"

9/18/2008 – Naturopathic practitioner notes indicated, "Repertorization [homeopathic remedy selection] for twitch. Consider: Zinc … Kali-M … lachesis. …" There were no further entries in the naturopathic practitioner records.

There were no indications in the personal medical records reviewed of any electrocardiographic abnormalities or cardiac symptoms, including palpitations. The FAA medical records did not contain any records of the naturopathic practitioner visits, or any references to such visits.

The following information was extracted by Dr. Mitchell A. Garber, NTSB Medical Officer, from the report of autopsy performed on the pilot by the Alaska Chief Medical Examiner:

Under "Final Pathologic Diagnoses" was noted:

1. Blunt force injury of head and neck.
    A. Cutaneous lacerations, abrasions, and contusions.
    B. Fracture of 4th cervical vertebra.
2. Blunt force injury of trunk.
    A. Multiple bilateral rib fractures and sternum fracture.
    B. Pericardial hemorrhage, epicardial hemorrhage, and hemorrhage surrounding left anterior descending coronary artery.
    C. Liver laceration.
    D. Crushing pelvic fractures with crush injury of all pelvic structures and vessels.
3. Blunt force injury to extremities.
    A. Cutaneous contusions, abrasions, and lacerations.
    B. Open fracture of left tibia and fibula, and right tibia.

Under "Opinion" was noted, in part, "The cause of death in this 62-year-old man is due to multiple blunt force injuries of the head, neck, trunk, and extremities.…"

Under "External Evidence of Injuries" was noted, in part, "There is a large laceration extending from the left medial eyebrow region superiorly to the left occipital scalp, to measure approximately 10 inches in length with undermining of the lateral margin. The calvarium is exposed but appears intact. There are multiple surrounding abrasions. There is a 1/4-inch laceration above the glabella with an irregular 0.75-inch abraded laceration seen at the glabella. Below this, on the nose, is an additional 1/4-inch laceration with contusion. There is a palpable fracture of the nose. Laceration is seen involving the left lateral eyelid and eyebrow region with surrounding contusion. …"

Under "Internal Examination" was noted, in part:

> HEAD
>
> Reflection of the SCALP shows the usual scattered reflection petechiae. The calvarium is intact. Removal of the calvarium in the usual fashion shows the epidural space to be normal. Likewise, no collections of subdural blood are present. The BRAIN is removed in the usual manner and weighs 1450 grams. The LEPTOMENINGES are smooth and glistening, and the gyri demonstrate their usual orientation and configuration. The vessels at the base of the brain are normally disposed and no anomalies are identified. Serial sections of the brain show the cerebral cortical ribbon to be intact. There is evidence of old hemorrhage and necrosis involving the right lateral ventricle extending focally into the caudate and posterior into the basal ganglia. No acute hemorrhage is identified. The usual anatomic landmarks of the cerebrum, midbrain, cerebellum, pons and medulla demonstrate no abnormalities. Removal of the DURA from the base of the skull shows the usual anatomical features without abnormalities. The pituitary fossa is unremarkable. The foramen magnum demonstrates the normal orientation and the first portion of the spinal cord at the level of the transection as viewed through the foramen magnum is unremarkable. …
>
> CARDIOVASCULAR SYSTEM
>
> The HEART weighs 430 grams. Examination of the epicardium shows it to be intact. The chambers demonstrate their usual shape and configuration. The CORONARY ARTERIES are normally disposed. There is minimal mild concentric calcifying atherosclerosis of all 3 major coronary arteries. Cut surfaces of the MYOCARDIUM show a normal color and no thickening of the ventricular wall is identified. There is some yellow-tan discoloration around the left papillary muscles. The VALVES are intact with the usual anatomic relationships, except for ballooning and thickening of the mitral valve with underlying subendocardial fibrosis. The

> AORTA follows its usual course and the origins of the MAJOR VESSELS are normally disposed and unremarkable. The GREAT VESSELS of the venous return are in their usual positions and unremarkable.
>
> RESPIRATORY TRACT SYSTEM
> The LARYNX and TRACHEA show no abnormalities and are continuous in the usual manner with the primary BRONCHI. The secondary and tertiary BRONCHI likewise are unremarkable. The RIGHT LUNG weighs 550 grams and the LEFT LUNG weighs 400 grams. The lungs are collapsed bilaterally. The PLEURAL SURFACES are smooth and glistening. Cut surfaces show mildly congested, deep red to pink parenchyma with no evidence of natural disease or injury. There is no consolidation or enlargement of the air spaces. The PULMONARY VESSELS are normally disposed and unremarkable. …
>
> GASTROINTESTINAL TRACT
> The PHARYNX and ESOPHAGUS are unremarkable and the STOMACH contains approximately 200cc of partially-digested and masticated food. The mucosal lining of the stomach is intact and is continuous into a normal duodenum and small bowel. The SMALL and LARGE INTESTINE are unremarkable and the APPENDIX is not visualized. (No external scar identified). …

The following information was extracted by Dr. Mitchell A. Garber, NTSB Medical Officer, from the report of a second autopsy performed on the pilot by a private forensic pathologist at the request of the pilot's family:

> Under "External Exam" was noted, in part, "… Both legs are fractured immediately below the knees. Ankles are intact. A laceration is present in the left groin which is approximately 8 cm in length. It communicates with the markedly comminuted left pelvis. The iliac artery was found to be disrupted by the embalmer."
>
> Under "Internal Exam" was noted, "All organs have been thoroughly dissected by the medical examiner. Except for the cardiac ventricles which were not found, all organs appeared to have been normal. Specifically, many sections of brain are examined, and all are normal without evidence of old or recent hemorrhage or infarction."
>
> Under "Microscopic" was noted, "Cardiovascular System: Sections of myocardium show focal fatty infiltration in the superior interventricular septum. Two large arterioles in the base of one trabecula show marked fibromuscular hyperplasia. Neither AV node nor Bundle of His is definitely recognizable, but

> one small mass of fat is in a suggestive location. Bundle branch fibers are seen in one section which appear normal."

The following information was extracted by Dr. Mitchell A. Garber, NTSB Medical Officer, from the report of a third autopsy performed on the pilot by the Armed Forces Institute of Pathology at the request of the NTSB:

> Under "Opinion" was noted, "This 62 year old male civilian pilot died of multiple blunt force injuries as a result of the ground impact of his aircraft. Traumatic injuries included probable skull fracture with bleeding in the brain as well as cervical, rib, lumbar, pelvic, and left lower extremity fractures. Review of the available medical records revealed a history of CVA [cerebrovascular accident] in 2006. Examination of the available brain tissue showed the presence of a focal area of chronic infarction (remote CVA) without evidence of recent extension. The findings of acute hemorrhage and hypoxic/ischemic neuronal injury were most likely related to traumatic head injury and perimortem interval. Examination of the available heart tissue revealed no significant pathology. Postmortem toxicological examination was negative. Although investigative information reported suspected recent behavioral changes, no specific anatomic derangement was identified as a potential contributing factor to this mishap. The manner of death has been classified as accident. This case has been reviewed in consultation with the Divisions of Neuropathology and Cardiovascular Pathology."