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Friday, April 15, 2011

Bac (Blood alcohol content)

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lood alcohol content, or BAC, (also called *Blood alcohol content*, *blood alcohol concentration*, *blood ethanol concentration*, *Blood Alcohol Level* (BAL)) is most commonly used as a metric of [intoxication](#) for legal or medical purposes. It is usually expressed as a **fractional percentage** in terms of **volume** of alcohol per liter of blood in the body. That is commonly expressed without units, or as a decimal with 2-3 significant digits followed by a percentage sign, which means 1/100 of the previous number (e.g., 0.0008 expressed as a percentage = 0.08%). Each country or state may define BAC differently. For example, the U.S. state of California defines their BAC as a ratio of grams of alcohol per 100 milliliters of blood,^[1] which is equal to grams of alcohol per deciliter of blood.

Since measurement must be accurate and inexpensive, several measurement techniques are used as proxies to approximate the true parts per million measure. Some of the most common are listed here: (1) Mass of alcohol per volume of exhaled breath (e.g. 0.38 mg/L; see also [breath gas analysis](#)), (2) Mass per volume of blood in the body (e.g.: 0.08 g/dL), and (3) Mass of alcohol per mass of the body (e.g.: 0.0013 g/Kg).

The number of drinks consumed is often a poor measure of blood alcohol content, largely because of variations in weight, sex and body fat.

An ethanol level of 0.10% is equal to 22 mmol/l or 100 mg/dl of blood alcohol.^{[2][3]} This same 0.10% BAC also equates to 0.10 g/dL of blood alcohol or 0.10 g/210L of exhaled breath alcohol or 0.476 mg/L of exhaled breath alcohol. Likewise, 0.10 mg/L of exhaled breath alcohol converts to 0.02% BAC, 0.022 g/dL of blood alcohol or 0.022 g/210L of exhaled breath alcohol.

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Effects at different levels [\[edit\]](#)

See also: [Short-term effects of alcohol](#) and [Alcohol equivalence](#)

Progressive effects of alcohol ^[4]		
BAC (% by vol.)	Behavior	Impairment
0.010–0.029	<ul style="list-style-type: none">Average individual appears normal	<ul style="list-style-type: none">Subtle effects that can be detected with special tests

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0.030–0.059	<ul style="list-style-type: none">• Mild euphoria• Sense of well-being• Relaxation• Joyousness• Talkativeness• Decreased inhibition	<ul style="list-style-type: none">• Concentration
0.06–0.09	<ul style="list-style-type: none">• Blunted feelings• Disinhibition• Extroversion	<ul style="list-style-type: none">• Reasoning• Depth perception• Peripheral vision• Glare recovery
0.10–0.19	<ul style="list-style-type: none">• Over-expression• Emotional swings• Angriiness or sadness• Boisterousness• Super human feeling• Decreased libido	<ul style="list-style-type: none">• Reflexes• Reaction time• Gross motor control• Staggering• Slurred speech
0.20–0.29	<ul style="list-style-type: none">• Stupor• Loss of understanding• Impaired sensations	<ul style="list-style-type: none">• Severe motor impairment• Loss of consciousness• Memory
0.30–0.39	<ul style="list-style-type: none">• Severe CNS depression• Unconsciousness• Death is possible	<ul style="list-style-type: none">• Bladder function• Breathing• Heart rate
≥0.40	<ul style="list-style-type: none">• General lack of behavior• Unconsciousness• Death	<ul style="list-style-type: none">• Breathing• Heart rate

Standard drink chart (US) ^[5]					
Alcohol	Amount (ml)	Amount (fl oz)	Serving size	Alcohol (% by vol.)	Alcohol
80 proof liquor	44	1.5	One shot	40	0.6 US fl oz (18 ml)
Table wine	148	5	One glass	12	0.6 US fl oz (18 ml)
Beer	355	12	One can	5	0.6 US fl oz (18 ml)

Male Female	Approximate blood alcohol percentage (by vol.) ^[6]									
	One drink has 0.5 US fl oz (15 ml) alcohol by volume									
Drinks	Body weight									
	40 kg	45 kg	55 kg	64 kg	73 kg	82 kg	91 kg	100 kg	109 kg	
	90 lb	100 lb	120 lb	140 lb	160 lb	180 lb	200 lb	220 lb	240 lb	
1	– 0.05	0.04 0.05	0.03 0.04	0.03 0.03	0.02 0.03	0.02 0.03	0.02 0.02	0.02 0.02	0.02 0.02	
2	– 0.10	0.08 0.09	0.06 0.08	0.05 0.07	0.05 0.06	0.04 0.05	0.04 0.05	0.03 0.04	0.03 0.04	
3	– 0.15	0.11 0.14	0.09 0.11	0.08 0.10	0.07 0.09	0.06 0.08	0.06 0.07	0.05 0.06	0.05 0.06	
4	– 0.20	0.15 0.18	0.12 0.15	0.11 0.13	0.09 0.11	0.08 0.10	0.08 0.09	0.07 0.08	0.06 0.08	
5	– 0.25	0.19 0.23	0.16 0.19	0.13 0.16	0.12 0.14	0.11 0.13	0.09 0.11	0.09 0.10	0.08 0.09	
6	– 0.30	0.23 0.27	0.19 0.23	0.16 0.19	0.14 0.17	0.13 0.15	0.11 0.14	0.10 0.12	0.09 0.11	
7	– 0.35	0.26 0.32	0.22 0.27	0.19 0.23	0.16 0.20	0.15 0.18	0.13 0.16	0.12 0.14	0.11 0.13	
8	– 0.40	0.30 0.36	0.25 0.30	0.21 0.26	0.19 0.23	0.17 0.20	0.15 0.18	0.14 0.17	0.13 0.15	
9	–	0.34	0.28	0.24	0.21	0.19	0.17	0.15	0.14	

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 borderlands
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	0.45	0.41	0.34	0.29	0.26	0.23	0.20	0.19	0.17
10	–	0.38	0.31	0.27	0.23	0.21	0.19	0.17	0.16
	0.51	0.45	0.38	0.32	0.28	0.25	0.23	0.21	0.19
Subtract approximately 0.01 every 40 minutes after drinking.									

Units of measurement

[edit]

There are several different units in use around the world for defining blood alcohol concentration. Each is defined as either a mass of alcohol per volume of blood or a mass of alcohol per mass of blood (never a volume per volume). 1 milliliter of blood is approximately equivalent to 1.06 grams of blood. Because of this, units by volume are similar but not identical to units by mass. In the U.S. the concentration unit 1% w/v (percent weight/volume, equivalent to 10g/l or 1g per 100ml) is in use^[7]. This is not to be confused with the amount of alcohol measured on the breath, as with a breathalyzer. The amount of alcohol measured on the breath is generally accepted to be proportional to the amount of alcohol present in the blood at a rate of 1:2100. Therefore, a breathalyzer measurement of 0.10 mg/L of breath alcohol converts to 0.021 g/210L of breath alcohol, or 0.021 g/dL of blood alcohol (the units of the BAC in the United States).

Unit	Dimensions	Equivalent to	Used in
1 percent (%) BAC by volume	1/100 g/mL = 1 cg/mL	9.43 mg/g, 217.4 mmol/L	United States, Australia, Canada, Spain
1 permille (‰) BAC by volume	1/1000 g/mL = 1 mg/mL	0.943 mg/g, 21.7 mmol/L	Netherlands, Lithuania, Latvia, Poland, Switzerland, Austria, Romania, Turkey
1 basis point (‱) BAC by volume	1/10,000 g/mL = 100 µg/mL	94.3 ppm, 2.17 mmol/L	Britain
1 permille (‰) BAC by mass	1/1000 g/g = 1 mg/g	1.06 mg/mL, 23 mmol/L	Finland, Norway, Sweden, Denmark, Germany
1 part per million (ppm)	1/1,000,000 g/g = 1 µg/g	1.06 µg/mL, 23 µmol/L	

Legal limits

[edit]

For purposes of law enforcement, blood alcohol content is used to define intoxication and provides a rough measure of impairment. Although the degree of impairment may vary among individuals with the same blood alcohol content, it can be measured objectively and is therefore legally useful and difficult to contest in court. Most countries disallow operation of motor vehicles and heavy machinery above prescribed levels of blood alcohol content. Operation of boats and aircraft are also regulated.

The alcohol level at which a person is considered to be legally impaired varies by country. The list below gives limits by country. These are typically blood alcohol content limits for the operation of a vehicle. In the United States, the legal limit can vary by state but (for all states as of 2011) is 0.08 blood alcohol content as measured by a breath device, urinalysis or blood test. This legal limit is down from 0.15 just a few decades previously.^[8]

Zero tolerance, (It is illegal to have any alcohol in your blood while driving in these countries.)

Since there is always some amount of alcohol even in non-drinkers' bodies, they have to have some legal guidelines for determining what behavior is illegal. Often that guideline is something like impairment in driving to any degree that can be shown to be probably caused by recent alcohol consumption.

- [Czech Republic](#)
- [Slovakia](#)
- [Romania](#) (beyond 0.08% drivers will not only receive a fine and have their license suspended, the offense will also be added to their criminal records.)
- [Russia](#)
- [Saudi Arabia](#)
- [United Arab Emirates](#)
- [Brazil](#)
- [Bangladesh](#)
- [Hungary](#)
- [Canada](#) - new drivers undergoing [graduated licensing](#) in [Ontario](#), [Quebec](#), [Northwest Territories](#), [Manitoba](#), [Alberta](#), [Saskatchewan](#), [British Columbia](#), [Nova Scotia](#) and [New Brunswick](#); drivers under the age of 22 in [Ontario](#)^[9]

0.02%

- [China](#)
- [Estonia](#)
- [Poland](#)
- [Norway](#) (road vehicles)

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Christina Grimmie

Jonah Hex

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Yuri Gagarin

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helen mirren use electronic cigarette from
stumble...

- [Netherlands](#) (for drivers in their first five years after gaining a driving license)^[10]
- [Sweden](#)
- [Puerto Rico](#) (for drivers 18–20 years old)^[11]

0.03%

- [India](#) (note: In the State of Kerala, a policy of zero tolerance has developed.)^[12]
- [Serbia](#)
- [Japan](#)^[13]
- [Uruguay](#)^[14] (0.00% for truck/taxi/bus drivers)^[15]

0.04%

- [Lithuania](#) (0.02% for drivers in their first two years after gaining a driving license)
- [Canada: Saskatchewan](#) - provincial offense

0.05%

- [Argentina](#) (0.02% for motorbikes, 0.00% for truck/taxi/bus drivers)
- [Australia](#) (0.00% for [Australian Capital Territory](#) learner, probationary & convicted DUI drivers (changed down from 0.02% on December 1, 2010), 0.02% for truck/bus/taxi, 0.00% for learner drivers, provisional/probationary drivers (regardless of age), truck and bus drivers, driving instructors and DUI drivers in all other states)
- [Austria](#)
- [Belarus](#)
- [Belgium](#)
- [Bulgaria](#)
- [Canada](#): British Columbia, Ontario, Manitoba, [Newfoundland](#), Nova Scotia - provincial offence
- [Costa Rica](#)^[16]
- [Croatia](#)
- [Denmark](#)
- [Finland](#)
- [France](#) (0.025% for bus drivers)^[17]
- [Germany](#) (0.00% for learner drivers, all drivers 18-21 and newly licensed drivers of any age for first two years of licence; also, if the BAC exceeds 0.03%, driving is illegal if the driver is showing changes in behavior ("Relative Fahruntüchtigkeit"))
- [Greece](#)
- [Hong Kong](#)
- [Iceland](#)
- [Ireland](#) (0.02% for learner drivers and professional drivers)^[18]
- [Israel](#) (240µg/L of air. 50µg/L of air for drivers under 24 and professional drivers)
- [Italy](#)
- [Latvia](#) (0.02% for drivers in their first two years after gaining a driving license)
- [Luxembourg](#)
- [Macedonia](#) (0.00% for drivers in their first two years after gaining a driving license)
- [Netherlands](#) (0.02% for drivers in their first five years after gaining a driving license)^[10]
- [Peru](#)
- [Portugal](#)
- [Slovenia](#) (0.00% for drivers in their first two years after gaining a drivers licence, drivers under 21 and common drivers, such as buses, trucks...)
- [South Africa](#)
- [Spain](#) (0.03% for drivers in their first two years after gaining a driving license and common carriers, such as buses, trucks...)
- [Switzerland](#)
- [Thailand](#)
- [Taiwan](#)
- [Turkey](#)

0.08%

- [Canada](#)^[19] - criminal offence
- [Malaysia](#)
- [Malta](#)
- [Mexico](#)
- [New Zealand](#) (0.03% for drivers under 20)
- [Norway](#) (legal limit for some sea vessels)
- [Puerto Rico](#) (for drivers 21 years and older)^[11]
- [Singapore](#)^[20]
- [United Kingdom](#)^[21] (0.02% for operators of fixed-wing aircraft)
- [United States](#)

Drivers under 21 (the most common US legal drinking age), however, are held to stricter standards under [zero](#)

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tolerance laws. Adopted in varying forms in all states, these laws hold the driver to much lower blood alcohol content levels for criminal and/or license suspension purposes, commonly 0.01% to 0.05%. Many states have statutory regulations regarding driving while "under the influence" of an intoxicant and a different law for driving beyond the legal blood alcohol concentration. A large number of laws apply from Federal regulatory bodies, states, counties, and cities. For further information on U.S. laws restrictions on alcohol sales, see [Alcohol laws of the United States by state](#). Federal Aviation Administration: 0.01% for operators of common carriers, such as buses, for pilots 0.019% to fly, .039 without loss of medical (no fly until .019 or below), .04 permanent revocation of license for pilots, no alcohol within 8 hours per Federal Aviation Regulations^[22] Federal Motor Carrier Safety Administration: 0.04% for drivers driving a commercial vehicle which requires a [Commercial Driver's License](#) otherwise 0.08%.^[23]

- Blood alcohol content measures and proxies (such as breath PPM and blood alcohol content measured as mass/volume) are commonly coded into the law to provide prima-facie cases (much like speed limits). A driver measured to be over the allowed blood alcohol content limit has automatic penalties. But even below those levels, drivers can have civil liability and other criminal guilt. For example, in some state statutes (e.g., AZ), any driving impairment to any degree caused by alcohol consumption can be a civil or criminal offense in addition to other offenses at higher blood alcohol content levels.

0.1%

- Legally [drunk](#) in some jurisdictions

0.15%

- [Norway](#) (legal limit for other sea vessels)

Limits by country (BrAC: Breath Alcohol Content)

[\[edit\]](#)

In certain countries, alcohol limits are determined by the Breath Alcohol Content (BrAC), not to be confused with blood alcohol content (BAC).

- In [Greece](#), the BrAC limit is 25 microgrammes of alcohol per 100 millilitres of breath. The limit in blood is 0.50 g/l.
 - BrAC 25–40 = €200 fine
 - BrAC 40–60 = €700 fine, plus suspension of driving license for 90 days(introduced in 2007,^[24]
 - BrAC >60 = 2 months imprisonment, plus suspension of driving license for 180 days, plus €1,200 fine
- In [Hong Kong](#), the BrAC limit is 220 microgrammes per litre of breath (as well as other defined limits)
- In [The Netherlands](#) and [Finland](#), the BrAC limit is 220 microgrammes of alcohol per litre of breath (µg/l, colloquially known as "Ugl").
- In [Singapore](#), the BrAC limit is 350 microgrammes of alcohol per litre of breath.^[20]
- In [Spain](#) the BrAC limit is 250 microgrammes of alcohol per litre of breath and 150 microgrammes per litre of breath for drivers in their first two years after gaining a driving licence and common carriers.
- In the [United Kingdom](#) the BrAC limit is 350 microgrammes of alcohol per litre of breath (as well as the above defined blood alcohol content).

Other limitation schemes

[\[edit\]](#)

- For [South Korea](#), the penalties for different blood alcohol content levels include
 - 0.01–0.049 = No Penalty
 - 0.05–0.09 = 100 days license suspension
 - >0.10 = Cancellation of car license.

Test assumptions

[\[edit\]](#)



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Blood alcohol tests assume the individual being tested is average in various ways. For example, on average the ratio of blood alcohol content to breath alcohol content (the *partition ratio*) is 2100 to 1. In other words, there are 2100 parts of alcohol in the blood for every part in the breath. However, the actual ratio in any given individual can vary from 1300:1 to 3100:1, or even more widely. This ratio varies not only from person to person, but within one person from moment to moment. Thus a person with a true blood alcohol level of .08 but a partition ratio of 1700:1 at the time of testing would have a .10 reading on a Breathalyzer calibrated for the average 2100:1 ratio.

A similar assumption is made in [urinalysis](#). When urine is analyzed for alcohol, the assumption is that there are 1.3 parts of alcohol in the urine for every 1 part in the blood, even though the actual ratio can vary greatly.

Breath alcohol testing further assumes that the test is *post-absorptive*—that is, that the absorption of alcohol in the subject's body is complete. If the subject is still actively absorbing alcohol, their body has not reached a state of *equilibrium* where the concentration of alcohol is uniform throughout the body. Most forensic alcohol experts reject test results during this period as the amounts of alcohol in the breath will not accurately reflect a true

concentration in the blood.

Metabolism and excretion

[\[edit\]](#)


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Alcohol is removed from the bloodstream by a combination of [metabolism](#), excretion, and evaporation. The relative proportion disposed of in each way varies from person to person, but typically about 95% is metabolised by the liver. The remainder of the alcohol is eliminated through excretion in breath, urine, sweat, feces, milk and saliva. ^[25] Excretion into urine typically begins after about 40 minutes, whereas metabolism commences as soon as the alcohol is absorbed, and even before alcohol levels have risen in the brain.

Alcohol is metabolised mainly by the group of six [enzymes](#) collectively called [alcohol dehydrogenase](#). These convert the ethanol into [acetaldehyde](#) (an intermediate that is actually more toxic than ethanol). The enzyme [acetaldehyde dehydrogenase](#) then converts the acetaldehyde into non-toxic Acetic acid.

Many physiologically active materials are removed from the bloodstream (whether by [metabolism](#) or excretion) at a rate proportional to the current concentration, so that they exhibit [exponential decay](#) with a characteristic [half-life](#) (see [pharmacokinetics](#)). This is not true for alcohol, however. Typical doses of alcohol actually saturate the enzymes' capacity, so that alcohol is removed from the bloodstream at an approximately constant rate. This rate varies considerably between individuals; Another gender based difference is in the elimination of alcohol. Persons below the age of 25^{[[citation needed](#)]}, women ^[26] persons of certain ethnicities, and persons with liver disease may process alcohol more slowly. Many [East Asians](#) (e.g. about half of [Japanese](#)) have impaired [acetaldehyde dehydrogenase](#); this causes acetaldehyde levels to peak higher, producing more severe [hangovers](#) and other effects such as flushing and tachycardia. Conversely, members of certain ethnicities that traditionally did not brew alcoholic beverages have lower levels of alcohol dehydrogenases and thus "sober up" very slowly, but reach lower aldehyde concentrations and have milder [hangovers](#). Rate of detoxification of alcohol can also be slowed by certain drugs which interfere with the action of alcohol dehydrogenases, notably [aspirin](#), [furfural](#) (which may be found in [fusel oil](#)), fumes of [certain solvents](#), many [heavy metals](#), and some [pyrazole](#) compounds. Also suspected of having this effect are [cimetidine](#) ([Tagamet](#)), [ranitidine](#) ([Zantac](#)), and [acetaminophen](#) ([Tylenol](#)) ([paracetamol](#)).

Currently, the only known substance that can increase the rate of metabolism of alcohol is [fructose](#). The effect can vary significantly from person to person, but a 100g dose of fructose has been shown to increase alcohol metabolism by an average of 80%.^[27]

Alcohol absorption can be slowed by ingesting alcohol on a full stomach. Spreading the total absorption of alcohol over a greater period of time decreases the maximum alcohol level, decreasing the [hangover](#) effect. Thus, drinking on a full stomach or drinking while ingesting drugs which slow the breakdown of ethanol into acetaldehyde, will reduce the maximum blood levels of this substance, and decrease the hangover. Alcohol in non-carbonated beverages is absorbed more slowly than alcohol in carbonated drinks.^[28]

Retrograde extrapolation

[\[edit\]](#)

Retrograde [extrapolation](#) is the mathematical process by which someone's blood alcohol concentration at the time of driving is estimated by projecting backwards from a later chemical test. This involves estimating the absorption and elimination of alcohol in the interim between driving and testing. The rate of elimination in the average person is commonly estimated at .015 to .020 grams per deciliter per hour (g/dl/h)^{[[citation needed](#)]}, although again this can vary from person to person and in a given person from one moment to another. Metabolism can be affected by numerous factors, including such things as body temperature, the type of alcoholic beverage consumed, and the amount and type of food consumed.

In an increasing number of states, laws have been enacted to facilitate this speculative task: the blood alcohol content at the time of driving is legally presumed to be the same as when later tested. There are usually time limits put on this presumption, commonly two or three hours, and the defendant is permitted to offer evidence to rebut this presumption.

Forward extrapolation can also be attempted. If the amount of alcohol consumed is known, along with such variables as the weight and sex of the subject and period and rate of consumption, the blood alcohol level can be estimated by extrapolating forward. Although subject to the same infirmities as retrograde extrapolation—guessing based upon averages and unknown variables—this can be relevant in estimating BAC when driving and/or corroborating or contradicting the results of a later chemical test.

Blood alcohol content calculation

[\[edit\]](#)

Blood alcohol content can be roughly estimated using a mathematical approach. Mathematical estimations can be useful for calculating a blood alcohol content level that is not currently testable, or a level that may be present in the future. While there are several ways to calculate it, one of the most effective ways is to simply measure the total amount of alcohol consumed divided by the total amount of water in the body—effectively giving the percent

alcohol per volume water in the blood.

Gender plays an important role in the total amount of water that a person has. In general, men have a higher percent of water (58%) than women (49%). This fact alone strongly contributes to the generalization that men require more alcohol than women to achieve the same blood alcohol content level. Additionally, men are, on average, heavier than women. The more water a person has, the more alcohol is required to achieve the same alcohol: blood ratio, or blood alcohol content level. Further, studies have shown that women's alcohol metabolism varies from that of men due to such biochemical factors as different levels of [alcohol dehydrogenase](#) (the enzyme which breaks down alcohol) and the effects of oral contraceptives.^[29]

It is not strictly accurate to say that the water content of a person alone is responsible for the dissolution of alcohol within the body, because alcohol does dissolve in fatty tissue as well. When it does, a certain amount of alcohol is temporarily taken out of the blood and briefly stored in the fat. For this reason, most calculations of alcohol to body mass simply use the weight of the individual, and not specifically his water content.

Cases of high blood alcohol levels

[\[edit\]](#)



The examples and perspective in this article **deal primarily with the United States and do not represent a worldwide view of the subject**. Please [improve this article](#) and discuss the issue on the [talk page](#). (March 2011)

In November 2007, a driver was found passed out in her car in Oregon in the United States. A blood test showed her blood alcohol level was 0.550%. She was charged with several offenses, including two counts of driving under the influence of an intoxicant, reckless endangerment of a person, criminal mischief and driving with a suspended license. Her bail was later set at USD 50,000 since she had several previous convictions for similar offenses.^{[30][31][32]}

In December 2007, a driver was arrested in Klamath County, Oregon after she was found unconscious in her car which was stuck in a snow bank with its engine running. Police were forced to break a car window to remove her. After realizing she was in alcohol induced-coma, they rushed her to the hospital where a blood test showed her blood alcohol level was 0.720%. She reportedly was released from the hospital the next day.^{[30][33]} She was subsequently charged with drunk driving.^[34]

In July 2008, a driver was arrested after he ran into a highway message board on Interstate 95 in [Providence, Rhode Island](#). A breath test showed his blood alcohol level was at 0.491% and he was raced to the hospital where he was sedated and placed in a detoxification unit. He was subsequently charged with driving while intoxicated and resisting arrest.^{[35][36]} He was later sentenced to one year probation, a \$500 fine, 40 hours of community service and a one-year loss of his driver's license. The police later stated that his blood alcohol level was the highest they had ever seen for someone who hadn't died of alcohol poisoning.^[37] It was later estimated that the driver had consumed 10-14 drinks over the course of 1–2 hours,^[30] based on the standard levels of elimination which as documented previously can vary by up to 300%.

In December 2009, a [South Dakota](#) woman was found behind the wheel of a stolen car with a measured blood alcohol content of .708%, almost nine times the state's limit of .08%, thus becoming the highest recorded level of alcohol toxicity for the state. After she was hospitalized, she was released on bond and subsequently found in another stolen automobile while under the influence.^[38]

Highest recorded blood alcohol level/content

[\[edit\]](#)

In 1995, a man in [Wrocław, Poland](#) had a car accident. At the hospital, his BAC was determined to be 1.48%. He died a few days later from wounds from a car accident. Police were baffled as to how an individual could attain such a high blood alcohol. Later, police discussions with his brother in-law Francois Hughes revealed that he had "[beer bonged](#)" pure grain alcohol allegedly stolen from his place of work, a chemical plant.^[39]

In December 2004, a man was admitted to the hospital in [Plovdiv, Bulgaria](#) after being struck by a car. After detecting a strong alcohol odor, doctors at a hospital conducted a breath test which displayed the man's blood alcohol content at 0.914. Concerned that their equipment was malfunctioning, doctors also performed five separate lab tests, all of which confirmed the man's blood alcohol content.^[40] The man was treated for serious injuries sustained in the crash and survived.^[41]

In February 2005, French [gendarmes](#) from [Bourg-en-Bresse, France](#) conducted a breath test on a man who had lost control of his car. He had an alcohol content of 0.976.^[42] He was not injured in the accident but was charged with a € 150 fine and his driving license was canceled.

There have been reported cases of blood alcohol content higher than 1.00. In March 2009, a 45-year-old man was admitted to the hospital in Skierniewice, Poland after being struck by a car. The blood test showed blood alcohol content at 1.23. The man survived but did not remember either the accident or the circumstances of his alcohol consumption.^[43] One such case was reported by O'Neil, et al. in 1984. They report on a 30-year old man who survived a blood alcohol concentration of 1,500 mg/100ml blood after vigorous medical intervention.^[44]

In 1982, a 24 year old woman was admitted to the UCLA emergency room with a serum alcohol concentration of 1.5 (1510 mg/dL). She was alert and oriented to person and place (Reported in the Lancet, Dec 18 1982, pg 1394). Serum Alcohol Concentration of course is not equal to nor calculated in the same way as Blood Alcohol Content.^[45]

In South Africa a man driving a Mercedes-Benz Vito and was arrested on December 22, 2010, near [Queenstown](#) in [Eastern Cape](#). His blood had an alcohol content of 1,6g/100ml. Five boys as well as a woman who were also in the vehicle with 15 sheep, allegedly stolen from nearby farms, were also arrested.^[46]

In Poland a homeless man was found sleeping half-naked on January 28, 2011, in [Cieszyn](#). His blood had an alcohol level of 1.024 %. Despite the temperature of -10 °C and extremely high blood alcohol content the man survived.^[47]

A 20 year old woman, Erica Lopez, was found dead in the northern section of Sherwood Park with a blood alcohol content of 1.4% in Paso Robles, California on July 26, 2010. The authorities note that it was simply from organ failure.

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