Alcohol is a Metabolic Bully
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ABSTRACT

The metabolic fate of ingested alcohol is poorly understood, even by those who are highly educated and otherwise fit, healthy, or athletic. Those who drink heavily, even if 'just on the weekends,' can derive a large portion of their total caloric intake from alcoholic beverages. Indeed, alcohol is a form of energy, but as a 'bully' it sabotages normal energy conversion pathways in the body. Instead of directly fueling muscle contraction or other desirable biochemical processes, the energy in alcohol is first converted to triglycerides and stored as body fat. In that process, a metabolic traffic jam is created as the breakdown of alcohol takes priority. Thus, even normal trim athletes, because of the high caloric content (~7 Kcal/g) and the large amounts that are sometimes ingested at a single occasion. This review will examine the metabolism of alcohol – how does it break down and where the energy typically ends up. We will present evidence that alcohol is not an efficient fuel for muscle metabolism, that it too easily ends up as stored body fat. We will also discuss the role of alcohol as a 'metabolic bully.' Once ingested, its breakdown takes precedence over other metabolic processes and it creates a back up of more desirable processes such as glycolysis and the Kreb’s cycle. Thus, the production of ATP for muscle contraction is slowed down, and the energy from the alcohol is converted to triglycerides and stored as body fat.

RESULTS

Alcohol as Energy

Alcohol can be seen as energy through its amount in calories. Calories give us the energy needed to do work (both internal body functions and muscular contractions) and this energy comes from the chemical bonds between atoms of the items we ingest. In alcohol there are 7 kcal of energy per gram compared to the 4 kcal/gm found in carbohydrates or proteins and near the 9 kcal/gm found in dietary fat. Although there are many calories in alcohol, these are seen as “empty” calories because they have little nutritional value, thus not being a healthy energy source.

Metabolic Breakdown

Once alcohol is absorbed into the bloodstream, it can then start its process of being broken down. This happens by first being oxidized in the liver starting with the enzyme alcohol dehydrogenase, secondly be broken down by the microsomal ethanol-oxygenizing system, and lastly be passed out of the body in the breath and urine. Alcohol is oxidized at a rate of 100 mg per kg of body mass per hour. This gives a 220 lb. person the ability to metabolize one drink per hour while in a 110 lb. person it would take two hours. There is no way to speed up this process, as the rate of breakdown is determined by the amount of the enzyme alcohol dehydrogenase available in the liver.

SUMMARY AND CONCLUSIONS

Alcohol has many effects, some potentially desirable, some not. It may provide the information into a message that is applicable to college students. It has been suggested, however, that to maximize such health benefits, the proper rate of alcohol ingestion would be so slow that the blood alcohol level would not even rise. (think slow intravenous drip) What alcohol won’t do is promote a lean body or provide ready energy for muscular work. Meanwhile, the chemical steps that are involved in muscle contraction are hindered as the processing of the alcohol takes precedence.

REFERENCES


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