

American College of Sports Medicine Position Statement on: The Use of Alcohol in Sports

Based upon a comprehensive analysis of the available research relative to the effects of alcohol upon human physical performance, it is the position of the American College of Sports Medicine that:

1. The acute ingestion of alcohol can exert a deleterious effect upon a wide variety of psychomotor skills such as reaction time, hand-eye coordination, accuracy, balance, and complex coordination.
2. Acute ingestion of alcohol will not substantially influence metabolic or physiological functions essential to physical performance such as energy metabolism, maximal oxygen consumption ($\dot{V}\cdot\text{O}_{2\text{max}}$), heart rate, stroke volume, cardiac output, muscle blood flow, arteriovenous oxygen difference, or respiratory dynamics. Alcohol consumption may impair body temperature regulation during prolonged exercise in a cold environment.
3. Acute alcohol ingestion will not improve and may decrease strength, power, local muscular endurance, speed, and cardiovascular endurance.
4. Alcohol is the most abused drug in the United States and is a major contributing factor to accidents and their consequences. Also, it has been documented widely that prolonged excessive alcohol consumption can elicit pathological changes in the liver, heart, brain, and muscle, which can lead to disability and death.
5. Serious and continuing efforts should be made to educate athletes, coaches, health and physical educators, physicians, trainers, the sports media, and the general public regarding the effects of acute alcohol ingestion upon human physical performance and on the potential acute and chronic problems of excessive alcohol consumption.

Research Background for the Position Statement

This position statement is concerned primarily with the effects of acute alcohol ingestion upon physical performance and is based upon a comprehensive review of the pertinent international literature. When interpreting these results, several precautions should be kept in mind. First, there are varying reactions to alcohol ingestion, not only among individuals, but also within an individual depending upon the circumstances. Second, it is virtually impossible to conduct double-blind placebo research with alcohol because subjects can always tell when alcohol has been consumed. Nevertheless, the results cited below provide us with some valid general conclusions relative to the effects of alcohol on physical performance. In most of the research studies, a small dose consisted of 1.5-2.0 ounces (45-60 ml) of alcohol, equivalent to a blood alcohol level (BAL) of 0.04-0.05 in the average-size male. A moderate dose was equivalent to 3-4 ounces (90-120 ml), or a BAL of about 0.10. Few studies employed a large dose, with a BAL of 0.15.

1. Athletes may consume alcohol to improve psychological function, but it is psychomotor performance that deteriorates most. A consistent finding is the impairment of information processing. In sports involving rapid reactions to changing stimuli, performance will be affected most adversely. Research has shown that small to moderate amounts of alcohol will impair reaction time,^[8,25,26,34-36,42] hand-eye coordination,^[8,9,14,40] accuracy,^[36,39] balance,^[3] and complex coordination or gross motor skills.^[4,8,22,36,41] Thus, while Coopersmith^[10] suggests that alcohol may improve self-confidence, the available research reveals a deterioration in psychomotor performance.
2. Many studies have been conducted relative to the effects of acute alcohol ingestion upon metabolic and physiological functions important to physical performance. Alcohol ingestion exerts no beneficial influence relative to energy sources for exercise. Muscle glycogen at rest was significantly lower after alcohol compared to control.^[30] However, in exercise at 50% maximal oxygen uptake ($\dot{V}\cdot\text{O}_{2\text{max}}$), total glycogen depletion in the leg muscles was not affected by alcohol.^[30] Moreover, Juhlin-Dannfelt et al.^[29] have shown that although alcohol does not impair lipolysis or free fatty acid (FFA) utilization during

exercise, it may decrease splanchnic glucose output, decrease the potential contribution from liver gluconeogenesis, elicit a greater decline in blood glucose levels leading to hypoglycemia, and decrease the leg muscle uptake of glucose during the latter stages of a 3-h run. Other studies^[17-19] have supported the theory concerning the hypoglycemic effect of alcohol during both moderate and prolonged exhaustive exercise in a cold environment. These studies also noted a significant loss of body heat and a resultant drop in body temperature and suggested alcohol may impair temperature regulation. These changes may impair endurance capacity.

In one study,^[5] alcohol has been shown to increase oxygen uptake significantly during submaximal work and simultaneously to decrease mechanical efficiency, but this finding has not been confirmed by others.^[6,15,33,44] Alcohol appears to have no effect on maximal or near-maximal $\dot{V}\cdot\text{O}_2$.^[5-7,44]

The effects of alcohol on cardiovascular-respiratory parameters associated with oxygen uptake are variable at submaximal exercise intensities and are negligible at maximal levels. Alcohol has been shown by some investigators to increase submaximal exercise heart rate^[5,20,23] and cardiac output,^[5] but these heart rate findings have not been confirmed by others.^[6,15,33,36,44] Alcohol had no effect on stroke volume,^[5] pulmonary ventilation,^[5,15] or muscle blood flow^[16,30] at submaximal levels of exercise, but did decrease peripheral vascular resistance.^[5] During maximal exercise, alcohol ingestion elicited no significant effect upon heart rate,^[5-7] stroke volume and cardiac output, arteriovenous oxygen difference, mean arterial pressure and peripheral vascular resistance, or peak lactate,^[5] but did significantly reduce tidal volume resulting in a lowered pulmonary ventilation.^[5]

In summary, alcohol appears to have little or no beneficial effect on the metabolic and physiological responses to exercise. Further, in those studies reporting significant effects, the change appears to be detrimental to performance.

3. The effects of alcohol on tests of fitness components are variable. It has been shown that alcohol ingestion may decrease dynamic muscular strength,^[24] isometric grip strength,^[36] dynamometer strength,^[37] power^[20] and ergographic muscular output.^[28] Other studies^[13,20,24,27,43] reported no effect of alcohol upon muscular strength. Local muscular endurance was also unaffected by alcohol ingestion.^[43] Small doses of alcohol exerted no effect upon bicycle ergometer exercise tasks simulating a 100-m dash or a 1500-m run, but larger doses had a deleterious effect.^[2] Other research has shown that alcohol has no significant effect upon physical performance capacity,^[15,16] exercise time at maximal levels,^[5] or exercise time to exhaustion.^[7]

Thus, alcohol ingestion will not improve muscular work capacity and may lead to decreased performance levels.

4. Alcohol is the most abused drug in the United States.^[11] There are an estimated 10 million adult problem drinkers and an additional 3.3 million in the 14-17 age range. Alcohol is significantly involved in all types of accidents—motor vehicle, home, industrial, and recreational. Most significantly, half of all traffic fatalities and one-third of all traffic injuries are alcohol related. Although alcohol abuse is associated with pathological conditions such as generalized skeletal myopathy, cardiomyopathy, pharyngeal and esophageal cancer, and brain damage, its most prominent effect is liver damage.^[11,31,32]

5. Because alcohol has not been shown to help improve physical performance capacity, but may lead to decreased ability in certain events, it is important for all those associated with the conduct of sports to educate athletes against its use in conjunction with athletic contests. More over, the other dangers inherent in alcohol abuse mandate that concomitantly we educate our youth to make intelligent choices regarding alcohol consumption. Anstie's rule, or limit,^[1] may be used as a reasonable guideline to moderate, safe drinking for adults.^[12] In essence, no more than 0.5 ounces of pure alcohol per 23 kg body weight should be consumed in any one day. This would be the equivalent of three bottles of 4.5% beer, three 4- ounce glasses of 14% wine, or three ounces of 50% whiskey for a 68-kg person.

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