

## Thiamine alcohol and ARBD

It is well established that long term alcohol misuse has a direct effect on nerve cells (**neurones**) of the brain. What evidence there is indicates that women drinking 30 units or more and men drinking 50 units or more a week for 5 years or longer are likely to experience these changes.

These are probably a consequence of disruption of the chemicals that pass messages between neurones but there is also evidence that brain cell volume is also affected; suggesting that there are deleterious effects on the brain structure itself.

These physical changes in the brain are associated with changes in thinking, reasoning and memory, amongst other intellectual changes. This is referred to **cognitive damage** and may manifest in a very serious and usually permanent disorder called **Korsakoff's Syndrome**. Usually, however, in most cases, and provided the individual remains abstinent, cognitive damage may improve.

The brain can take three to four months of abstinence to recover from the direct effects of excessive, long standing alcohol exposure. During this time (depending on the degree of damage), cognitive performance can dramatically improve, and the individual may completely recover. However, longer lasting cognitive damage may have occurred but, research has shown that, provided the individual remains abstinent, the brain can still show signs of recovery and scanning studies clearly show brain growth over a period of three to four years. During this time there may well be evidence of varying degrees of cognitive improvement. Long-term follow-up studies demonstrate that about a quarter of people presenting with severe cognitive damage (including people with Korsakoff's Syndrome) will remain impaired and show little change over time. The remaining three quarters are likely to show varying degrees of improvement as the brain regrows and heals, with approximately a quarter showing complete or almost complete recovery. These findings will depend on a variety of factors including the nature of the help the individual gets.

Nutritional support is critical to recovery. One of the many characteristics of long-term alcohol dependency are problems with diet. A nutritious diet is frequently the victim of long-term and/or intermittent intoxication. Alcohol provides substantial calories. Consequently, the individual may not eat a good diet. Frequent vomiting due to inflammation of the stomach (caused by alcohol) may compromise the digestion of appropriate vitamins.

(A good illustration of this is that Korsakoff's Syndrome can be bought on by excessive vomiting in pregnancy, unrelated to any alcohol ingestion.)

Many of the vitamins required for the brain to function are water soluble. This means that they cannot be stored by the body, leaving no reserves. A regular and frequent intake is required in order to avoid brain changes. Thiamine (vitamin B1) is one of these vitamins and is critical in maintaining cognitive function. If an individual's diet is compromised through alcohol dependency, then the shortage of thiamine may become critical. This problem is complicated by a couple of other factors.

Firstly, long term alcohol drinking can affect the gut lining, making it very difficult for the thiamine to be absorbed from the gut into the blood. Consequently, the brain is starved of thiamine even though it is taken in the diet.

Secondly, there is some evidence indicating that alcohol can affect the way the brain can use thiamine when the thiamine does reach the brain.

Consequently, the alcohol dependent individual's brain is highly vulnerable to thiamine starvation through an inadequate diet, poor absorption and changes in how the brain can access the thiamine. There is a very real chance of cognitive damage. It is important to remember that there is also the problem of the direct and toxic effects of alcohol on the brain through damage to neurones and related chemicals. All these changes (and potentially the effect of other vitamin deficiencies) contribute to both Alcohol Related Cognitive Damage and the more well defined Korsakoff's Syndrome.

When a long-term alcohol dependent individual presents with withdrawal in the context of significant thiamine deficiency, there is a danger that **Wernicke's Syndrome** will develop. This is a potentially fatal condition. It can present with confusion, jerky eye movements, double vision and drooping eye lids, tremors and unsteadiness. It can deteriorate into coma and death. Obviously, this is urgent and requires immediate hospitalisation. Apart from stabilising the individual, treatment includes urgent intravenous thiamine. This treatment may be across a few days and is recommended even when the clear signs of Wernicke's syndrome are not evident, but the clinician considers that there is a risk of them developing.

Permanent brain damage can result in Korsakoff's Syndrome in which the individual suffers from long standing memory problems often stretching back many years, difficulty in learning new information (short term memory problems), the experience of false memories (**confabulations**), reasoning problems and residual neurological problems potentially affecting the eye movement and walking.

These problems are long lasting and may be irreversible. Long term oral thiamine is recommended after the Wernicke's syndrome has been treated.

In less severe cases, the onset of signs of thiamine deficiency and direct effects of alcohol can be more subtle and gradual. They can frequently be recognised in high-risk individuals, for example, those attending alcohol treatment services. These include a history of weight loss, vomiting and signs of malnutrition. Other clinical signs include nerve damage, such as numbness and persistent tingling and increasing weakness. Memory/reasoning problems are likely to emerge, and the person may become apathetic, lethargic and increasingly anxious. These features indicate that treatment is advised. In severe cases, this might be intravenous thiamine (undertaken in hospital). However, some alcohol treatment and community services may provide intramuscular thiamine injections that can be given by trained and properly equipped nurses.

It is recommended in most guidelines that if a clinician considers that an alcohol dependent individual is vulnerable to developing thiamine deficiency over a long period, then it is important to encourage oral thiamine supplementation. There is little long-term evidence supporting this approach but despite the potential problems in compliance and thiamine absorption in people that are drinking heavily, it is strongly recommended and generally accepted as good practice.