

## Alcoholism

**Alcoholism** is a broad term for problems with alcohol, and is generally used to mean compulsive and uncontrolled consumption of alcohol, usually to the detriment of the drinker's health, personal relationships, and social standing. It is medically considered an addictive illness.

In 1979 an expert World Health Organisation committee discouraged the use of 'alcoholism' in medicine, preferring the category of 'alcohol dependence syndrome'. People suffering from alcoholism are often called alcoholics, although the word is not used in all areas of work. Nacoa researched through surveys and focus groups the use of many words, which are used and have been used throughout history to describe problematic drinking. The study found that although fewer agencies used the words 'alcoholic' or 'alcoholism', it was agreed that these words best described a situation where people lose control of their drinking. Despite the less frequent use of these words, the social stigma associated with alcohol and drug abuse, which causes people to avoid diagnosis and treatment for fear of shame or social consequences, remains as entrenched as ever.

### The historic definition of alcoholism includes four symptoms:

<b>Craving</b>	A strong need, or compulsion, to drink
<b>Impaired control</b>	An inability to limit one's drinking on any given occasion
<b>Physical dependence</b>	Withdrawal symptoms, such as nausea, sweating, shakiness, and anxiety, when alcohol use is stopped after a period of heavy drinking
<b>Tolerance</b>	The need for increasing amounts of alcohol in order to feel its effects

The World Health Organisation estimates that there are 140 million people with alcoholism or alcohol dependence syndrome worldwide. According to recent estimates from a study commissioned by the Department of Work and Pensions (Hay and Bauld, 2010) there are nearly 2.3 million problem drinkers in Great Britain. Furthermore, it has been estimated that approaching 5 million children are affected by parental substance misuse (Manning et al., 2009).

In the UK, the NHS breaks down 'alcohol misuse' into the following three categories - hazardous, harmful and dependent drinking. This is usually determined by, but not always, the amount of alcohol consumed.

### Hazardous drinking

Hazardous drinking is defined as when a person drinks over the recommended weekly limit of alcohol (21 units for men and 14 units for women).

It is also possible to drink hazarously by binge drinking, even if you are within your weekly limit. Binge drinking involves drinking a large amount of alcohol in a short space of time - eight units a day for men and six units a day for women. If you are drinking hazarously, you may not yet have any health problems related to alcohol, but you are increasing your risk of experiencing problems in the future.



Hazardous drinking, particularly binge drinking, also carries additional risks such as:

- being involved in an accident
- becoming involved in an argument or fight
- taking part in risky or illegal behaviour when drunk, such as drink-driving

## Harmful drinking

Harmful drinking is defined as when a person drinks over the recommended weekly amount of alcohol and experiences health problems that are directly related to alcohol.

In some cases, there may be obvious problems such as:

- depression
- an alcohol-related accident, such as a head injury
- acute pancreatitis (inflammation of the pancreas)

Many of the health problems that occur as a result of harmful drinking do not cause any symptoms until they reach their most serious stages. These include:

- high blood pressure (hypertension)
- cirrhosis (scarring of the liver)
- some types of cancer, such as mouth cancer and bowel cancer
- heart disease

It can be easy to underestimate the levels of physical damage caused by harmful drinking. Harmful drinking can also cause related social problems, such as difficulties with your partner or spouse, family and friends or with colleagues at work or fellow students in higher education.

## Dependent drinking

Alcohol is both physically and psychologically addictive and it is possible to become dependent. Being dependent on alcohol means that a person feels that they are unable to function without alcohol, and the consumption of alcohol becomes an important, or sometimes the most important, factor in their life.

Depending on their level of dependence, a person can experience withdrawal symptoms if they suddenly stop drinking alcohol. Withdrawal symptoms can be both physical and psychological.

Physical withdrawal symptoms include:

- hand tremors (the shakes)
- sweating
- nausea
- visual hallucinations (seeing things that are not actually real)
- seizures (fits) in the most serious cases



Psychological withdrawal symptoms include:

- depression
- anxiety
- irritability
- restlessness
- insomnia (difficulty sleeping)

Severely dependent drinkers usually experience severe withdrawal symptoms. They often fall into a pattern of relief drinking, to avoid withdrawal symptoms. They are often able to tolerate very high levels of alcohol, and they are able to drink amounts that would incapacitate, or even kill, most other people.

The amount of alcohol that can be biologically processed and its effects differ between sexes. Equal amounts of alcohol consumed by men and women generally result in women having higher blood alcohol concentrations. This can be attributed to many reasons, the main being that women have less body water than men. A given amount of alcohol therefore becomes more highly concentrated in a woman's body and causes greater intoxication due to different hormone release compared to men.

The biological mechanisms that cause alcoholism are not yet well understood and it is agreed that social environment, stress, mental health, family history, age, ethnic group, and gender all influence the risk for the condition.

## Genetic link

Early work in the 1950s by Virginia Davis advocating alcoholism as a disease included work on a genetic link. She found that people metabolise ethanol (alcohol) differently and identified THIQ, a substance found in the brain of alcohol-dependents but not in the brains of people who consumed alcohol but did not develop a problem. THIQ was thought to predispose alcohol-dependents to alcoholism.

Later, psychiatric geneticists John I. Nurnberger, Jr., and Laura Jean Bierut suggested that alcoholism does not have a single cause – including genetic – but that genes play an important role 'by affecting processes in the body and brain that interact with one another and with an individual's life experiences to produce protection or susceptibility'.

At least one genetic test exists for an allele that is correlated to alcoholism and opiate addiction. Human dopamine receptor genes have a detectable variation referred to as the DRD2 TaqI polymorphism. Although this allele is slightly more common in alcohol-dependents and opiate addicts, it is not by itself an adequate predictor of alcoholism, and some researchers argue that evidence for DRD2 is contradictory. More recent studies include the study of physical changes experienced by people who can trace alcoholism in their families compared to the general population.



## Causes

A complex mixture of genetic and environmental factors influences the risk of the development of alcoholism. One paper found that alcohol use at an early age may influence genes which increase the risk of alcohol dependence. Individuals who have a genetic disposition to alcoholism are also more likely to begin drinking at an earlier age than average.

Younger age of onset of drinking is associated with an increased risk of the development of alcoholism, and about 40% of alcohol-dependents will drink excessively by their late adolescence. It is not entirely clear whether this association is causal, and some researchers have been known to disagree with this view. A high testosterone concentration during pregnancy may be a risk factor for later development of alcohol dependence.

Severe childhood trauma is also associated with a general increase in the risk of drug dependency. Lack of peer and family support is associated with an increased risk of alcoholism developing. Genetics and adolescence are associated with an increased sensitivity to the neurotoxic effects of chronic alcohol abuse. Cortical degeneration due to the neurotoxic effects increases impulsive behaviour, which may contribute to the development, persistence and severity of alcohol use disorders. There is evidence that with abstinence, there is a reversal of at least some of the alcohol induced central nervous system damage.

## Neurochemistry

Alcohol produces changes in the brain's structure and chemistry, described by Dr Peter Taberner, Forensic Scientist and formerly Senior Lecturer in Pharmacology, University of Bristol, as follows:

- Alcohol (ethanol) is almost unique amongst drugs of abuse in not having a specific site of action in the brain; it will eventually affect all nervous system function in an inhibitory manner.
- Its acute effects are sedation, muscle relaxation, reduction in anxiety (anxiolysis), memory loss, and, most importantly for the abuser, a sense of wellbeing and euphoria.
- Alcohol interacts both with the chemicals that transmit signals between neurones (neurotransmitters) and also the channels in nerve cell membranes that permit the passage of ions, which regulate the excitability of the neurone.
- The longer-term effects of alcohol, i.e. tolerance, dependence, addiction and craving can also be explained by adaptive changes to neurotransmitter and ion channel function.
- Neurotransmitters: like the barbiturates and benzodiazepines, alcohol potentiates the action of the normal inhibitory neurotransmitter GABA (γ-aminobutyric acid) which is why it is sedative, anxiolytic and muscle relaxant.
- It also inhibits the action of acetylcholine, an excitatory neurotransmitter in the cortex and cerebellum. This contributes to its sedative and amnesic actions and is similar to the effects of atropine.
- Alcohol also indirectly activates neurones in the mesolimbic pathway, which innervates the so-called 'reward centre'. These neurones release the neurotransmitter dopamine, and dopamine potentiation is a common feature of many drugs of abuse including opiates, amphetamines and cocaine, although the latter drugs lack the sedative actions of alcohol.



- Glutamate is yet another excitatory transmitter blocked by alcohol. In this case, one particular sub-type of glutamate receptor called NMDA is inhibited. This action is thought to be responsible for the cognitive disturbances and craving induced by alcohol.
- Ion channels: calcium ions are the important regulators of neuronal excitability. During the chronic alcohol treatment the number of neuronal calcium channels increases, as though the brain were trying to overcome the sedative effects of alcohol. This increase in ion channel number accounts for the tolerance that develops to alcohol (i.e. higher doses are needed to achieve the same effect).
- These additional calcium channels render the neurones hyperexcitable, so that if alcohol is withdrawn (as in abstinence), the opposite behavioural effects are seen: tremor, anxiety, insomnia, convulsions and deliriums. This syndrome persists until the calcium channels can down regulate back to normal (up to 96 hours).

## Physical health

Long-term alcohol abuse can cause a number of physical symptoms, including cirrhosis of the liver, pancreatitis, epilepsy, polyneuropathy, alcohol induced dementia, heart disease, nutritional deficiencies, peptic ulcers and sexual dysfunction and can be fatal. Other physical effects include an increased risk of developing cardiovascular disease, alcoholic liver disease, and cancer. Damage to the central nervous system and peripheral nervous system can occur from sustained alcohol consumption. A wide range of immunologic defects can result and there may be a generalized skeletal fragility, in addition to a recognized tendency to accidental injury, which results in a propensity to bone fractures.

Women develop long-term complications more rapidly than men. Additionally, women have a higher mortality rate from alcoholism. Examples of long-term complications include brain, heart, and liver damage and an increased risk of breast cancer. Additionally, heavy drinking over time has been found to have a negative effect on reproductive functioning in women which results in reproductive dysfunction such as anovulation, decreased ovarian mass, problems or irregularity of the menstrual cycle, and early menopause. Alcoholic ketoacidosis can occur in individuals who chronically abuse alcohol and have a recent history of binge drinking. Even though alcoholism can increase the risk of liver cancer, studies have shown that a moderate consumption of alcohol (1 unit per day for women and 2 units per day for men) does not affect diabetes Type II greatly.

## Mental health

Long-term misuse of alcohol can cause a wide range of mental health problems. Severe cognitive problems are common; approximately 10 percent of all dementia cases are related to alcohol consumption, making it the second leading cause of dementia. Excessive alcohol use causes damage to brain function, and psychological health can be increasingly affected over time.

Social skills are significantly impaired in people suffering from alcoholism due to the neurotoxic effects of alcohol on the brain, especially the prefrontal cortex area of the brain. The social skills that are impaired by alcohol abuse include impairments in perceiving facial emotions, perception problems and theory of mind deficits; the ability to understand humour is also impaired.

Psychiatric disorders are common in alcohol-dependents, with as many as 25% suffering severe psychiatric disturbances. The most prevalent psychiatric symptoms are anxiety and depression disorders. Psychiatric



symptoms usually initially worsen during alcohol withdrawal, but typically improve or disappear with continued abstinence. Psychosis and confusion may be caused by alcohol misuse, which can lead to a misdiagnosis such as schizophrenia. Panic disorder can develop or worsen as a direct result of long-term alcohol misuse.

The co-occurrence of major depressive disorder and alcoholism is well documented. Among those with comorbid occurrences, a distinction is commonly made between depressive episodes that remit with alcohol abstinence (substance-induced), and depressive episodes that are primary and do not remit with abstinence (independent episodes). Additional use of other drugs may increase the risk of depression.

Psychiatric disorders differ depending on gender. Women who have alcohol-use disorders often have a co-occurring psychiatric diagnosis such as major depression, anxiety, panic disorder, bulimia, post-traumatic stress disorder (PTSD), or borderline personality disorder. Men with alcohol-use disorders more often have a co-occurring diagnosis of narcissistic or antisocial personality disorder, bipolar disorder, schizophrenia, impulse disorders or attention deficit/hyperactivity disorder.



**Figure 1 Symptoms of alcoholism (adapted from the Jellinek chart of addiction and recovery)**

Women with alcoholism are more likely to have a history of physical or sexual assault, abuse and domestic violence than those in the general population, which can lead to higher instances of psychiatric disorders and greater dependence on alcohol.



## Mechanisms

In 1960, E Morton Jellinek's study on alcoholism suggested 4 stages – Figure 1. Drinking is often social motivated (pre-alcoholic stage) leading to relief drinking (a way to medicate emotions and problems) with a need to increase consumption to maintain relief (initial stage). An inability to control intake or stop drinking, isolation from family and other coping mechanisms, physical and mental health problems, anti-social behaviour and alcohol taking priority over everything else (crucial stage). Finally withdrawal symptoms relieved only by drinking more, lead to a preoccupation with the supply and consumption of alcohol. Fear of not being able to access alcohol increases the compulsion to drink. Obsessive drinking continues in vicious circles causing permanent physical damage (chronic stage).

In 1980 Johnson explored the emotional progression of the addict's response to alcohol. He looked at four phases. The first two are considered 'normal' drinking and the last two are viewed as 'typical' alcohol-dependent drinking. Johnson's four phases consist of:

1. Learning the mood swing. A person is introduced to alcohol (in some cultures this can happen at a relatively young age), and the person enjoys the happy feeling it produces. At this stage there is no emotional cost.
2. Seeking the mood swing. A person will drink to regain that feeling of euphoria experienced in phase 1; the drinking will increase as more intoxication is required to achieve the same effect. Again at this stage, there are no significant consequences.
3. At the third stage there are physical and social consequences, i.e., hangovers, family problems, work problems, etc. A person will continue to drink excessively, disregarding the problems.
4. The fourth stage can be detrimental, as Johnson cites it as a risk for premature death. As a person now drinks to feel normal, they block out the feelings of overwhelming guilt, remorse, anxiety, and shame they experience when sober.

In 1983 Milam & Ketcham focused on the physical deterioration of alcoholism. They describe the process in three stages:

1. Adaptive stage - The person will not experience any negative symptoms, and believe they have capacity for alcohol. Physiological changes are happening with the increase in tolerance, but this will not be noticeable to the drinker or others.
2. Dependent stage - At this stage, symptoms build gradually. Hangover symptoms may be confused with withdrawal symptoms. Many addicts will maintain their drinking to avoid withdrawal sickness, drinking small amounts frequently. They will try and hide their problem from others, and will avoid gross intoxication.
3. Deterioration stage - Various organs are damaged due to long-term drinking. Medical treatment will be required; otherwise the pathological changes will cause death.



## Functional uses

People continue to drink despite harm because on some level it works for them. The functions listed below are a few of many theories which illustrate how alcohol becomes the solution to problems to problem drinkers.

## Adaptive orientation

We all adapt to cope with life's stressors in order to continue to live everyday lives from getting up in the morning, interacting with our families and friends and working to provide for our families. Having a drink to unwind is common to many people but for some can lead to the escalation of use in the following stages:

1. Life is stressful
2. Need coping mechanism in the form of alcohol which leads to social then relief drinking
3. Coping mechanism (alcohol) dependent with loss of control over alcohol intake and ability to stop
4. Coping mechanism (alcohol) increases stress levels which leads to more stress, i.e. interferes with work performance and dealing with the family who may fear loss of financial support etc.
5. More coping mechanism (alcohol) because life is even more stressful

## Exposure orientation

In a home where problems are not openly discussed where the parents may not be available, or able to adequately parent their children, children learn to cope with difficulties by watching other peoples' behaviour. Children, who grow up with parental alcoholism live everyday with their parent(s)' alcohol use. The message is, if you have a problem of any sort, you medicate it. With little or no opportunity to develop other coping strategies, they may continue the cycle and use alcohol and or other drugs to cope early in life which increases their risk of developing alcoholism.

## Addiction begins with a discovery

Dr Chris Johnstone at the Robert Smith Unit in Bristol suggests addiction begins with a discovery, an answer to all problems leading to dependency in the following stages:

1. The Button: Life is stressful – stress is relieved by alcohol which meets the need to alter mood, turning the un-desirable to desirable, boredom to excitement, pain to pleasure and anxiety to a relaxed 'I can do' state.
2. The Funnel: Alcohol works well and is reliable so all other coping strategies are dropped - the narrowing of the repertoire – if something works well why waste time with other ways to cope? Alcohol is now the only solution to all life's problems in the short term.
3. The Whirlpool: As tolerance is built up, more alcohol is needed which leads to a spiraling habit or use.
4. The Trap: The problem drinker is now trapped needing increasing amounts of alcohol, fearing withdrawal symptoms fear, anxiety, the shakes, depression, sleeplessness, fatigue and seizures.



## Social effects

The social problems arising from alcoholism are serious, caused by the pathological changes in the brain and the intoxicating effects of alcohol. Alcohol abuse is associated with an increased risk of committing criminal offences, including child abuse, domestic violence, rape, burglary and assault. Alcoholism is associated with loss of employment, which can lead to financial problems. Drinking at inappropriate times and places (increasingly in the UK there are 'no street drinking areas') and behaviour caused by reduced inhibition, can lead to legal consequences, such as criminal charges for drunk driving or public disorder and may lead to a criminal record.

An alcohol-dependent's behavior and mental impairment, while drunk, can profoundly affect those around them and lead to isolation from family and friends. This isolation can lead to marital conflict and divorce, or contribute to domestic violence.

Alcoholism can also lead to child neglect, with subsequent lasting damage to the emotional development of the children. For this reason, children of alcohol-dependents can develop a number of emotional problems. For example, they may believe they are responsible for their parent's drinking, become carers to parents and siblings, feel a considerable amount of shame over their inadequacy to stop their parent(s) from drinking and suffer poor self-image and low self-esteem, which can lead to depression, suicidal thoughts, eating disorders, self-harm and other compulsive behaviours including drink and drug use. They are also six times more likely to experience domestic violence than children in the general population.

## Social barriers

Attitudes and social stereotypes can create barriers to the detection and treatment of alcohol abuse. This is more of a barrier for women than men. Fear of stigmatisation may lead women to deny that they are suffering from a medical condition, to hide their drinking, and to drink alone. This pattern, in turn, leads family, doctors, and others to be less likely to suspect that a woman they know is an alcohol-dependent. In contrast, reduced fear of stigma may lead men to admit that they are suffering from a medical condition, to display their drinking publicly, and to drink in groups. This pattern, in turn, leads family, doctors, and others to be more likely to suspect that a man they know is alcohol-dependent.

## Genetic variation

Genetic differences exist between different racial groups which affect the risk of developing alcohol dependence. For example, there are differences between African, East Asian and Indo-racial groups in how they metabolise alcohol.

These genetic factors are believed to explain the differing rates of alcohol dependence among racial groups. The alcohol dehydrogenase allele ADH1 B\*3 causes a more rapid metabolism of alcohol. The allele ADH1 B\*3 is only found in those of African descent and certain Native American tribes. African Americans and Native Americans with this allele have a reduced risk of developing alcoholism.



Native Americans however, have a significantly higher rate of alcoholism than average; it is unclear why this is the case. Other risk factors such as cultural environmental effects e.g. trauma have been proposed to explain the higher rates of alcoholism among Native Americans compared to alcoholism levels in Caucasians.

## Diagnosis

The CAGE questionnaire, named for its four questions, requires two 'yes' responses to indicate that the respondent should be investigated further. The questionnaire asks the following questions:

1. Have you ever felt you needed to Cut down on your drinking?
2. Have people Annoyed you by criticising your drinking?
3. Have you ever felt Guilty about drinking?
4. Have you ever felt you needed a drink first thing in the morning (Eye-opener) to steady your nerves or to get rid of a hangover?

The CAGE questionnaire has demonstrated a high effectiveness in detecting alcohol related problems; however, it has limitations in people with less severe alcohol related problems.

The DSM-IV4 Diagnostic and Statistical Manual of Mental Disorders require 3 or more of the following in a 12-month period to indicate the respondent should be investigated further:

- Tolerance to alcohol (a need for markedly increased amounts of alcohol to achieve same intoxication or desired effect and diminished effect with continued use of the same amount)
- Withdrawal symptoms (listed above – if alcohol not available a similar substance taken to relieve or avoid withdrawal symptoms)
- Impaired control (persistent desire or unsuccessful efforts to cut down or control substance)
- Drinking more or for longer than intended
- Increased time spent obtaining alcohol, drinking or recovering from drinking
- Neglect of social, occupational or recreational activities
- Continued use despite knowledge of having recurrent psychological or physical problems

The Alcohol Use Disorders Identification Test (AUDIT), a screening questionnaire developed by the World Health Organization, is unique in that it has been validated in six countries and is used internationally. Like the CAGE questionnaire, it uses a simple set of questions – a high score earning a deeper investigation. The Paddington Alcohol Test (PAT) was designed to screen for alcohol related problems amongst those attending Accident and Emergency departments. It concurs well with the AUDIT questionnaire but is administered in a fifth of the time.



## Alcohol withdrawal

As with similar substances with a sedative-hypnotic mechanism, such as barbiturates and benzodiazepines, withdrawal from alcohol can be fatal if it is not properly managed. Alcohol's primary effect is the increase in stimulation of the GABAA receptor, promoting central nervous system depression. With repeated heavy consumption of alcohol, these receptors are desensitised and reduced in number, resulting in tolerance and physical dependence.

When alcohol consumption is stopped too abruptly, the person's nervous system suffers from uncontrolled synapse firing. This can result in symptoms that include anxiety, life threatening seizures, delirium tremens, hallucinations and possible heart failure. Other neurotransmitter systems are also involved, including dopamine, NMDA and glutamate.

Severe acute withdrawal symptoms such as delirium tremens and seizures rarely occur after one week and the acute withdrawal phase can be defined as lasting between one to three weeks. In weeks three to four, increased anxiety, depression as well as sleep disturbance is common; fatigue and tension can persist for up to five weeks; some people experience anxiety and depression for up to two years.

A progressive effect occurs in alcohol-dependents whereby each subsequent withdrawal syndrome is more severe than the previous withdrawal; this is due to neuroadaptations which occur as a result of periods of abstinence followed by re-exposure to alcohol. Individuals who have had multiple withdrawals are more likely to develop seizures and experience more severe anxiety. The progressive effect leads to persistent functional changes in brain neural circuits and also results in psychological symptoms of alcohol withdrawal becoming more intensified. Alcohol damages almost every organ in the body. The cumulative toxic effects of chronic alcohol abuse can cause both physical and mental health problems.

## Detoxification and treatment

Alcohol detoxification or 'detox' is an abrupt stop of alcohol drinking coupled with the substitution of drugs, such as benzodiazepines, that have similar effects to prevent alcohol withdrawal. Individuals who are only at risk of mild to moderate withdrawal symptoms can be detoxified as outpatients. Individuals at risk of a severe withdrawal syndrome as well as those who have significant or acute comorbid conditions are generally treated as inpatients. Some symptoms of alcohol withdrawal such as depressed mood and anxiety typically take weeks or months to abate while other symptoms persist longer due to persisting neuroadaptations. Alcoholism has serious adverse effects on brain function; on average it takes one year of abstinence to recover from the cognitive deficits incurred by chronic alcohol abuse.

Treatments are varied because there are multiple perspectives of alcoholism. Most treatments focus on helping people discontinue their alcohol intake, followed up with social support in order to help them resist a return to alcohol use. Since alcoholism involves multiple factors which encourage a person to continue drinking, they must all be addressed in order to successfully prevent a relapse.

An example of this kind of treatment is detoxification followed by a combination of supportive therapy, attendance at self-help groups, and ongoing development of coping mechanisms. The treatment community for alcoholism typically supports an abstinence-based zero tolerance approach; however, some prefer a harm-reduction approach.



## Prevention

The World Health Organisation, the European Union and other regional bodies, national governments and parliaments have formed alcohol policies in order to reduce the harm of alcoholism. Targeting adolescents and young adults is regarded as an important step to reduce the harm of alcohol abuse. Increasing the age at which alcohol can be purchased, the banning or restricting advertising of alcohol has been recommended as additional ways of reducing the harm of alcohol dependence and abuse. Credible, evidence based educational campaigns in the mass media about the consequences of alcohol abuse have been recommended. Guidelines for parents to prevent alcohol abuse amongst adolescents and for helping young people with mental health problems have also been suggested.

## Summary

The information above is a summary of the research and experience collated by Nacoa since 1990 and provides an overview of a complex subject.

For more information, please visit [www.nacoa.org.uk](http://www.nacoa.org.uk), call 0800 358 3456 or email [helpline@nacoa.org.uk](mailto:helpline@nacoa.org.uk).

