1. *The pilot provided his post accident medical records to the National Transportation Safety Board (NTSB) for review. The NTSB Medical Officer reviewed the records and spoke with the pilot's daughter who is a physician. The medical officer's report documents that the pilot was an insulin dependent diabetic and that he had coronary bypass surgery two years prior to the accident. Emergency room records indicate the pilot had an oxygen saturation (from pulse oximetry) of 88 percent. The NTSB Medical Officers report states that discussions with the pilot's daughter revealed, "A specific etiology for the pilot's unusual behavior in the days preceding and on the day of the crash has not been identified."

   The pilot did not hold a current airman's certificate. On April 24, 1970, the pilot was issued a private pilot certificate based on his Canadian private pilot certificate. The limitations on the certificate stated that it expired on April 30, 1972, and that the holder of the certificate must wear corrective lenses.

---

2. The pilot reported he was in cruise flight at 3,000 feet, when he suffered a seizure and lost consciousness. When the pilot awakened, the airplane was in a high speed descent. In addition, the pilot felt disoriented, and numbness in his right leg. The airplane was equipped with a Cirrus Airplane Parachute System (CAPS). The pilot recovered from the descent at an altitude of about 1,700 feet; and elected to deploy the CAPS system. … Subsequent medical examinations on the pilot revealed the presence of a brain tumor. The pilot's most recent Federal Aviation Administration third class medical certificate was issued on August 11, 2004, with the only limitation that the pilot wear glasses or contact lenses.

---

3. *The Los Angeles County Coroner completed an autopsy on the pilot. The cause of death was attributed to multiple traumatic injuries. The Federal Aviation Administration Forensic Toxicology completed toxicological testing. Cyanide and carbon monoxide testing were not performed and the volatiles test was negative. Drug tests showed positive results for Azacyclonol (a structural isomer of pipradol hydrochloride partially antagonistic to its actions, used with varying results to treat hallucinations and confusion. The antihistamine agent terfenadine produces azacyclonol as an active major metabolite which has mild depressant effects) and Ibuprofen.

---

4. *The pilot held a third class medical certificate, with waivers or limitations, which was issued on June 21, 2007. The Saint Louis University Health Sciences Center completed an autopsy. The cause of death was listed as: Immediate Cause: Massive Trauma of Head, Chest, Abdomen and Extremities.

   The FAA Toxicology and Accident Research Laboratory performed toxicological testing

of specimens of the pilot with the following results: NO CARBON MONOXIDE detected in Blood, NO CYANIDE detected in Blood, NO ETHANOL detected in Urine, AZACYCLONOL (a structural isomer of pipradol hydrochloride partially antagonistic to its actions, used with varying results to treat hallucinations and confusion. The antihistamine agent terfenadine produces azacyclonol as an active major metabolite which has mild depressant effects), detected in Urine, AZACYCLONOL detected in Liver, BUPROPION (see http://en.wikipedia.org/wiki/Bupropion) detected in Blood, BUPROPION detected in Urine, BUPROPION METABOLITE detected in Urine, DIHYDROCODEINE detected in Blood, 0.012 (ug/mL, ug/g) DIHYDROCODEINE (analgesic) detected in Urine, 0.019 (ug/ml, ug/g) HYDROCODONE detected in Blood, 0.093 (ug/ml, ug/g) HYDROCODONE detected in Urine, LOSARTAN (blood pressure med, allowed based on evaluation) detected in Urine, LOSARTAN detected in Liver, QUININE detected in Urine, and QUININE detected in Liver.

The pilot had noted on his most recent application for airman medical certificate, dated 6/21/2007, a history of asthma requiring only intermittent treatment, allergies, high blood pressure treated with losartan/hydrochlorothiazide, and use of the cholesterol-lowering medication atorvastatin and the antihistamine fexofenadine. No other conditions or medications were noted on that application.

The pilot's personal medical records documented a history of chronic knee pain, chronic back pain treated with surgery and hydrocodone/acetaminophen (used once a day on average), depressive symptoms treated with bupropion extended release 150 mg twice a day, and a history of frequent abnormal heart rhythms. An electrophysiologist documented in 2002 that the pilot had a "…history of recurrent episodes of supraventricular tachycardia … rate of approximately 220 beats per minute. … six to seven year history of recurrent episodes … three or four times a year … associated with moderate to strenuous activities … abrupt onset of palpitations and fullness in his neck … he will lie down and the palpitations will subside after 1 to 5 minutes. … can be somewhat dangerous for him … discussed the treatment options ..." A 2004 primary care physician's note indicated "…Episodic supraventricular tachycardia. The patient has not had any episodes recently. He has seen [an electrophysiologist] for an opinion, but for the time being he is not interested in pursuing that option…"

The autopsy report on the pilot noted "Arteriosclerotic Heart Disease: Coronary artery, right, severe [75% occlusion] atherosclerosis." The report also noted that the blood for toxicology testing was "from the chest."

---

5. *Review of the pilot's personal medical records indicated that he had been treated for age-related macular degeneration in both eyes for over 2 years. About 3 weeks before the

accident, his distant visual acuity without correction was recorded as 20/200 for each eye. On at least two occasions, the pilot's retinal specialist advised him not to drive. However, the pilot continued to drive and was involved in a traffic accident, in which he turned in front of an oncoming vehicle, 10 days before the aircraft accident. The pilot's visual deficiency would have made it difficult for him to decipher the readings on cockpit instruments and to distinguish objects on the ground. This lack of visual acuity increased the likelihood that the pilot would fly at an inappropriate speed or altitude, thus increasing the chances of a stall.

About 1 year before the accident, the pilot applied for a Federal Aviation Administration (FAA) Airman Medical Certificate and provided false information about his eye condition (he did not report his visits to the retinal specialist). Even so, the pilot's visual deficiency, given its severity, should have been detectable during the vision examinations required before issuance of such an Airman Medical Certificate. However, the pilot's aviation medical examiner (AME) reported normal eye test results, including 20/20 uncorrected vision, and issued the pilot a second-class medical certificate. About 7 months after the accident, the FAA decertified the AME for improper issuance of medical certificates.

The pilot's autopsy noted severe coronary artery disease, which could have increased the likelihood of a heart attack or abnormal heart rhythm, resulting in impairment or incapacitation. There was no evidence of such an event, but no such evidence would necessarily be expected if death occurred within a few minutes to an hour of the impairment or incapacitation. The pilot's personal medical records did not indicate coronary artery disease.

Either the pilot's macular degeneration or his unrecognized coronary artery disease could have contributed to his failure to maintain control of the airplane. The NTSB could not conclusively determine whether either condition directly resulted in the accident. However, given the incompatibility of the pilot's vision deficiency with safe motor vehicle operation and the pilot's awareness of this, the pilot displayed extremely poor judgment in not only continuing to fly but in deciding to perform passenger-carrying flights. Furthermore, the pilot did not provide all of the required information on his most recent application for an Aviation Medical Certificate, and his AME did not adequately evaluate the pilot's eyesight.

On autopsy, the pilot was noted to have severe coronary artery disease with "only a pinpoint lumen remaining distally of the left anterior descending coronary artery," prostate cancer with evidence of radioactive seed implantation and no indications of spread beyond the prostate, and severe diverticulosis.

Review of the accident pilot's personal medical records indicated treatment for age-related macular degeneration in both eyes since at least April 2006. The accident pilot's left eye had been treated twice with laser photocoagulation, eleven times with bevacizumab injection, and once with combined photodynamic therapy and bevacizumab injection, with the last combined therapy on May 20, 2008. His records also note treatment of the right eye with laser photocoagulation on May 6, 2008. His distant visual acuity without correction was last noted on May 20, 2008, to be 20/200 for each eye. Distant visual acuity with correction was last noted on April 8, 2008, to be just worse than 20/100 for each eye. Near visual acuity was last noted on May 13, 2007, for his better (left) eye, with best possible correction, to be 20/40. On that same date, his uncorrected distant visual acuities were noted to be 20/160 for his right eye and 20/100 for his left eye. He had been advised not to drive on at least two separate occasions (in October 2007 and January 2008) by his retinal specialist. The accident pilot's personal medical records also noted (in August 2006) a history of hyperglycemia (high blood sugar), with a hemoglobin A1c of 6.8 and blood glucose of 118, and of prostate cancer. There were no indications of heart disease in the personal medical records reviewed.

The accident pilot had not noted any conditions or treatments, and had specifically denied "Eye or vision trouble except glasses" and "Visits to Health Professional within Last 3 Years," on his most recent application for airman medical certificate, dated May 4, 2007, which has the following limitation: "must have available glasses for near vision." On the examination performed in conjunction with that application, his uncorrected distant vision was noted to be 20/20 in each eye separately and both eyes together, and his near vision was noted as corrected to 20/20 in each eye separately and both eyes together.

The records document the same aviation medical examiner (AME) on each application for Airman Medical Certificate and associated examinations since 1998. The FAA decertified the AME on January 28, 2009, for improper issuance of medical certificates.

---

6. The flight instructor had a long history of diabetes, and had recently started a new injectable medication (exenatide, 10 micrograms twice a day) to help control his blood sugar. This medication can result in impairment due to low blood sugar, but he had not reported any adverse effects, and he was observed to be behaving normally the day prior to and the day of the accident. He was at extremely high risk of obstructive sleep apnea given his height (70 inches), weight (285 pounds), and poorly controlled blood pressure. Obstructive sleep apnea often results in impairment, but he was apparently not observed to snore while sleeping, a hallmark of the condition. Autopsy revealed an enlarged heart (it weighed 500 grams), but it was not thickened, suggesting an apparently unrecognized heart condition, dilated cardiomyopathy, that can result in sudden incapacitation. Given

the failure of this experienced instructor pilot to either execute a normal climbout or appropriately oversee the climbout by his novice student, it is possible that he was incapacitated by a cardiac event. It is also possible, though less likely, that he was impaired either by unrecognized low blood sugar as a result of his new diabetes medication or by fatigue from unrecognized obstructive sleep apnea. However, the investigation could not conclusively determine if the instructor was impaired at the time of the accident.

According to rescue personnel, the student pilot was pronounced dead at the scene. The instructor Autopsies were performed on both was transported to the hospital where he expired.

pilots. Both deaths were attributed to massive blunt trauma. Toxicology protocols were conducted by FAA's Civil Aeromedical Institute in Oklahoma City, Oklahoma. Azacyclonol and triamterene were detected in the instructor's blood and urine.

NTSB's medical officer reviewed the instructor's FAA medical file and autopsy report, and the following are based on this review. The pilot had a long history of diabetes that was being treated by oral medications (metformin, 1000mg twice a day; rosiglitazone, 8mg a day, and glimepiride, 1 mg three times a day). Six weeks before the accident, he had been started on a new injectable medication (exenatide, 10 micrograms twice a day) to help control his blood sugar. No blood sugar measurements had been documented in FAA records since he began taking exenatide. The pilot had not reported any adverse effects from taking exenatide. Other flight students told an FAA inspector that the instructor's behavior was normal on the day prior to, and on the day of, the accident.

The pilot's height was noted as 70 inches on his most recent application for an airman medical certificate, and his weight was noted as 285 pounds 10 days prior to the accident.

FAA's medical file also noted that the pilot had high blood pressure. He was taking three different medications to control his blood pressure. Ten days before the accident, his blood pressure was 152/72. The records do not indicate any history of heart disease, and a treadmill stress test performed 12 years prior to the accident, as part of an evaluation for high blood pressure, was normal. According to the pilot's autopsy report, the heart was enlarged (it weighed 500 grams) but not thickened. The attorney representing the pilot's estate indicated that the pilot did not snore and had no family history of heart disease, congestive heart failure, or sudden cardiac death.

---

7. The autopsy results were consistent with a cardiac event suffered by the pilot at some point around the time of the accident, but the pilot had not reported any symptoms and

was actively controlling the aircraft and speaking with the surviving passenger during the accident sequence.

Autopsies were conducted by the Los Angeles County Department of the Coroner. The cause of death for both rear seat occupants was reported as the combined effects of blunt force and thermal injuries.

The cause of death for the pilot was reported as the combined effects of blunt force and thermal injuries. The autopsy report also noted "severe coronary atherosclerosis" with "almost complete occlusion by a thrombus of the left anterior descending coronary artery."

The pilot's most recent application for a third-class airman medical certificate indicated "No" in response to "Do You Currently Use Any Medication," to all items under "Medical History," and to "Visits to Health Professionals Within the Last 3 Years." The pilot reported his occupation as a physician.

Toxicological tests on specimens from the pilot were performed by the FAA Civil Aeromedical Institute. Analysis revealed no findings for carbon monoxide or cyanide. The results were negative for all screened drug substances and ingested alcohol. Refer to the attached toxicology report for specific test parameters and results.

---