



A ROLE FOR NUTRITION IN DRUG WITHDRAWAL PROGRAMS - A FIVE PART SERIES

Part 2: Alcohol Addiction and Withdrawal

Alcohol is one of the most widely recognized, used and abused drug in the western world. Prohibited in the 1920s and 30s, today many people disagree with alcohol being grouped in the same category as 'drugs'. However, the effects alcohol has on the body ensure that it remains in this group of substances. For example alcohol is an addictive substance that crosses the blood brain barrier and affects neurotransmitter balance and mood.

Alcohol Addiction

An addiction can be considered a 'learned' response to the continual exposure of the brain to a specific substance, in this case alcohol. The dopaminergic reward cascade is most significantly related to addictive behaviour and studies have shown genetic susceptibility to defects in this system leading to addictions. The most significant and most thoroughly studied is the A1 allele of the DRD2 gene, which results in altered D2 receptor response and therefore low activity of dopamine. The presence of this allele has been associated with alcoholism, drug abuse, smoking, obesity, compulsive gambling and several other personality traits. A range of other dopamine, opioid, cannabinoid, norepinephrine and related genes have since been added to this list.[1] Polymorphism of the serotonin transporter linked polymorphic region (5-HTTLPR) and the GABAA receptor genes may also be associated with increased susceptibility of alcoholism.[2] Defects in these systems, in particular the dopaminergic system may lead to 'Reward Deficiency Syndrome'.

Neurotransmitter Imbalance

Alcohol, a sedative hypnotic can alter multiple neurotransmitter systems in the brain including GABA, dopamine, serotonin, glutamate and opioid peptides. Alterations in these neurotransmitters contribute to the addictive and rewarding effects of alcohol as well as symptoms of withdrawal and craving. Alcohol increases opioid neurotransmission and this activation is part of the mechanism responsible for its reinforcing effects. Acute alcohol consumption depletes serotonin levels, which may account for increased aggressive and impulsive behaviour.

Neurotransmitter	Acute	Chronic	Withdrawal
GABA	Upregulated	Downregulated	Downregulated
Glutamate	Downregulated	Upregulated	Upregulated
Serotonin	Depletes	?	?
Opioids	Upregulated	Downregulated	Downregulated

Alcohol Withdrawal

Chronic consumption of alcohol specifically leads to the hypofunction of GABA receptors and enhanced function of NMDA receptors. The resultant imbalance between GABA and glutamate in the brain (decreased GABA and increased glutamate) may be responsible at least in part for withdrawal symptoms.[3] Multiple cycles of chronic alcohol abuse and withdrawal eventually lead to further neurotransmitter dysfunction. For example brain glutamate increases during the first cycle of alcohol withdrawal, this is exacerbated and the increase is much higher during the third cycle of alcohol withdrawal.

Symptoms experienced during alcohol withdrawal can include depression, anxiety, sweating, nausea, racing pulse, oversensitivity to noise, and even convulsions and hallucinations. Supporting the above mentioned neurotransmitter pathways may help to reduce withdrawal symptoms.

Alcohol Detoxification

There are two main steps in the detoxification of alcohol. Firstly alcohol is converted into acetaldehyde by alcohol dehydrogenase. Secondly acetaldehyde is converted to acetate by aldehyde dehydrogenase. This second pathway is generally deficient in chronic alcoholics leading to a build up of acetaldehyde in tissues, particularly the brain. Acetaldehyde may play dual roles in the body with relation to alcohol consumption. When accumulated in the peripheral areas of the body, acetaldehyde induces unpleasant effects that prevent further alcohol consumption. In the brain, however this substance may actually exert reinforcing effects leading to addiction.

Acetaldehyde may also be an important mediator in the brain damage associated with chronic alcohol consumption. [4, 5]

Nutrient Depletion

Originally toxic effects of alcohol were attributed solely to the depletion of certain nutrients. For example alcohol may deplete folic acid and vitamins B6 and B12, promoting high homocysteine levels. Homocysteic acid (a metabolite of homocysteine) induces neuronal death by further stimulating NMDA receptors in the brain and producing free radicals. Now, however, effects of alcohol are attributed to both this and direct toxic effects of the metabolites of alcohol detoxification. Alcoholics with high homocysteine levels are at higher risk of seizures during the withdrawal phase due to the stimulation of NMDA receptors (excitatory).[6]

Supportive Guidelines

1) Support Neurotransmitter Imbalances

Opioid Support – dl-phenylalanine

Blockade of the endogenous opioid system by mu or delta opioid receptor antagonists prevents alcohol's activation of the dopamine system and reduces alcohol consumption.[7] Research has identified that alcohol consumption and alcohol-induced dopamine release are both reduced by opioid antagonists.

Studies have shown that the combination of an enkephalinase inhibitor with an opioid antagonist enhances withdrawal treatment.[8] dl-phenylalanine inhibits enkephalinase, maintaining the brain's endogenous opioid levels, thus helping to reduce cravings and addiction.

Dopamine Support – tyrosine, dl-phenylalanine

Supplemental tyrosine, (dopamine precursor) can help to up-regulate dopamine activity in the brain, reducing the need for alcohol consumption. dl-phenylalanine may also promote production of dopamine.

Serotonin Support – tryptophan, 5-hydroxytryptophan

Research suggests that early onset alcoholism may respond best to 5-HT3 receptor antagonists rather than SSRIs, whereas late onset alcoholism may present the reverse response pattern.[9] Tryptophan or 5-hydroxytryptophan supplementation in the majority of cases will support serotonin pathways in the brain and decrease impulsivity and aggressiveness associated with the depleted serotonin levels in alcoholism. Supporting serotonin production may also decrease depressive withdrawal symptoms. Essential co-factors must also be present (vitamins B6, C, folate, magnesium).

GABA Support – glutamine, B3, B6

The nutritional precursor for GABA, glutamine together with vitamin B6 may help to increase GABA levels in the brain, relieving alcohol withdrawal symptoms. Specifically symptoms of anxiety may improve. Supporting GABA, the major inhibitory neurotransmitter of the brain will also assist in decreasing over activity of glutamate, associated with chronic alcohol abuse. Glutamine (in conjunction with vitamin B3) has been shown to also reduce craving for alcohol.[10, 11]

2) Support Detoxification of Alcohol

Liver Support - Glutathione

Support liver detoxification with nutrients such as methionine, choline, taurine. Liver conditions such as fatty liver are commonly associated with excessive alcohol consumption. Damage to the liver may eventually lead to

cirrhosis and death if alcohol consumption is not reduced. Acetyl-l-carnitine and choline may be beneficial in the treatment of alcoholic fatty liver. Acetyl-l-carnitine may promote normal fatty acid metabolism in the liver. Glutathione levels become depleted in the liver due to detoxification of alcohol, supplementing with glutathione, (or precursors – cysteine, glutamine and glycine), lipoic acid or SAME may help to increase depleted intracellular glutathione.

Enzyme co-factors – B3, Zinc

Ensure sufficient co-factors are present for the enzymes involved in detoxification and break down of alcohol. Vitamin B3 (niacin) is a co-factor for both alcohol dehydrogenase and aldehyde dehydrogenase. Zinc also assists function of alcohol dehydrogenase.

3) Address nutritional deficiencies

Alcohol is known to deplete B vitamins, particularly vitamin B3 as it is involved directly in the detoxification of alcohol (through enzymes mentioned above). Folate and vitamins B6 and B12 may be necessary to decrease high homocysteine levels. Urinary and gastrointestinal losses of magnesium are increased with excessive alcohol ingestion. Excessive alcohol intake is associated with low levels of zinc.[12] A powdered multivitamin may be of great benefit as it will be more easily absorbed in these individuals.

If you have any questions regarding this article or related topics, please contact Fiona on

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