ABC of Alcohol

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TOOLS OF DETECTION

Alcohol concentrations

The blood alcohol concentration is not used enough as a test for alcohol abuse. It can be measured in toxicology laboratories and in many chemical pathology departments, or, if necessary, in a regional laboratory. Raised concentrations can provide incontrovertible evidence of excessive drinking, and because alcohol is eliminated relatively slowly from the blood, appreciable amounts may be found for 24 hours after a drinking session.

A blood alcohol concentration exceeding 80 mg/100 ml (the legal limit for driving in Britain) is highly suggestive of alcoholism, and values above 150 mg/100 ml are diagnostic. Such values do not distinguish an isolated drinking bout from chronic alcohol abuse, but if there are no signs of inebriation at concentrations of 80 mg/100 ml or more the individual may be assumed to be a heavy drinker. A blood alcohol estimation should always be considered in the unconscious patient: values usually exceed 300 mg/100 ml if alcohol is responsible.

Breath alcohol measurements reflect blood levels, are simple to perform, and provide an immediate result. Breath alcometers cost £100-£200 and can be used with a minimum of instruction.

The *urinary alcohol* concentration can also be measured: a value exceeding 120 mg/100 ml is suggestive and one over 200 mg/100 ml is diagnostic of alcoholism. The sample should be refrigerated and preferably frozen until analysis, otherwise false-positive results will be obtained, especially in diabetic patients, because of fermentation of glucose.

Conventional tests: no unequivocal values

	Normal values
Gamma-glutamyl transpeptidase (GGT)	< 40 IU/l
Mean corpuscular volume (MCV)	80-90 fl
Urate	120-360 µmol/l
Triglycerides (fasting)	0.85-2 mmol/l
Aspartate aminotransferase	< 25 IU/l
Creatine phosphokinase (CPK)	< 150 IU/l

None of the conventional laboratory tests, either singly or in combination, can give an unequivocal indication of alcohol abuse. Those which are highly sensitive are not invariably abnormal. They are affected by other diseases, in particular of the liver, blood, heart, and kidneys, and by drugs, especially those which induce enzymes, such as barbiturates, anticonvulsants, and steroid hormones. Nevertheless, if these causes can be excluded, abnormal values should alert the doctor to the possibility of alcohol abuse before there is physical damage and suggest to him that he should give advice about reducing alcohol intake or even abstaining altogether.

GGT and MCV

Other tests

The most sensitive markers of alcoholism are the serum concentration of the enzyme gamma-glutamyl transpeptidase (GGT) and the red cell mean corpuscular volume (MCV). Together they will identify three out of four heavy drinkers. Supportive evidence may be obtained from measuring serum urate, fasting triglycerides, and the enzymes aspartate or alanine aminotransferase and creatinine phosphokinase.

Measurement of gamma-glutamyl transpeptidase activity is the best screening test available. Values above 40 IU/l are found in about 80% of problem drinkers, both men and women, whether or not there is demonstrable liver damage.

A mean corpuscular volume of more than 92 fl is found in about 60% of alcoholics and is more commonly raised in women than men. If other causes have been excluded, a raised mean corpuscular volume is especially meaningful, since the action of alcohol on the maturation of red cells differs from its effect on biochemical processes in the liver.

Urate concentrations (raised in about half of all heavy drinkers) and triglycerides may be usefully included in a screening profile in men, but they are poor discriminators of heavy drinking in women. A grossly lipaemic serum will sometimes indicate alcoholism.

Raised *aminotransferase* activities indicate liver damage rather than alcoholism, being present in over 95% of patients with alcoholic hepatitis and in half of those with fatty liver or cirrhosis.

Creatinine phosphokinase activity is raised in nearly half of all alcoholics; high values may result from bruising. Because it is not an index of liver function it provides a means of separating detection of alcoholism from detection of liver damage.

Biochemical and haematological profiles can be used to obtain an index of excessive alcohol intake. Increasing concentrations of each marker can be directly related to increasing alcohol intake, but they give only a statistical probability that a subject is abusing alcohol. Nevertheless, since their normal distribution is heavily skewed (most results being at the lower end) values in the upper range of normal should be viewed with suspicion if one marker—for example, mean corpuscular volume—is definitely abnormal.

Biochemical markers such as gamma-glutamyl transpeptidase activity return rapidly to normal with abstinence from alcohol and may be misleading if measured 48 hours after the last drink. A subsequent rise of 50% or more is strong evidence of resumption of heavy drinking. The mean corpuscular volume, on the other hand, takes several weeks to return to normal after abstinence.

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