

Biology of a Hangover: Acetaldehyde

admin · Saturday, March 15th, 2008

A product of alcohol metabolism that is more toxic than alcohol itself, **acetaldehyde** is created when the alcohol in the liver is broken down by an enzyme called **alcohol dehydrogenase**. The acetaldehyde is then attacked by another enzyme, **acetaldehyde dehydrogenase**, and another substance called **glutathione**, which contains high quantities of cysteine (a substance that is attracted to acetaldehyde). Together, the acetaldehyde dehydrogenase and the glutathione form the nontoxic **acetate** (a substance similar to vinegar). This process works well, leaving the acetaldehyde only a short amount of time to do its damage if only a few drinks are consumed.

Unfortunately, the liver's stores of glutathione quickly run out when larger amounts of alcohol enter the system. This causes the acetaldehyde to build up in the body as the liver creates more glutathione, leaving the toxin in the body for long periods of time. In studies that blocked the enzyme that breaks down acetaldehyde (acetaldehyde dehydrogenase) with a drug called **Antabuse**, designed to fight alcoholism, acetaldehyde toxicity resulted in headaches and vomiting so bad that even alcoholics were wary of their next drink. Although body weight is a factor part of the reason women should not keep up with men drink-for-drink is because women have less acetaldehyde dehydrogenase and glutathione, making their hangovers worse because it takes longer for the body to break down the alcohol.

Some of the most common hangover symptoms -- fatigue, stomach irritation and a general sense of illness all over -- can be further attributed to something called glutamine rebound. In the next blog, we'll see what this aftereffect is all about.

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