

CHAPTER 8: MEDICAL FACTORS

Glider pilots are not required to undergo a medical examination or obtain a medical certificate, as is the case with airplane pilots. However, as a glider pilot you are responsible for making sure that you do not have a medical condition that could prevent you from safely conducting a flight.

Flying in general, and soaring in particular, requires intense concentration and some physical endurance. Accordingly, glider pilots should try to keep in good physical shape and recognize their limitations.

Minor illnesses, especially those requiring medications, can seriously impair a pilot's abilities. Even commonplace conditions such as fatigue, stress, and allergies can hinder performance. The safest decision when feeling ill is not to fly. If you are unsure about how a medical condition will affect your ability to pilot a glider, consult an Aviation Medical Examiner.

In this chapter, you will learn about the physiological, mental, and chemical issues that can affect flight safety.

8.1 Physiological Issues

Physiological issues are ones that involve the physical systems of our bodies. Illness, hypoxia, motion sickness, and dehydration are examples of physiological issues.

Middle Ear and Sinus Problems

Climbs and descents can sometimes cause ear or sinus pain and a temporary reduction in the ability to hear. The discomfort is caused by a difference between the pressure of the air outside of the body and the pressure of the air inside the middle ear and nasal sinuses.

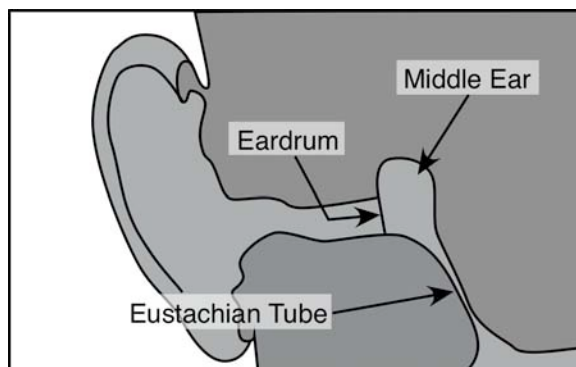


Figure 8.1 – The structure of the middle ear

The middle ear is a small cavity located in the bone of the skull. It is closed off from the external ear canal by the eardrum. Normally, pressure differences between the middle ear and the atmosphere are equalized by a tube leading from the inside of each ear to the back of the throat, called the Eustachian tube. These tubes are usually closed, but open during chewing, yawning, or swallowing to equalize pressure. Even a slight difference between external pressure and middle ear pressure can cause discomfort.

During a climb, the pressure of the air in the middle ear may exceed the pressure of the air in the external ear canal, causing the eardrum to bulge outward. As this change in pressure occurs, you will probably experience alternate sensations of “fullness” and “clearing”.

During descent, the opposite occurs. The pressure of the air in the external ear canal increases and exceeds the pressure of the air in the middle ear cavity, which had equalized with the lower pressure of the higher altitude. The higher outside pressure causes the eardrum to bulge inward.

This condition is often painful and can cause a temporary reduction in hearing sensitivity. It can be difficult to relieve because the partial vacuum tends to constrict the walls of the Eustachian tube. Swallowing frequently or yawning can help to equalize the pressure. If these techniques don't work, you can try exhaling gently while pinching your nostrils shut and closing your mouth and lips. This procedure forces air through the Eustachian tube into the middle ear. If you have a cold, an ear infection, or sore throat, it may not be possible to equalize the pressure in the ears. Flying in this condition can be extremely painful, as well as harmful to the eardrums. If you are experiencing minor congestion, then nose drops or a nasal spray may reduce the chance of a painful ear blockage. Before using any medication, check with an Aviation Medical Examiner to make sure that it will not hinder your ability to fly.

Like the ear, the sinuses can also experience blockage due to changes in pressure. Air pressure in the sinuses equalizes with air pressure in the cockpit through small openings connecting the sinuses to the nasal passages. An upper respiratory infection such as a cold or sinusitis, or a nasal allergic condition can produce enough congestion around an opening to slow or prevent equalization. This “sinus block” occurs most frequently during descent. A slower descent rate may reduce the associated pain. A sinus block can occur in the frontal sinuses located above each eyebrow, or in the maxillary sinuses located in each upper cheek. A sinus block can produce excruciating pain over the sinus area. A maxillary sinus block can also make the upper teeth ache.

Sinus blocks can be avoided by not flying with an upper respiratory infection or nasal allergic condition. Decongestant sprays or drops usually do not provide the sinuses with adequate protection from congestion. Oral decongestants have side effects that can impair your performance. If a sinus block does not clear shortly after landing, you should consult a physician.

Spatial Disorientation (Vertigo)

Spatial disorientation is a loss of orientation with regard to the position, attitude, or movement of the glider in space. The body uses sensory inputs from the eyes (visual), the body (kinesthetic), and the inner ear (vestibular) to ascertain orientation and movement in space.

Visual System

The eyes provide by far the greatest amount of spatial information. When visual references are available, spatial disorientation is unlikely to occur. When visual cues are taken away, you can quickly become disoriented.

Kinesthetic System

Kinesthetic sensations are the brain's interpretation of signals from the skin, joints, and muscles. "Seat of the pants" flying is largely dependent upon these signals. Because gravity is usually the predominant force experienced by the body, the brain tends to interpret kinesthetic sensations as being caused by changes in our position with respect to gravity's pull.

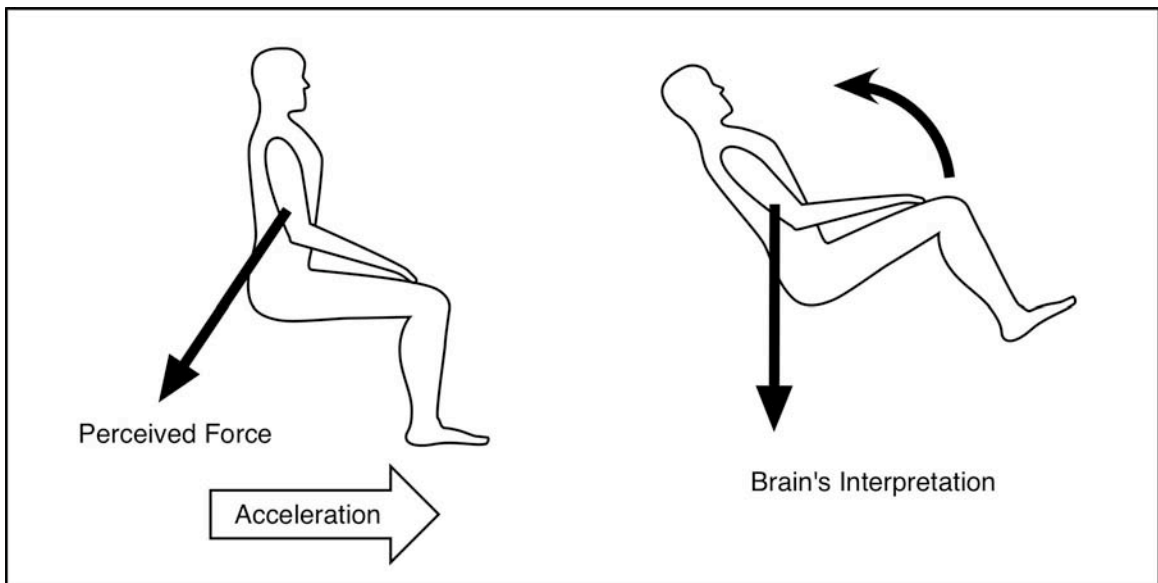


Figure 8.2 – Kinesthetic error. Forward acceleration without visual cues can be misinterpreted by the brain as an increase in pitch attitude.

For example, if we were to accelerate forward without visual cues, our brain may interpret the kinesthetic sensations to mean that we have pitched up, so that gravity, instead of acceleration, is pulling us back into our seats.

Vestibular System

The vestibular system is a very sensitive motion-sensing system located in the inner ears. In both inner ears, three semicircular canals are positioned at approximate right angles to each other, as shown in Figure 8.3. Fine hairs inside the tubes sense fluid movement caused by rotation of the tubes about their axes.

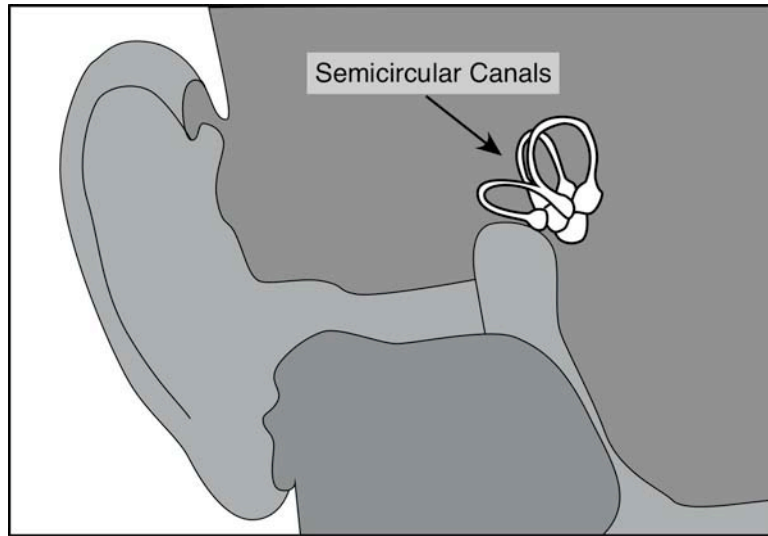


Figure 8.3 – The vestibular system consists of three orthogonal semicircular canals filled with fluid.

Under normal flight conditions when there is visual reference to the horizon and ground, the vestibular system helps to identify the pitch, roll, and yaw movements of the glider. When visual contact with the horizon is lost, the vestibular system becomes unreliable.

The Brain

All visual, kinesthetic, and vestibular information comes together in the brain. Most of the time, the three streams of information agree, giving a clear idea of where and how the body is moving. Flying can sometimes cause these systems to supply conflicting information to the brain, which can lead to disorientation, or as discussed in the following section, motion sickness.

Temporary disorientation can occur even when vision is not obstructed. This can happen, for instance, during a turn if you suddenly move your head, inducing erroneous currents in the vestibular system. This momentary disorientation usually is not a flight hazard.

A more serious type of disorientation occurs when you lose sight of the horizon. This could happen, for instance, if you climb into a cloud. You may think the glider is in level flight when in reality, it is in a gradual turn. If the airspeed then increases, you may experience the sensation of a level dive and pull back on the stick, which tightens the turn and creates increasing G-loads. Eventually, the glider can exceed its load limit and break apart.

Prevention is the best remedy for spatial disorientation. Glider pilots must take care to not fly into clouds.

Motion Sickness

Anyone who has experienced motion sickness knows how unpleasant it can be. Most important for the pilot, motion sickness can cause flight skills to be jeopardized at critical times. Student pilots sometimes experience motion sickness when they first start flight training. The flight instructor will usually recognize the onset of motion sickness and terminate the flight lesson. With increasing experience, the problem usually goes away.

Motion sickness results from the brain's receiving conflicting signals from the visual, kinesthetic, and vestibular systems. Often, we are buffeted by thermals while at an altitude where the eyes cannot detect our movement with respect to the ground. Our vision tells the brain that we are sitting still, yet our vestibular and kinesthetic systems tell the brain we are moving. In short, the brain interprets the discordant signals to mean that it is hallucinating, assumes that it is being poisoned, and responds by telling the stomach to empty itself.

The first symptoms of motion sickness are loss of appetite, collection of saliva in the mouth, and perspiration. These may be followed by nausea, disorientation, headaches, and the desire to vomit. If allowed to become severe enough, motion sickness may incapacitate the pilot.

Pilots susceptible to motion sickness should *not* take the preventive drugs available over-the-counter or by prescription. These drugs can cause drowsiness, depression of brain function, and loss of motor skills.

When suffering from motion sickness, open the air vents, loosen clothing, and use oxygen if available. Keep the eyes focused on a point outside the glider and avoid unnecessary head movements. Terminate the flight as soon as possible.

Many pilots and passengers find that ginger taken in capsules or chewed raw or as candied ginger helps to reduce or eliminate the symptoms of motion sickness.

Dehydration

When you lose more liquid than you ingest, your body gets dehydrated. Breathing dry bottled oxygen, or sweating from exertion, stress, or high temperatures, can all lead to dehydration.

The first effect of dehydration is usually fatigue. This may progress to dizziness, weakness, nausea, tingling of the hands and feet, abdominal cramps, and extreme thirst. At the first stages of dehydration, mental and physical performance is impaired.

It is very important that you have liquids available and drink often while flying. If you do not have to urinate regularly, you are not drinking enough liquids. (The issue of urine disposal while in the glider is discussed in Chapter 15: Cross-Country Soaring.)