



**FAA OFFICE OF AVIATION MEDICINE
CIVIL AEROMEDICAL INSTITUTE
PUBLICATIONS**



ALCOHOL AND FLYING

A DEADLY COMBINATION

Alcoholic beverages, used by many to "unwind" or relax, act as a social "ice-breaker," is a way to alter one's mood by decreasing inhibitions. Alcohol consumption is widely accepted, often providing the cornerstone of social gatherings and celebrations. Along with cigarettes, many adolescents associate the use of alcohol as a rite of passage into adulthood.

While its use is prevalent and acceptable in our society, it should not come as a surprise that problems arise in the use of alcohol and the performance of safety-related activities, such as driving an automobile or flying an aircraft. These problems are made worse by the common belief that accidents happen "to other people, but not to me." There is a tendency to forget that flying an aircraft is a highly demanding cognitive and psychomotor task that takes place in an inhospitable environment where pilots are exposed to various sources of stress.



Hard facts about alcohol

- It's a sedative, hypnotic, and addicting drug.
- Alcohol quickly impairs judgment and leads to behavior that can easily contribute to, or cause accidents.

The erratic effects of alcohol

- Alcohol is rapidly absorbed from the stomach and small intestine, and transported by the blood throughout the body. Its toxic effects vary considerably from person to person, and are influenced by variables such as gender, body weight, rate of consumption (time), and total amount consumed.
- The average, healthy person eliminates pure alcohol at a fairly constant rate - about 1/3 to 1/2 oz. of pure alcohol per hour, which is equivalent to the amount of pure alcohol contained in any of the popular drinks listed in Table 1. This rate of elimination of alcohol is relatively constant, regardless of the total amount of alcohol consumed. In other words, whether a person consumes a few or many drinks, the rate of alcohol elimination from the body is essentially the same. Therefore, the more alcohol an individual consumes, the longer it takes his/her body to get rid of it.
- Even after complete elimination of all of the alcohol in the body, there are undesirable effects-

hangover-that can last 48 to 72 hours following the last drink.

- The majority of adverse effects produced by alcohol relate to the brain, the eyes, and the inner ear—three crucial organs to a pilot.
- Brain effects include impaired reaction time, reasoning, judgment, and memory. Alcohol decreases the ability of the brain to make use of oxygen. This adverse effect can be magnified as a result of simultaneous exposure to altitude, characterized by a decreased partial pressure of oxygen.
- Visual symptoms include eye muscle imbalance, which leads to double vision and difficulty focusing.
- Inner ear effects include dizziness, and decreased hearing perception.
- If other variables are added, such as sleep deprivation, fatigue, medication use, altitude hypoxia, or flying at night or in bad weather, the negative effects are significantly magnified.

Type Beverage	Typical Serving (oz.)	Pure Alcohol Content (oz.)
Table Wine	4	.48
Light Beer	12	.48
Aperitif Liquor	1.5	.38
Champagne	4	.48
Vodka	1	.50
Whiskey	1.25	.50

Table 1. Amount of alcohol in various alcoholic beverages.

Table 2 summarizes some of the effects of various blood alcohol concentrations. The blood alcohol content values in the table overlap because of the wide variation in alcohol tolerance among individuals.

0.01-0.05 (10-50 mg%)	average individual appears normal
0.03-0.12* (30-120 mg%)	mild euphoria, talkativeness, decreased inhibitions, decreased attention, impaired judgment, increased reaction time
0.09-0.25 (90-250 mg%)	emotional instability, loss of critical judgment, impairment of memory and comprehension, decreased sensory response, mild muscular incoordination

0.18-0.30 (180-300 mg%)	confusion, dizziness, exaggerated emotions (anger, fear, grief) impaired visual perception, decreased pain sensation, impaired balance, staggering gait, slurred speech, moderate muscular incoordination
0.27-0.40 (270-400 mg%)	apathy, impaired consciousness, stupor, significantly decreased response to stimulation, severe muscular incoordination, inability to stand or walk, vomiting, incontinence of urine and feces
0.35-0.50 (350-500 mg%)	unconsciousness, depressed or abolished reflexes, abnormal body temperature, coma; possible death from respiratory paralysis (450 mg% or above)

* Legal limit for motor vehicle operation in most states is .08 or .10% (80-100 mg of alcohol per dL of blood).

Table 2. Some of the effects of various blood alcohol concentrations.

Studies of how alcohol affects pilot performance

- Pilots have shown impairment in their ability to fly an ILS approach or to fly IFR, and even to perform routine VFR flight tasks while under the influence of alcohol, regardless of individual flying experience.
- The number of serious errors committed by pilots dramatically increases at or above concentrations of 0.04% blood alcohol. This is not to say that problems don't occur below this value. Some studies have shown decrements in pilot performance with blood alcohol concentrations as low as the 0.025%.

Year	General Aviation Pilot Fatalities	Pilots with BAC of 0.02% or more*	Piots with BAC of 0.04% or more *
1987	341	13.5%	8.5%
1988	364	6.6%	6.3%
1989	349	12.9%	8.0%
1990	367	14.2%	7.9%
1991	379	12.9%	7.9%
1992	396	11.9%	7.3%
1993	338	12.7%	8.9%

*Some cases may include alcohol produced after death by tissue decomposition.

BAC= Blood alcohol concentration

Table 3. Fatal general aviation accidents with alcohol as possible contributing factor.

Studies of fatal accidents

Table 3 shows the annual alcohol-related pilot fatalities in general aviation accidents between 1987 and 1993, as reported by the Forensic Toxicology Research Section of the FAA Civil Aeromedical Institute. This information is based on the analysis of blood and tissue samples from pilots involved in fatal aviation accidents.

Hangovers are dangerous

A hangover effect, produced by alcoholic beverages after the acute intoxication has worn off, may be just as dangerous as the intoxication itself. Symptoms commonly associated with a hangover are headache, dizziness, dry mouth, stuffy nose, fatigue, upset stomach, irritability, impaired judgment, and increased sensitivity to bright light. A pilot with these symptoms would certainly not be fit to safely operate an aircraft. In addition, such a pilot could readily be perceived as being "under the influence of alcohol."

You are in control

Flying, while fun and exciting, is a precise, demanding, and unforgiving endeavor. Any factor that impairs the pilot's ability to perform the required tasks during the operation of an aircraft is an invitation for disaster.

The use of alcohol is a significant self-imposed stress factor that should be eliminated from the cockpit. The ability to do so is strictly within the pilot's control.

Federal Aviation Regulation (FAR) 91.17

The use of alcohol and drugs by pilots is regulated by FAR 91.17. Among other provisions, this regulation states that no person may operate or attempt to operate an aircraft:

- within 8 hours of having consumed alcohol
- while under the influence of alcohol
- with a blood alcohol content of 0.04% or greater
- while using any drug that adversely affects safety

Keep in mind that regulations alone are no guarantee that problems won't occur. It is far more important for pilots to understand the negative effects of alcohol and its deadly impact on flight safety.

General Recommendations

1. As a minimum, adhere to all the guidelines of FAR 91.17:
 - o 8 hours from "bottle to throttle"
 - o do not fly while under the influence of alcohol
 - o do not fly while using any drug that may adversely affect safety
2. A more conservative approach is to wait 24 hours from the last use of alcohol before flying. This is especially true if intoxication occurred or if you plan to fly IFR. Cold showers, drinking black coffee, or breathing 100% oxygen cannot speed up the elimination of alcohol from the body.
3. Consider the effects of a hangover. Eight hours from "bottle to throttle" does not mean you are in the best physical condition to fly, or that your blood alcohol concentration is below the legal limits.
4. Recognize the hazards of combining alcohol consumption and flying.
5. Use good judgment. Your life and the lives of your passengers are at risk if you drink and fly.

Ideally, total avoidance of alcohol should be a key element observed by every pilot in planning or accomplishing a flight.



Alcohol avoidance is as critical as developing a flight plan, a good preflight inspection, obeying ATC procedures, and avoiding severe weather.

ALCOHOL USE IN AMERICA

- Over 50% of American adults consume alcohol.
- Per capita consumption is about 25 gallons per year.
- Alcoholic beverages are marketed in a variety of forms, with wine and beer being the most liked.
- Different alcoholic beverages have different concentrations of alcohol; however, their total alcohol content can be the same. For example, a pint of beer contains as much alcohol as a 5 1/2 ounce glass of table wine. Therefore, the notion that drinking low-concentration alcoholic beverages is safer than drinking hard liquor is erroneous.
- The total alcohol content of any alcoholic beverage can be easily calculated using the following formula: "Proof" divided by 2 = percent pure alcohol.



Medical Facts for Pilots

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