NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

January 29, 2021

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Medical Officer

A. ACCIDENT: ANC20LA074AB; Soldotna, AK

On July 31, 2020, about 0827 Alaska daylight time, a de Havilland DHC-2 (Beaver) airplane, N4982U, and a Piper PA-12 airplane, N2587M, were involved in an accident near Soldotna, Alaska. The pilots of both airplanes and the five passengers on the DHC-2 were fatally injured. The DHC-2 was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 135 on-demand charter flight. The PA-12 was operated as a Title 14 *CFR* Part 91 personal flight.

B. GROUP IDENTIFICATION

No group was formed for the medical evaluation in this accident.

C. DETAILS OF INVESTIGATION

1. Purpose

This investigation was performed to evaluate the pilots of both aircraft for medical conditions, the use of medications/illicit drugs, and the presence of toxins.

2. Methods

The pilots' autopsy and toxicology reports were reviewed, as were their Federal Aviation Administration (FAA) medical certification files, and the FAA medical case review. Pre-accident medical records of the Piper pilot were reviewed, including selected ophthalmology, optometry, and primary care records, and records from the Piper pilot's most recent commercial driver medical examination. Investigator reports and relevant regulation and medical literature were also reviewed.

3. Findings

a. Piper Pilot

I. FAA Medical Certification File/Medical Case Review

According to FAA medical certification records, the 63-year-old male Piper pilot had his last aviation medical examination on March 13, 2012. At that time, he was seeking second-class medical certification, and reported 1600 total civilian flight hours. He was 70 inches tall and weighed 243 pounds. He reported using no medications. He reported a history of glaucoma diagnosed in 2011, doing well after surgery, and right eye cataract in 2012.[1] At his examination, his visual acuity was assessed and met the regulatory standards for second-class medical certification (with corrective lenses).[2] His field of vision was noted to be normal.[3] He passed color vision testing. No abnormal physical findings were noted, but, due to his newly reported significant medical history, issuance of his medical certificate was deferred to the FAA.

In March 2012, the FAA received an eye evaluation report from the Piper pilot's ophthalmologist. In this report, the ophthalmologist noted that the Piper pilot had medically controlled open-angle glaucoma with visual field

[1] No reviewed FAA records from before the March 13, 2012 examination documented any eye or vision trouble except corrective lenses. The Piper pilot's previous aviation medical examination had been July 2, 2010.

[2] Visual acuity is sharpness of vision. It is commonly measured by having a person attempt to discern characters of standard sizes at a standard distance, while looking directly at the characters with one or both eyes. Visual acuity is expressed as 20/#, meaning that a person can clearly discern characters at a 20-foot distance that a person with normal vision can discern from a #-foot distance. For example, a person with 20/100 vision needs to be within 20 feet to discern the same characters that a person with normal vision can see at 100 feet. FAA standards for first- and second-class medical certification (14 *CFR* 67.103 and 14 *CFR* 67.203) state that a pilot must have distant visual acuity of 20/20 or better, and near vision (measured at 16 inches, and, if age 50 or older, also at 32 inches) equivalent to 20/40 or better, in each eye separately, with or without corrective lenses. FAA standards for third-class medical certification (14 *CFR* 67.303) state that a pilot must have distant visual acuity of 20/40 or better, and near vision (measured at 16 inches) equivalent to 20/40 or better, in each eye separately, with or without corrective lenses. For any class, if corrective lenses are needed to meet the distant vision standard, the lenses must be worn while exercising pilot privileges.

[3] A visual field is the entire area that an eye can see while it is fixated on a central stationary point. There are several methods for testing visual fields. Confrontation testing is widely used to screen for visual field abnormalities because the method, although known to be unreliable, requires no special equipment. In this method, the examiner typically holds up fingers in each of four quadrants of the examinee's visual field while the examinee, with one eye covered, looks at the examiner's nose and reports what the examinee sees. For example, the examinee may be asked to count the number of fingers, state where moving fingers first become visible, or identify which fingers are wiggled. A test object moved against a contrasting background (kinetic target) may also be used. The FAA Guide for Aviation Medical Examiners describes acceptable techniques of visual field examination including using a kinetic target or (less acceptably) confrontation testing with moving fingers. More-reliable formal/automated methods are also acceptable, but require specialized resources. The visual field examination technique used during the Piper pilot's last aviation medical exam was not specified in the reviewed records.
[Federal Aviation Administration. Application process for medical certification – examination techniques item 53 field of vision. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item53/et/. Updated March 7, 2011. Accessed January 25, 2021.]
[Johnson LN, Baloh FG. The accuracy of confrontation visual field test in comparison with automated perimetry. *J Natl Med Assoc*. 1991;83(10):895-898.]
[Kerr NM, Chew SSL, Eady EK, Gamble GD, Danesh-Meyer HV. Diagnostic accuracy of confrontation visual field tests. *Neurology*. 2010;74(15):1184-1190. doi:10.1212/WNL.0b013e3181d90017.]

loss in both eyes, had undergone previous laser surgery for glaucoma in both eyes (left eye September 24, 2010, and right eye October 8, 2010), and required ophthalmology followup every 4 months. Attached results from automated visual field testing supported the documentation of reduced visual fields in both eyes.

Based on this, the Alaska Regional Flight Surgeon sent a denial letter to the Piper pilot dated June 18, 2012. The letter stated that the Piper pilot did not meet the general medical standards for first-, second-, or third-class medical certification, specifically as prescribed in 14 *CFR* 67.113(b), 67.213(b), and 67.313(b), due to his glaucoma and visual field loss.[4]

Following that denial, the Piper pilot requested reconsideration. The FAA received an ophthalmological evaluation for glaucoma form from the Piper pilot's ophthalmologist, dated July 2, 2012. This form again noted the open-angle glaucoma diagnosis, with reduced visual fields in both eyes as supported by attached repeat automated visual field testing. The form noted that the Piper pilot's cup-to-disc ratios were 0.9 horizontally and vertically in both eyes.[5] The form noted that intraocular pressures (IOPs, the pressures within the eyes) were well controlled off medications following laser surgery, and that visual acuity was 20/20 (or equivalent) for uncorrected distant, corrected distant, and corrected near vision in the right eye, left eye, and both eyes (uncorrected distant visual acuity in the right eye was 20/20 with two characters missed).[2] The form also noted that the Piper pilot had undergone right eye cataract surgery on April 4, 2012.

Based on that form, and on the rest of the Piper pilot's FAA medical certification file, the Aerospace Medical Certification Division sent another denial letter to the Piper pilot, dated July 23, 2012. The letter

[4] 14 *CFR* 67.113(b), 67.213(b), and 67.313(b) state that (for first-, second-, and third-class medical certification, respectively) a pilot must have "No other organic, functional, or structural disease, defect, or limitation that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds – (1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or (2) May reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges."

[5] Cup-to-disc ratio is used to assess optic nerve damage in glaucoma. Neurons that carry the visual information from the eye to the brain converge at the back of the eye to form the optic nerve, exiting through the back of the eye in a circle called the "disc." The circle of exiting neurons has a space at the center called the "cup." As neurons are lost from the optic nerve due to nerve damage, the cup gets larger, and the cup-to-disc ratio increases. A cup-to-disc ratio of 0.9 means that the cup diameter takes up about 90% of the diameter of the disc, with neurons accounting for about 10% of the diameter of the disc. The average normal cup-to-disc ratio is somewhere around 0.3 but there is variability among individuals. As cup-to-disc ratio increases, so does the likelihood that glaucoma-related optic nerve damage has occurred; a cup-to-disk ratio of 0.7 or greater is roughly 14 times more likely to be associated with glaucoma than it is to be found in an eye without glaucoma.
[Hollands H, Johnson D, Hollands S, Simel DL, Jinapriya D, Sharma S. Do findings on routine examination identify patients at risk for primary open-angle glaucoma? The rational clinical examination systematic review. *JAMA*. 2013;309(19):2035-2042. doi:10.1001/jama.2013.5099.]

sustained the previous (June 18, 2012) denial due to glaucoma and visual field loss.

The Piper pilot made no further requests for reconsideration of his application for airman medical certification.[6]

II. Pre-Accident Medical Records

i. Ophthalmology and Optometry Records

Records since 2012 were reviewed from the Piper pilot's ophthalmologist and from two optometry practices. Those records showed that the Piper pilot had open-angle glaucoma in both eyes, had undergone previous laser surgery for glaucoma in both eyes (left eye September 24, 2010, right eye October 8, 2010), and had undergone surgery to replace the lens in his right eye with an artificial lens due to a cataract (April 4, 2012).

The Piper pilot's most recent ophthalmology visit was in June 2014, for a routine check of his glaucoma. At that visit, his (confrontation) visual fields were abnormal inferiorly in the right and left eyes. His cup-to-disc ratios were 0.95 horizontally and vertically in both eyes.[5] He had an artificial lens in place in the right eye, and mild age-related lens changes in the left eye. His uncorrected distant visual acuity was 20/20 (with two characters missed) in the right eye and 20/20 (with one character missed) in the left eye.[2] His IOPs were controlled and stable. He was not using medicated eye drops.

The Piper pilot's most recent automated visual field testing was performed on October 1, 2019. The test protocol was designed to measure light sensitivity thresholds for each eye at each of 54 points of the eye's visual field within 24 degrees of center (extending to 30 degrees nasally).[7] Similar to previous tests, results showed visual field deficits in both eyes, right worse than left.

The right eye test was a good-quality test. It showed significant deficits across nearly the entire tested field when compared to age-matched normal subjects. For almost the entire inferior portion of the tested field, even the brightest available stimulus was not seen. There were small areas of relatively better (but still unlikely normal) performance near the center of the tested field just above the horizontal midline, and at the superonasal edge of the tested field.

[6] Notably, FAA denial of a pilot's most recent application for medical certification disqualifies that pilot not only from exercising privileges requiring medical certification, but also from exercising privileges under the provisions of BasicMed (14 *CFR* 61.23(c)(3)(iv)), and from exercising sport pilot privileges (14 *CFR* 61.23(c)(2)(ii)).

[7] The test used was Humphrey visual field analysis (central 24-2 threshold test, stimulus III white, SITA standard). More information about this type of testing can be found in: Choplin NT, Edwards RP. *Visual Field Testing with the Humphrey Field Analyzer: A Text and Clinical Atlas*. 2nd ed. Thorofare, NJ: SLACK Incorporated; 1999.

The left eye test was also a good-quality test. It showed significant deficits across most of the inferior tested field, and in a portion of the superior tested field. Inferior field deficits were worse nasally; even the brightest available stimulus was not seen for the entire inferonasal quadrant of the tested field.

The Piper pilot's most recent optometry visit was in May 2020, for a yearly glaucoma exam. At the time, he had no specific complaints or concerns, stated his vision seemed "fine" to him, and reported using prescribed timolol eye drops regularly. His cup-to-disc ratios were 0.9-0.95 in his right eye and 0.9 in his left eye.[5] His corrected visual acuity was 20/30 in his right eye and 20/25 in his left eye.[2] His IOPs were controlled and stable. The optometrist noted a diagnosis of severe open-angle glaucoma, right greater than left, and a plan for the Piper pilot to be referred back to his ophthalmologist for re-evaluation and possible repeat laser surgery or other procedure, with another optometry visit to be scheduled in 4-6 months.

ii. Primary Care Records

Records were reviewed from the Piper pilot's most recent primary doctor, who the Piper pilot first visited in May 2019. These records included copies of select past medical records from 2014-2018 that had been obtained previously by the primary doctor. The reviewed records indicated that the Piper pilot was being treated for high blood pressure, low thyroid hormone, and prediabetes. The Piper pilot's most recent documented thyroid hormone levels were in August 2019 and were normal. The most recent documented hemoglobin A1c was in November 2018 and was 5.8%.[8] Records indicated that the Piper pilot had also been a patient of a cardiologist, but there was no documentation of an active heart disease diagnosis.[9]

[8] Hemoglobin A1c (HbA1c) is an indirect measure of a person's average blood sugar over the lifespan of that person's red blood cells, which is usually about 3 months. In general, HbA1c of 6.5% or higher diagnoses diabetes, as does a fasting (no caloric intake for at least 8 hours before the test) blood sugar of 126 milligrams per deciliter (mg/dL) or more. Prediabetes may be diagnosed if HbA1c is 5.7-6.4%, or if fasting blood sugar is 100-125 mg/dL. The Piper pilot had a diagnosis of prediabetes. At his initial visit with his most recent primary doctor in May 2019, the doctor noted that the Piper pilot's prediabetes was probably the early stages of actual diabetes because records he brought with him showed HbA1c above 6% and fasting blood sugar above 115 mg/dL. However, no diabetes diagnosis was recorded, and the records reviewed for this investigation showed no HbA1c above 5.8% (documented in November 2018) and no fasting blood sugar above 102 mg/dL (documented in January 2016). According to the primary doctor's note, repeat HbA1c testing had been planned for 4 months after metformin was initiated in May 2019; however, there is no indication in reviewed records that follow-up HbA1c or blood sugar testing was performed after metformin initiation. [American Diabetes Association. Standards of medical care in diabetes – 2020. *Diabetes Care*. 2020;43(Suppl. 1):S1-S212. http://care.diabetesjournals.org/content/43/Supplement_1. Accessed January 27, 2020.]

[9] Records indicate that the Piper pilot had undergone cardiology evaluation related to high blood pressure, previous shortness of breath/wheezing, chronic leg swelling, electrocardiogram (ECG) abnormalities, and a history of rheumatic fever as a child. Full details of the Piper pilot's past cardiology workup were not available from reviewed records. The most recent cardiology visit to be specifically noted in the reviewed primary care records was in December 2018. At that visit (according to a note from a primary care visit the next day) there was reportedly nothing of concern; some harmless irregular heartbeats were noted but were expected to go away.

The Piper pilot's most recent primary care visit was in April 2020, for an episode of resolved irregular heartbeat.[10] As of that date, the Piper pilot had prescriptions for thyroid hormone and testosterone replacement, metformin (an oral medication used to help control blood sugar, started May 2019), and timolol (based on reviewed optometry records, the timolol was in eye drop form, used to treat glaucoma). At the April 2020 primary care visit, the Piper pilot was switched from one combination blood pressure medication, hydrochlorothiazide / lisinopril, to another, hydrochlorothiazide / losartan. None of the above medications are generally considered impairing, although the FAA requires otherwise-qualified pilots to have been on metformin for at least 14 days without problems (such as significant low blood sugar episodes) before they may be medically certified.[11,12,13]

iii. Commercial Driver Medical Examinations

The records from the Piper pilot's primary doctor documented that the Piper pilot underwent commercial driver medical examinations in January 2014, January 2016, and January 2018. The records state that the commercial driver medical certificate issued to the Piper pilot in January 2018 was a 2-year certificate (the full allowable certificate duration) without limitations or restrictions.

The Piper pilot went to a different provider for his most recent commercial driver medical exam, on December 4, 2019. Records from that examination were reviewed, comprising the Federal Motor Carrier Safety Administration (FMCSA) Medical Examination Report Form (long form) and Medical Examiner's Certificate.

On the long form for the December 4, 2019 exam, the Piper pilot reported no medication use or medical problems. In response to questions about whether he had ever had eye problems (except glasses or contacts), heart problems, high blood pressure, or diabetes or blood sugar problems, he answered "no." The examiner documented

[10] On examination, the Piper pilot's heart rate and rhythm were normal, and no specific follow-up tests or referrals were planned unless symptoms recurred.

[11] Federal Aviation Administration. Decision considerations disease protocols - diabetes mellitus type II - medication controlled. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/dec_cons/disease_prot/diabetes_med/. Updated May 27, 2015. Accessed January 27, 2021.

[12] Federal Aviation Administration. Decision considerations - aerospace medical dispositions item 48 general systemic - diabetes, pre-diabetes, metabolic syndrome, and/or insulin resistance. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item48/amd/diabetes/. Updated January 7, 2021. Accessed January 27, 2021.

[13] Federal Aviation Administration. Pharmaceuticals (therapeutic medications) do not issue - do not fly. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/pharm/dni_dnf/. Updated January 21, 2021. Accessed January 27, 2021.

uncorrected visual acuity of 20/20 in the right eye, left eye, and both eyes together.[2] The examiner documented horizontal field of vision as 90+ degrees in each eye.[14] Urine screening for protein, blood, and sugar was normal. The examiner found that the Piper pilot met standards for commercial driver medical certification and issued him a 2-year medical certificate.

III. Autopsy

The Alaska State Medical Examiner's Office performed the Piper pilot's autopsy. According to the autopsy report, the cause of death was multiple blunt-force injuries of the head, torso, and extremities, and the manner of death was accident. The autopsy (including examination of the heart) did not identify any significant natural disease.

IV. Toxicology

At the request of the Medical Examiner's office, NMS Labs performed toxicological testing on heart blood from the Piper pilot. No tested-for substances (including ethanol) were identified.[15]

The FAA Forensic Sciences Laboratory detected ethanol in the Piper pilot's muscle, at 0.011 grams per deciliter (g/dL). Ethanol was not detected in brain tissue, and no blood was available for FAA testing. The FAA testing also identified timolol and losartan in the Piper pilot's liver and muscle.[16]

V. Relevant Medical and Regulatory Information

i. Descriptions of Detected Substances

Ethanol is the intoxicating alcohol in beer, wine, and liquor. It can impair judgment, psychomotor performance, cognition, and vigilance.[17,18] 14 *CFR* 91.17(a) imposes strict limits on flying after consuming ethanol. This includes a prohibition on acting as a crewmember of a civil aircraft while having a blood ethanol level of

[14] The field of vision for purposes of commercial driver medical certification is measured in the horizontal direction only, and is required to be at least 70 degrees in each eye.

[15] According to the NMS Labs toxicology report, tested-for substances were: amphetamines, barbiturates, benzodiazepines, buprenorphine/metabolite, cannabinoids, cocaine/metabolites, fentanyl/acetyl fentanyl, methadone/metabolite, methamphetamine/MDMA, opiates, oxycodone/oxymorphone, phencyclidine, acetone, ethanol (reporting threshold 0.010 grams per deciliter), isopropanol, and methanol.

[16] The FAA Forensic Sciences Laboratory tests specimens for over 1,300 compounds including toxins, prescription and over-the-counter medications, and illicit drugs; information about those compounds can be found at the Civil Aerospace Medical Institute WebDrugs website (https://jag.cami.jccbi.gov/toxicology).

[17] Spitz WU. Forensic aspects of alcohol. In: Spitz WU, Spitz DJ, eds. *Spitz and Fisher's Medicolegal Investigation of Death: Guidelines for the Application of Pathology to Crime Investigation*. 4th ed. Springfield, IL: Charles C Thomas; 2006:1218-1229.

[18] Cook CCH. Alcohol and aviation. *Addiction*. 1997;92(5):539-555.

0.04 g/dL or greater.[19] Ethanol can also be produced by microbes in a person's body tissues after death.[17]

Timolol is a prescription medication that can be used as an eye drop to reduce IOP, as a treatment for glaucoma.[20] Losartan (sometimes marketed as Cozaar) is a prescription medication commonly used to treat high blood pressure.[21] Neither timolol nor losartan is generally considered impairing.

ii. Glaucoma

Glaucoma is condition in which the optic nerve (the nerve that carries visual information from the eye to the brain) is damaged, usually by increased IOP. Increased IOP in glaucoma may be caused by fluid being produced inside the eye more quickly than it is drained. This can result from the fluid drain, called the "angle," narrowing or closing (angle-closure glaucoma), or can happen despite the drain remaining open (open-angle glaucoma). Angle-closure glaucoma often produces symptoms such as pain, eye redness, and loss of vision, and may occur suddenly. Open-angle glaucoma usually progresses more insidiously, with painless vision loss often going unnoticed for years or decades as optic nerve damage gradually worsens in untreated individuals.[22]

Chronic vision loss caused by glaucoma is typically described as narrowing of the field of vision, with vision loss progressing inward from the periphery, and relative preservation of central vision until late in the disease course. Other deficits also occur, including decreased color perception and decreased contrast sensitivity. Glaucoma patients usually do not perceive "tunnel vision," and may remain unaware of even advanced peripheral vision loss. Some of the most common visual symptoms reported by glaucoma patients are blurry vision and needing more light. Many patients experience glare, difficulty seeing objects off to the side, letters appearing faded while reading, seeing too much light, areas of dark or missing vision, and/or a feeling like looking through dirty glasses or clouds. Central visual acuity

[19] Office of the Federal Register. 14 CFR 91.17. Electronic Code of Federal Regulations. https://www.ecfr.gov/cgi-bin/text-idx?node=se14.2.91_117. Updated December 9, 2020. Accessed December 11, 2020.

[20] National Institutes of Health National Library of Medicine. Timoptic. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=45ac65b3-19f7-4f33-aebf-cadd3daa4bf1. Updated February 3, 2020. Accessed January 11, 2021.

[21] National Institutes of Health National Library of Medicine. Cozaar. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=5ac32c20-169d-475a-fc8a-934f758d6ab0. Updated December 21, 2020. Accessed January 11, 2021.

[22] Jacobs DS. Open-angle glaucoma: epidemiology, clinical presentation, and diagnosis. In: Post TW, ed. *UpToDate*. Waltham, MA: UpToDate Inc. https://www.uptodate.com/contents/open-angle-glaucoma-epidemiology-clinical-presentation-and-diagnosis. Updated August 4, 2020. Accessed January 25, 2021.

(sharpness of vision in the direction the eye is pointed) is often preserved until late in glaucoma progression.[22,23]

Glaucoma can be treated with medication and/or surgery, including laser surgery (a relatively simple outpatient procedure). Generally, the intent of treatment is to slow the production of eye fluid and/or speed its drainage, to reduce IOP and thereby limit the progression of optic nerve damage. Glaucoma treatment does not restore lost vision. Once optic nerve damage has occurred, resultant vision loss is irreversible.[24]

FAA regulations for first-, second-, and third-class medical certification require that a pilot not have any acute or chronic eye problem that interferes with the proper function of an eye, that may reasonably be expected to progress to that degree, or that may reasonably be expected to be aggravated by flying. FAA regulations also set standards for near and distant visual acuity, and state that a pilot should be able to perceive colors as necessary for the safe performance of airman duties. For first- and second-class medical certification, FAA regulations specifically require that a pilot have normal fields of vision.[25]

A pilot with a known diagnosis of glaucoma may qualify for medical certification if the pilot meets specific criteria (CACI criteria), including undergoing ophthalmologic evaluation that shows stable, controlled disease, without any evidence of visual field defect on formal/automated testing, and without documented optic nerve damage. If a pilot with known glaucoma does not meet CACI criteria, the pilot may still be able to achieve medical certification, but this requires the FAA to make a special issuance decision on a case-specific basis.[26]

iii. Prediabetes

Prediabetes is not itself a disease. It denotes individuals with blood sugars that are higher than normal but lower than would be seen with diabetes, indicating increased risk of developing diabetes and

[23] Hu CX, Zangalli C, Hsieh M, et al. What do patients with glaucoma see? Visual symptoms reported by patients with glaucoma. *Am J Med Sci*. 2014;348(5):403-409. doi:10.1097/MAJ.0000000000000319.

[24] Jacobs DS. Open-angle glaucoma: treatment. In: Post TW, ed. *UpToDate*. Waltham, MA: UpToDate Inc. https://www.uptodate.com/contents/open-angle-glaucoma-treatment. November 16, 2020. Accessed January 25, 2021.

[25] Office of the Federal Register. 14 CFR Part 67 – medical standards and certification. Electronic Code of Federal Regulations. https://www.ecfr.gov/cgi-bin/text-idx?node=pt14.2.67. Updated January 19, 2021. Accessed January 25, 2021.

[26] Federal Aviation Administration. Decision considerations - aerospace medical dispositions item 32 ophthalmoscopic. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item32/amd/. Updated January 7, 2021. Accessed January 25, 2021.

cardiovascular disease.[27] A pilot with a known diagnosis of prediabetes may qualify for medical certification if the pilot meets specific criteria (CACI criteria), including the absence of symptoms, the absence of low blood sugar episodes, and the use of no associated medications other than metformin (which is acceptable after a 14-day trial period without side effects). If a pilot with known prediabetes does not meet CACI criteria, the pilot may still be able to achieve medical certification, but this requires the FAA to make a special issuance decision on a case-specific basis.[12]

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b. De Havilland Pilot

I. FAA Medical Certification File/Medical Case Review

According to FAA medical certification records, the 57-year-old male de Havilland pilot had his last aviation medical examination on June 12, 2020. At that time, he reported 18,750 total civilian flight hours. He was 68 inches tall and weighed 160 pounds. He reported no active medical conditions or medication use. No significant issues were identified, and he was issued a second-class medical certificate limited by a requirement he wear corrective lenses for near and distant vision.

II. Autopsy

The Alaska State Medical Examiner's Office performed the de Havilland pilot's autopsy. According to the autopsy report, the cause of death was blunt-force trauma of the head, neck, and torso, and the manner of death was accident. The autopsy did not identify any significant natural disease.

III. Toxicology

At the request of the Medical Examiner's office, NMS Labs performed toxicological testing on cavity blood from the de Havilland pilot. No tested-for substances were identified.[15]

The FAA Forensic Sciences Laboratory also screened specimens from the de Havilland pilot, and did not detect any tested-for substances.[16]

D. SUMMARY OF MEDICAL FINDINGS

1. Piper Pilot

The 63-year-old male Piper pilot's most recent application for medical certification was in March 2012. At that time, he reported a history of glaucoma and right eye cataract. Due to his significant medical history, issuance of his medical certificate was deferred to the Federal Aviation Administration (FAA). His application was denied by the FAA in June 2012, due to glaucoma and visual

[27] American Diabetes Association. Standards of medical care in diabetes – 2020. *Diabetes Care*. 2020;43(Suppl. 1):S1-S212. http://care.diabetesjournals.org/content/43/Supplement_1. Accessed January 27, 2020.

field loss. The Piper pilot requested reconsideration, but the FAA sustained the denial in July 2012.

The Piper pilot's medical records indicate that he had open-angle glaucoma in both eyes, treated with laser surgery in 2010, and being treated with prescription timolol eye drops as of his most recent optometry visit in May 2020. His glaucoma had caused irreversible optic nerve damage and visual field defects in both eyes, right worse than left. He had undergone surgery for a right eye cataract in April 2012, and his recent visual acuity remained good. He had high blood pressure, prediabetes, and low thyroid hormone, for which, as of his most recent primary care visit in April 2020, he had prescriptions for hydrochlorothiazide / losartan (switched at that visit from hydrochlorothiazide / lisinopril), metformin (started in May 2019), and thyroid hormone replacement, respectively. He also had a prescription for testosterone replacement.

The Alaska State Medical Examiner's Office performed the Piper pilot's autopsy. According to the autopsy report, the cause of death was multiple blunt-force injuries of the head, torso, and extremities. The autopsy did not identify any significant natural disease.

Two laboratories performed toxicological testing on specimens from the Piper pilot. One laboratory detected ethanol at 0.011 grams per deciliter (g/dL) in muscle, did not detect ethanol in brain tissue, and did not have blood available for testing. That laboratory also detected timolol and losartan in liver and muscle. The other laboratory did not detect any tested-for substances in heart blood.

2. <u>De Havilland Pilot</u>

At his last aviation medical examination on June 12, 2020, the 57-year-old male de Havilland pilot reported no active medical conditions or medication use. He was issued a second-class medical certificate limited by a requirement he wear corrective lenses for near and distant vision.

The Alaska State Medical Examiner's Office performed the de Havilland pilot's autopsy. According to the autopsy report, the cause of death was blunt-force trauma of the head, neck, and torso. The autopsy did not identify any significant natural disease.

Neither of two laboratories found any tested-for substances in toxicological specimens from the de Havilland pilot.