CENTER OF ALCOHOL STUDIES

THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS

FACTS ON:

DRIVING WHILE IMPAIRED

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Many factors contribute to motor vehicle related injuries, including vehicle design and function, roadway characteristics (e.g., traffic volume, speed, lighting, weather conditions) and driver characteristics such as experience, gender, personality and health, including state of brain function. These variables should be considered in reaching conclusions about the causes of a crash. For example, unintended acceleration accidents, once thought to be due to faulty throttle or braking systems, are now believed to have been due largely to driver error. Highways and rural areas are the scene of more fatal crashes than urban roadways, in part, because of higher driving speeds and resulting crash severity on these roadways. Young males have more driving accidents and are at greater risk than young females because of a combination of factors, and older drivers are also at increased risk in comparison to younger drivers because of nervous system changes in sensory perception, reaction time and other age-related changes. However, one variable stands out. Up to 40% of all fatal accidents involve alcohol.

The most important driver characteristic necessary for safe motor vehicle operation, and the human variable most quickly altered by a variety of factors, is mental state. Alcohol, other drugs, sleep deprivation, competing tasks (e.g., cell phone use) significantly impair the psychomotor and cognitive skills needed to drive safely.

There are many identified risk factors in DWI crashes. In 1997, one in seven drivers aged 16-20 years of age, and one in four drivers aged 21-24 years old who were involved in fatal crashes had blood alcohol concentrations (BACs) of .10% or more. Men who die in car crashes are twice as likely to be intoxicated at .10% or more than women. When compared to drivers who have never been arrested for drunk driving, 21-34 year olds who are arrested for drunk driving are four times as likely to die in a future crash due to intoxication. About one in four Americans are likely to be involved in an alcohol-related crash during their lifetime. More drunk driving crashes occur late at night and on weekends.

Alcohol and other central nervous system depressants impair the ability to divide attention among the many factors involved in safe driving. Current studies have demonstrated that impairment at a BAC of .02% is measurable not only in laboratory studies of divided attention, as indicated by prior research, but in field investigations of fatal crashes. Attending to lane position, curves, intersections, traffic control devices, presence of other vehicles, etc., while driving is particularly difficult, even at relatively low levels of intoxication. A BAC of .02% can be obtained in most drinkers after approximately 2 standard drinks in an hour, depending upon various biological factors (e.g., body size, gender, rates of absorption and metabolism). At BACs well below .08-.10%, variability in lane position, increased brake use, decreased steering ability, gear changing and steering errors are commonly detected during closed course driving tests. Although some studies suggest that there is a relationship between level of intoxication and crash responsibility, some drivers, intoxicated or sober, are involved in crashes due to the mistakes of others, through no fault of their own. Therefore, studies of relative risk based upon single vehicle crash data are particularly useful in demonstrating the multiplicative increase in relative risk for a fatal crash as a function of BAC, younger age and male gender. Table 1 shows the relative risk for a crash for drivers 21-35 years old. Younger drivers (16-20) are at significantly greater risk than illustrated (e.g., at a BAC of .10-.149%, 16-20 year old males have a relative risk for a fatal crash that is about 50-1200 times greater than non-intoxicated controls).

At this time, virtually every state has established that a blood alcohol level of .08% is a violation of the drinking-driving statute of that state. Many states have a *per se* statute defines the BAC at which it is presumed that all drivers are intoxicated and cannot drive safely, regardless of actual motor vehicle operation. Federal law uses a BAC of .04% to define intoxication for commercial vehicle operators, and all states have lower or zero tolerance legal definitions (e.g., zero to .02%) for underage drinkers. Most other countries use BACs of .02-.05% to define intoxicated driving. For drugs other than alcohol, many legislatures use the mere presence of the drug, not its concentration in the human body to define impaired or intoxicated driving.

Although beer is the most commonly reported alcohol beverage consumed prior to a crash, the type of beverage bears no relationship to driving impairment. It is the drug ethanol, not the beverage in which it is delivered, that causes impairment. Even though driving ability is significantly impaired at low BACs, the ability to detect impairment due to intoxication without special tests or knowledge does not reliably occur until BACs are very high (e.g., .15% or more).

TABLE 1. RELATIVE RISK FOR FATAL CRASH* AND BIOBEHAVIORAL EFFECTS OF ALCOHOL**

%BAC	~Relative Risk Males/Females Ages 21-34	Biobehavioral Effects
.020-.049%	2 ½ - 3x	Impaired on some lab tests. Start of increased risk for fatal crash
.050-.079%	6-8x	0.04% and higher defines intoxication in many European countries and for commercial vehicle operators in the US
.080-.099%	11-17x	0.08% defines intoxicated driving in the majority of the states in the US
.100-.149%	28-49x	At 0.10%, most drinkers show impairment in SFSTs and would be by law, intoxicated in about 15 states
.150+%	> 343x	Most people appear visibly intoxicated at 0.15% without special tests
.30%		Most people lose consciousness above this level
.35%		Realm of surgical anesthesia
.40%		Lethal concentration for about half the population

* Modified from Zador, et al., (2000).
**Modified from Brick and Erickson (1999)

Numerous behavioral tests are employed by law enforcement officers to determine if someone is impaired, but only one test battery of Standardized Field Sobriety Tests (SFSTs) is specifically designed to detect intoxication at BACs of ≥ .10%. The original scientifically validated study for alcohol used three tests: Walk and Turn (68-80% accuracy in determining BAC of.10% or more), One Leg Balance (65-78%) and a test of eye movement, Horizontal Gaze Nystagmus (77-82%). Higher accuracy scores are achieved when tests are combined. When properly administered and scored, and particularly when combined with chemical tests (blood or breath), these tests provide convincing evidence of impairment due to alcohol use. Drug Recognition Evaluations (DREs) which include SFSTs and other measures, may provide evidence that a drug was ingested and psychoactive at the time of testing.

Alcohol and other drugs are a particularly fatal combination, especially among men aged 25-54. Although drugs other than alcohol are involved in about one in four fatal crashes, other factors, including sleep deprivation, have detrimental effects on drivers. For example, over 1300 fatal drowsy-driver crashes occur annually. Preliminary studies suggest that 36 hours of wakefulness, like alcohol intoxication, results in increased driving speed, lane excursions, and crashes.

Impaired driving takes many forms. Future prevention efforts would benefit from increased research and public awareness of this problem.

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