

# The effects of dehydration on pilot performance

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There is scant attention given to it. Most pilots overlook it. Some shrug it off. While others simply don't know about its effects in the cockpit. The problem? Pilot dehydration. Most pilots are unaware of its devastating effects and symptoms, which can increase the risk of aircraft incidents and accidents, even during a mildly warm day. So in order to heighten general aviation's awareness of this often-overlooked condition, the Federal Aviation Administration (FAA) has recently added pilot dehydration to its list of physiological conditions found in the latest Practical Test Standards—its symptoms, causes, effects and corrective actions. It believes that educating pilots about dehydration will not only decrease aircraft incidents, but also save your life one day.

Most pilots associate dehydration with thirst and assume that an easy fix is just to drink any type of liquid. This is not always the case. A pilot's dehydration condition can be caused by a lack of water within the body cavity due to high body temperatures, a dry aircraft environment, excess caffeine, antihistamines, inappropriate fluid intake and other factors. Many soft drinks, teas and juice drinks do not constitute good hydration substitutes, as they contain caffeine and sugar that may compromise absorption of the water content.

Hot cockpits and flight lines also cause dehydration. The 130-degree ramp at Phoenix, Arizona., for example, is an obvious cause of dehydration. But what about the 72-degree cockpit? Pilots should concern themselves in that environment, too, since average humidity in the cockpit is low, causing a dramatic increase in fluid loss.

Everyone must be aware that un-replaced water losses equal two percent of body weight and will impact your body's ability to regulate heat. At three percent loss, there is a decrease in muscle cell contraction times. When fluid losses equal four percent of body weight, there is a five to 10 percent drop in overall performance, which can last up to four hours.

According to the Spring 2000 edition of the Federal Air Surgeon Bulletin, there are three stages of heat exhaustion that lead to dehydration: Heat stress, when the body temperature is at 99.5 to 100 degrees Fahrenheit; Heat exhaustion, when the body temperature is at 101 to 105 degrees Fahrenheit; and Heat stroke, when the body temperature is more than 105 degrees Fahrenheit. There's a possibility that there's a subtle change between one stage to another, so you need to be extra careful and continually monitor your condition when flying in hot-weather conditions.

The symptoms of dehydration go beyond thirst. In an effort to respond to the brain's need for fluid, the kidneys reabsorb water through the urine, creating fluid retention and frequent urges to visit the bathroom. Dry skin is also an indicator of dehydration, as the skin gets most of its moisture subdermally. The brain is 75 percent water and, when it needs to replace lost fluid, it can manifest certain symptoms, such as headaches, light-headedness and fatigue. Dehydration also contributes to fuzzy thinking, poor decision-making, dizziness and muscle fatigue. Long-term effects include wrinkled skin, impaired memory function, dry hair, brittle nails, constipation, susceptibility to colds and, because of extremely dry nasal passages, sinus infections.

So how do you avoid dehydration in the cockpit? You'll need to permanently attach yourself to a water bottle and drink from it regularly. The Federal Air Surgeon Bulletin suggests drinking cool, 40-degree Fahrenheit water before feeling thirsty. This will help you stay ahead of the game, keeping you hydrated before the "thirst mechanism" sets in.

But for some, plain bottled water might be offensive. So one alternative to water is to simply drink mineralized (electrolyte) water. Electrolyte drinks, more commonly known as sports drinks, are generally

designed to replace the fluids (water) and electrolytes (sodium, potassium, chromium, manganese, etc.) lost during stress, body temperature regulation and exercise. Most contain sugars which may lower a pilots systemic blood-sugar levels and precipitate fatigue.

The FAA also suggests staying away from coffee, sodas and teas—otherwise called diuretic drinks. These beverages contain caffeine, alcohol and carbonation, which causes excess urine production or decreased voluntary fluid intake—a sure sign of dehydration. In addition, don't over-exercise before a flight, since it can cause a large amount of body fluid loss that is difficult to replace quickly. You also need to keep in mind that acclimation to a major change in weather takes one to two weeks, which can drastically affect your flying abilities. Monitoring personal effects of aging, recent illness, fever, diarrhoea or vomiting can also help you in gauging whether or not you're dehydrated.

But, perhaps, the most important factor in preventing dehydration is to continually be aware of your physiological and environmental conditions. This will help to maintain your rehydration water intake and prevent you from progressing into heat exhaustion and even heat stroke. It's a good plan for a problem that can easily be avoided—all with just a few gulps of water.

### **The Three Stages Of Heat Exhaustion**

1. Heat stress (99.5° to 100° F body temperature) reduces:

- Performance, dexterity and coordination
- Ability to make quick decisions
- Alertness
- Visual capabilities
- Caution and caring

2. Heat exhaustion (101° to 105° F body temperature) symptoms:

- Fatigue
- Nausea/vomiting
- Giddiness
- Cramps
- Rapid breathing
- Fainting

3. Heat stroke (above-105° F body temperature) symptoms:

- Body's heat control mechanism stops working
- Mental confusion
- Disorientation
- Bizarre behavior
- Coma