AEROMEDICAL ACCIDENTS

CASA MEDICAL OFFICER, DR DAVE FITZGERALD, EXAMINES SOME CASES FROM THE NTSB FILES, AND SHOWS THAT WHEN IT COMES TO GA, MEDICAL INCAPACITATION DOES HAPPEN IN FLIGHT, WITH DISASTROUS CONSEQUENCES.

It's often thought that aviation accidents due to medical factors are quite rare. If you're talking about high capacity RPT, or high performance aircraft operations, this is true, as can be seen in the following which lists 'medical cause' fatal accidents from 1980-2000. (It is interesting to note the proportion of these accidents relating to drug and alcohol impairment, reflecting the importance of this problem in aviation).

Year	Aircraft	Medical Problem	Confidence
1982	DC8	Schizophrenia	High
1982	Citation	Alcoholic impairment	High
1982	Metro	Vomiting	High
1983	Learjet	Use of marijuana	High
1988	Metro	Use of cocaine	High
1989	FH 227	Alcohol	High
1990	Learjet	Slurred speech? Cause	Medium
1993	Learjet	Alcohol/cocaine	High
1994	ATR 42	Suicide	Low
1999	An 26	Alcohol	Medium

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However, general aviation is different. The American National Transportation Safety Board (NTSB) database reveals a number of incidents and accidents related to medical incapacitation, such as:

Case 1: Brain tumour and seizure-promoting medication

The Beech 95A with a student pilot and 64-year-old, 7,000 hour flight time instructor on board, collided with a hangar during a night go-around. The controller cleared them for a simulated single-engine, full-stop landing. The controller thought that the airplane made a short approach with the wings rocking back and forth, and looked like it was low and could possibly land short of the runway. As the airplane approached the end of the runway, it began to veer to the left. The controller said it appeared to be headed directly for the control tower as it continued to drift left.

The airplane stayed low to the ground and the controller had the impression that the flight crew was attempting to climb. The wing lights were continuously rocking back and fourth as the airplane continued to drift left, and it crossed the dirt infield and a taxiway while still airborne. The bank angle then increased sharply to the left, and the airplane disappeared behind some hangars. The controller estimated that the airplane was 1,500 feet from the approach end of the runway when he observed a fireball and alerted rescue crews.

The instructor pilot's autopsy noted undiagnosed lung cancer that had metastasised to his brain. The brain showed evidence of severe swelling, with disruption of the normal brain structure. The instructor pilot had been prescribed a pain medication (tramadol), which was found in the instructor

pilot's blood at a level consistent with regular use at least at the dose prescribed. Tramadol is known to increase the seizure risk, particularly in patients with other potential seizure risks. The effects of the brain swelling and the medication likely produced seizure activity in the instructor, which could have significantly interfered with the aircraft controls, and made it difficult or impossible for the student to have adequately controlled the aircraft.

The NTSB determined the probable cause(s) as: 'a loss of aircraft control due to the instructor pilot's incapacitation by seizure activity as a result of his undiagnosed cancer, and use of a medication that can increase seizure risk'. Both the instructor and student were killed.

Case 2: Cardiac arrest

The passenger flying the Gulfstream 695A made a hard landing after the 49-year-old pilot with 1,880 flying hours experienced an incapacitating cardiac arrest. Shortly after takeoff, the pilot turned around to return to the airport. He started coughing and then fell unconscious. The passenger in the right seat, with no piloting experience, took control of the airplane and made several landing attempts. On the fourth attempt, he stalled the airplane at a low altitude. The airplane landed flat on its belly a few hundred feet short of the runway. The autopsy attributed the pilot's cause of death to arteriosclerotic-cardiovascular disease.

Case 3: Chest pains

Shortly after take off in a Mooney M20C, the 53-year-old, 1,142-hour pilot reported over the radio that he was having 'chest pains' and wanted to return to the 'ground'. A witness observed the airplane as it headed south at an approximate altitude of 1,200–1,500 feet above ground level. He then saw the airplane make a descending, 180-degree right turn. The airplane continued to descend (approximately 150-200ft per minute) until it disappeared from his view. The witness added that the engine was 'loud' and operating at full power during the turn. The landing gear was up, and the plane had no 'apparent difficulties'. Examination of the airplane and engine revealed no mechanical deficiencies. A review of the pilot's medical records revealed that in the months before, the pilot had been found to have high blood sugar, high triglycerides, and low HDL cholesterol, all risk factors for coronary heart disease. The NTSB determined the probable cause(s) as: the pilot's incapacitation due to chest pains, resulting in a loss of control.

Case 4: Stroke/loss of vision

On 14 September 2003, the 66-year-old, 8, 900 hour pilot, flying a Mooney M20J, contacted Palm Beach Departure and reported that he was returning to the Palm Beach airport with a 'severe, severe headache in the base of [his] neck'. Approximately two minutes later the pilot reported: 'my defibrillator just went off on me'. The pilot declared 'mayday', reported that he was losing his eyesight, and that he was going to head east. The controller confirmed that he wanted to proceed east over the water, to which the pilot responded, 'Yeah, I don't wanna take anybody out. I don't know whether I can make it back'. The last radio communication from the pilot was shortly after. Another airplane reported the accident airplane had hit the water. Radar data shows that at 1315, the airplane turned eastbound over the Atlantic Ocean. From 1315 to 1320, the airplane climbed from 1,300 to 4,100 feet. From 1320 to 1322, the airplane descended from 4,100 feet to 300 feet; radar contact was lost at 1322:25. Only a plastic bag with paper contents was recovered by the U.S. Coast Guard. An NTSB review of the pilot's medical records indicate approximately two years before, the pilot had his aortic valve replaced due to severe aortic insufficiency. Approximately eighteen months before, the pilot had a cardioverter/defibrillator implanted due to frequent abnormal rhythms on EKG and Holter monitor and 'inducible monomorphic ventricular tachycardia'. He was issued a second-class airmen medical certificate on June 26, 2000. Under federal aviation regulations, a second-class medical certificate for operations requiring a private pilot certificate expires at the end of 'the 24th month after the month of the date of the examination shown on

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the certificate if the person has reached his or her 40th birthday on or before the date of the examination'. Federal aviation regulations state that for first-, second-, and third-class airmen medical certificates, cardiovascular standards mean that a person cannot have a clinical diagnosis or medical history of cardiac valve replacement, or permanent cardiac pacemaker implantation.

Case 5: Gastrointestinal condition

On 16 August 2002, a 49-year-old, 5,720hr pilot completed a flight in a Piper PA31 without incident, and seemed in good sprits before departing, solo, on the return flight. That flight also progressed without incident, until cleared from 8,000 feet msl to 5,000 feet msl, which the pilot acknowledged. There were visual meteorological conditions at the time, and radar data depicted the airplane initiate and maintain a 500-foot per-minute descent, until radar contact was lost at approximately 400 feet agl. The pilot made no mention of difficulties while en route, or during the descent. The airplane hit trees at the top of a ridge in an approximate level attitude, and came to rest approximately 1,450 feet beyond, at the bottom of a ravine. Examination of the wreckage revealed no preimpact failures or malfunctions.

The pilot had been diagnosed with Crohn's disease (a chronic recurrent gastrointestinal disease, with no clear surgical cure) for approximately 35 years, which required him to undergo several surgeries more than 20 years before the accident. The pilot received a letter from the FAA on June 11, 1998, stating he was eligible for a first-class medical certificate. In the letter there was no requirement for a follow-up gastroenterological review, but the pilot was reminded he was prohibited from operating an aircraft if new symptoms or adverse changes occurred, or any time medication was required. His condition seemed to be stable until approximately five months prior to the accident.

Over these months, he experienced weight and blood loss, was prescribed several different medications to include intravenous meperidine, received three units of blood, and had a peripherally-inserted central catheter placed. On his medical application dated the month before the accident, the pilot reported he did not currently use any medications, and did not note any changes to his health. A toxicological test conducted after the accident identified meperidine in the pilot's tissue.

The NTSB determined the probable cause(s) as: physiological impairment or incapacitation likely related to the pilot's recent exacerbation of Crohn's disease. A factor in the accident was his decision to conduct the flight in his current medical condition.

So what can be learned from these incidents?

Lesson 1: Medical incapacitation in flight does happen, and has the potential to adversely affect flight safety.

Lesson 2: Despite best medical screening, some medical conditions will go undetected until it is too late, as in case 4, where the pilot had a number of risk factors for cardiac impairment.

Lesson 3: Aircrew should be aware of the requirement to notify their DAME or CASA if there is any significant change in their medical condition. Aircrew may not appreciate how their illness or disease may contribute to their risk of incapacitation. In the vast majority of cases, a return to flying is possible once a medical condition has been stabilised, but for some, a return to flying may be too risky.

In case number 1 – the pilot taking tramadol; case number 4 – the pilot who had the defibrillator implanted; and case number 5 – the pilot who required blood transfusions and intravenous treatment for his Crohns' disease; if the individuals had notified their medical examiners, they would almost certainly have not been flying. Luckily, except for case number 1, only the incapacitated pilot was killed.

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