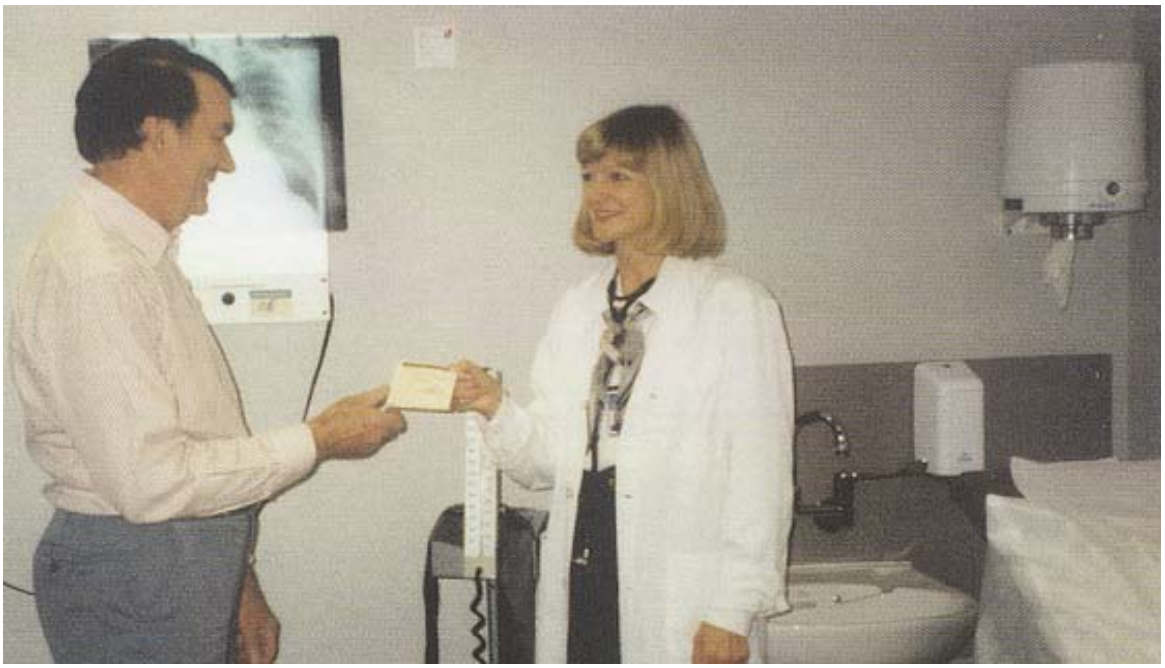
SAFETYSENSE LEAFLET 24 PILOT HEALTH



1. INTRODUCTION

The CAA requires pilots to hold a medical certificate (for Joint Aviation Authority, JAA, licences) or a declaration of health (for the National Private Pilot Licence, NPPL). The medical assessment is intended to reduce the risk of in-flight incapacitation.

A network of Authorised Medical Examiners (AMEs) across the country are approved by the CAA's Medical Division to undertake the appropriate medical examination for the JAA medical certificate. The AME has received training in aviation medicine and may also be a pilot.

However, pilots who wish to fly only light (up to 2,000 kg) single-engine aircraft (also microlights, gliders or gyroplanes) within the UK and in good weather can obtain the relevant medical documentation for a national PPL without visiting an AME, although they will need to attend their general practitioner. Slightly different requirements apply, depending on which type of flying activity is intended, so it is best to seek advice from your local flying club, or from the NPPL website: www.nppl.uk.com

Advice on health related matters can also be obtained from an airsport medical adviser, an AME, or the CAA Medical Division – see the Medical Division's website for further details: www.srg.caa.co.uk.

Medical requirements for flying are under regular review and frequently change. Any recent changes will be posted on the Medical Division's website.

2 THE MEDICAL ASSESSMENT

It is particularly important that pilots are aware of their state of health. as what may seem a trivial symptom, e.g. mild earache, can assume importance when flying. Whilst a medical assessment by a doctor can be reassuring, such assessments (which, for the NPPL, do not necessarily include a medical examination) are much less useful than the individual's self-determination of fitness, or unfitness. It is primarily the pilot's responsibility to decide if he is fit to fly, and it is also his responsibility to stay on the ground if he suspects he may not be completely well.

3 ENVIRONMENT

The earth's atmosphere consists of a mixture of gases, primarily oxygen and nitrogen, with the former being essential for human life. As an unpressurised aircraft climbs through the atmosphere the cockpit pressure reduces and at 18,000 ft the pilot experiences half the pressure of that at sea level.

4 THE BIOLOGICAL ENGINE

a. The human body converts the substances it absorbs such as food and oxygen into energy by a chemical process, similar to very slow combustion, called 'oxidation'. The body varies its consumption of stored energy sources according to its degree of activity, just like an engine. The intake of food (energy source) is adjusted on a medium- to long-term basis, whereas oxygen intake can be increased very quickly, in response to a short-term requirement to oxidise more stored nutrients and provide extra energy. When resting we require very little oxygen; under a high physical work load this increases and at maximum effort, oxygen use and energy production can be more than 15 times the resting value.

b. Air is inhaled into the lungs where its oxygen combines with haemoglobin in the red cells of the blood and is then circulated to those tissues where energy is needed. At the cellular level, oxygen combines with food stores to provide energy (with heat as a by-product). All cells need some oxygen to survive and the brain is particularly susceptible to a reduced supply of oxygen. Apart from heat, a main by-product of the oxidation process is carbon dioxide, which is returned to the lungs by the blood and exhaled.

c. Oxygen comprises only one fifth of the air breathed in and its availability for absorption and transport through the body is pressure dependent. Up to about 10,000 ft altitude, the healthy body has compensatory mechanisms to cope with the associated reduction in oxygen availability with increasing altitude without any noticeable detrimental effect. However, if there is an abnormality of the respiratory or cardiovascular system, the individual is likely to be more affected by a reduction in oxygen pressure, and may have symptoms even below 10,000 ft.

d. Reducing the capacity of your oxygen transport system by donating blood may increase your sensitivity to altitude, although this is quickly remedied by the body's reserves. However, a pilot should not fly for at least 24 hours after giving blood.

e. When an individual ascends above 10,000 feet in an aircraft the reduction in oxygen pressure reduces the efficiency of cellular processes, with the brain being the most sensitive of the body's systems. No-one is immune to these effects, which are insidious and often unnoticed by the affected individual. They may lead to hazardous actions, such as forgetting to change fuel tanks or flying off course. The effects become increasingly more serious with increasing altitude and above 18,000 feet, breathing atmospheric air, pilots are likely to eventually lose consciousness. At 25,000 feet this is likely to occur in 2-4 minutes. The mountaineer is able to adapt, to a certain extent, to such altitudes but such adaptation occurs at a rate which is too slow to be of benefit to the aviator used to living near sea level.

5 HYPOXIA

a. When the human body is starved of oxygen at altitude, or is in poor health with regard to its ability to absorb and transport oxygen, its efficiency reduces. When inadequate oxygen is available for normal functioning a condition called 'hypoxia' results. The brain is affected early but symptoms are often unnoticed due to the associated dulling of judgement. The effects are similar to alcohol intoxication. As hypoxia proceeds the individual becomes clumsy, drowsy, develops an inappropriate sense of well-being and becomes increasingly error prone. The extent of the symptoms is dependent upon the actual altitude but even short periods above 10,000 ft are likely to produce effects.

b. To prevent hypoxia, flights must be at an altitude less than 10,000 feet, or the aircraft must have a pressurised cabin (as do almost all commercial airliners) or the pilot must utilise an individual oxygen source supplied by a personal mask.

6 HYPERVENTILATION

a. The respiratory system adapts quickly to changes in oxygen demand caused by exercise. However, breathing rapidly does not reduce the effects of hypoxia and can have some disadvantages.

b. The body cells produce carbon dioxide as a by-product of the oxidation process, which is dissolved in the blood and returned to the lungs for exhalation. Increasing the rate and depth of breathing speeds up the removal of carbon dioxide, disturbing the chemical balance in the blood and symptoms similar to hypoxia may result.

c. The most common causes of hyperventilation are stress and anxiety but this can usually be controlled by consciously returning to a normal rate of respiration, and relaxing. Your instructor will give you advice if he notices you are breathing rapidly when under training. If you or a fellow crew member or passenger do experience symptoms which might be attributable to hyperventilation, it is important to first ensure that hypoxia is not the problem.

7 VISION

a. Our sight is something we tend to take for granted. There are, however, two points pilots should be aware of.

b. Firstly, if you use contact lenses or spectacles you should have a spare pair of spectacles immediately available, which can be put on if you become intolerant of your lenses (or lose one, or both, of them) in flight, or you lose or break your spectacles.

c. Secondly, almost all of us will require reading glasses at some point – the lens in each eye stiffens with increasing age and can't adjust for near distances as it can when younger. Generally this process becomes noticeable at about 40 years with the first sign being an inability to read in poor light (because in low lighting conditions the pupil widens and, in photographic parlance, the 'depth of field' reduces and the near point for focussing moves further away from the eye). Unfortunately it will not improve with eye exercises! After your first set of reading glasses you will probably need slightly stronger ones every few years until about age sixty. Do make sure that your reading glasses are suitable for flying. You still need to see clearly into the distance and so you should use bi-focal lenses or the half frame, look-over type so that you can be comfortable looking at a map, your instruments, or at the horizon without having to change or remove your glasses. Full frame near vision spectacles are not acceptable for pilots, because distant vision is adversely affected. 'Varifocal' lenses (those which gradually, rather than abruptly, adjust their refractive power) can be used but make sure you find them suitable for flying before using them in the air, as not everyone can tolerate them (it can make some individuals feel dizzy).

d. There are a number of surgical procedures available which reduce, or even eliminate, the need for spectacles. All involve a reshaping of the clear part at the front of the eye, called the cornea. Although the methods vary, some using lasers, others diamond knives (the older techniques) none offer guaranteed success and all will require a period of grounding with a specialist assessment before being considered fit for flying. The long-term effects are not fully known and vision can occasionally be worse after such surgery. Any pilot considering such surgery should look at the CAA Medical Division website (www.srg.caa.co.uk) before submitting to an irreversible procedure.

8 STRESS AND FATIGUE

a. All of us at some time will find our lives affected by stress, fatigue, illness or injury – the important thing is to recognise how these can affect our flying skills and to proceed in a sensible fashion.

b. Stress is considered a modern day ailment, but it is a part of everyday life. It is the reaction to it that may cause a problem. Sleep disturbance, poor appetite and indigestion can all be signs of excess stress, whether at home or at work. Although most consider flying to be a relief from such pressures, it is not sensible to fly when you are experiencing physical symptoms or ruminating over your problems. Any preoccupation can detract from the continuing mental activity needed for safe flying. If you are not feeling 100%, take responsibility for your own flight safety and seek medical advice if you are uncertain of the implications for flying.

c. Short-term fatigue is what we experience after strenuous physical or mental exercise. It may be associated with sleepiness and may also be the cause of mistakes and lapses of concentration. Medium- to long-term fatigue is more often associated with shift work, time zone crossings (which causes 'jet lag') or just regularly cutting back on sleep. It can cause drivers to fall asleep at the wheel or pilots to fall asleep at the controls. The only means of dealing with fatigue is to recognise when it is likely to occur and what can happen as a result. The only means of preventing it is to make sure you get adequate rest before flying.

9 ILLNESS AND INJURY

a. Any illness can be debilitating and recovery can take longer than you think. Most pilots would think that returning to work means they are fit to fly but this is not always the case. As a rule of thumb, any condition requiring medical certification that you are unfit for work should normally require at least an equivalent time back at full employment, without treatment, before flying. Your GP or AME may be able to give you specific guidance if you want to start flying earlier. This particularly applies to some of the modern outpatient surgery or investigations which have been addressed in Aeronautical Information Circular 96/2004 (Pink 69) 'Modern Medical Practice and Flight Safety'. Seek medical advice before flying and ensure you advise your doctor that you are a pilot.

b. If you have an injury ensure you have fully recovered before flying. You do not want to find yourself in severe pain, or with a weak arm or leg when operating an aircraft. Unlike car drivers, pilots do not have the option to stop in a few seconds. Also make sure that you have the full range of movement necessary for flying before returning to the cockpit. A circuit or two with an instructor before going solo can be beneficial if there is any doubt about your fitness after recovery from injury.

10 ALCOHOL

a. The consumption of alcohol produces effects similar to hypoxia. However, breathing oxygen will not reverse the effects. Increasing altitude increases the effects because of the reduced oxygen pressure. It is therefore essential for pilots to separate their flying from alcohol consumption. Since it takes an extended period of time to remove even low levels of alcohol from the blood, pilots should not fly for at least eight hours after consuming modest amounts of alcohol and up to 24 hours (or longer) following a major celebration!

b. Since one of the more subtle effects of alcohol is on the inner ear and can result in an increased susceptibility to disorientation up to three days after taking a large amount of alcohol, pilots should always be careful in the amount of alcohol they consume if they are flying during the next 1-3 days.

11 EXPANSION OF BODY GASES

a. If you take a balloon from sea level to 18,000 ft, its volume will double due to the decrease in pressure (Boyle's Law). Gas in the cavities of your body will do exactly the same thing. Problems can be experienced with air in the sinuses or behind the eardrum (middle ear) as both of these cavities have entrances which can be easily affected by the inflammation from a common cold. The most important point is to avoid flying with a respiratory tract infection (cold). You should know how to 'clear your ears' using the Valsalva technique and if you cannot clear your ears before flight, stay on the ground because you may tear an eardrum, or suffer severe pain in your ears or sinuses on descent (climbing is not usually a problem).

b. It is also possible for the nitrogen gas which is dissolved in our body fluids to come out of solution and form bubbles if exposed to reduced pressure for a prolonged period. This is known as decompression sickness or 'the bends' and is rarely experienced at an altitude below 18,000 ft. However, SCUBA diving exposes the body to increased pressure and dissolves more nitrogen in the body. This may cause decompression sickness during subsequent flying at a very much lower altitude. Most divers are aware of this problem and will not fly, even in a pressurised aircraft, immediately after diving. If you intend to SCUBA dive within 24 hours before flying, seek expert advice about the time interval between the two activities.

12 MEDICATION AND FLYING

a. Doctors can choose from a wide range of medications when treating an illness. There is also a wide range of 'over the counter' treatments which do not require a prescription. Doctors may be unaware of the effects of their prescriptions upon a pilot's flying capability. Some may cause drowsiness, nausea or fatigue and others may reduce resistance to even minor increases in acceleration forces.

b Some quite simple 'over the counter' products carry warnings to avoid operating machinery and they may react with other medication. If the medication you are taking says that driving or operating machinery may be adversely affected, it is probably unsuitable for use if you are flying. Remember that the underlying condition for which you are taking the medication may preclude flying. Seek specialist advice if you are unsure of whether or not you should be flying, before you take to the air as a pilot.

13 CARBON MONOXIDE

a. An aircraft engine is rather less efficient than your body in that some of its fuel oxidation is incomplete and carbon monoxide rather than dioxide is produced. This would be of academic importance if it were not that many aircraft use their engine exhaust gas heat, through an exchanger, to warm the cabin. Add to that the fact that carbon monoxide bonds very strongly to the blood cells and blocks its oxygen carrying capacity then it becomes necessary to consider the symptoms of carbon monoxide (CO) poisoning.

b. As a gas, CO is colourless, tasteless and lethal! Exposure of pilots to it has been the cause of many fatal accidents. It can usually only be recognised in an aircraft by associated engine exhaust smells. Symptoms are subtle, similar to hypoxia but perhaps with a more obvious headache and it doesn't respond so promptly to oxygen – although using an oxygen mask is likely to restrict further exposure.

c. The best way to deal with CO poisoning is to prevent exposure in the first place but if you do suspect its presence when in flight, increase ventilation, land and try to get an engineer to trace any sources. There are CO monitors on the market and we recommend that one of them be carried. Paper sensors are easily contaminated by other fumes and need to be changed more frequently than their markings would suggest. Electronic detectors often have several functions in addition to a basic warning, but if fitted permanently would constitute a modification, and may place the device outside its operating limits. However, one could be carried as personal equipment.

14 I'M SAFE

a. This acronym gives all pilots a basic checklist for their fitness to fly. The items on that checklist are covered in this leaflet. The bottom line is that a pilot's fitness can change quickly and it is primarily the responsibility of the pilot himself to decide whether or not he is fit to fly.

I llness
M edication
S tress
A lcohol
F atigue
E ating

I'M SAFE

Safety Promotion, GAD, Gatwick

Use this personal checklist before setting off for the airfield, just as you would look at the weather or do a pre-flight check. It is available as a free sticker from Safety Promotion, Flight Operations Inspectorate (General Aviation), Aviation House, Gatwick Airport South RH6 0YR (please send SAE).

b. If in doubt about any of the items, then take medical advice.