When the Liver Gets No Break – Fatty Liver During the Christmas Season-

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Why sugar, alcohol, and late nights throw the body's quietest organ out of balance

Christmas feasts place a particular strain on our liver (Canada 1985; special stamp Spain 2018).

In Germany, around one in four adults now suffers from fatty liver disease, many without knowing it. For a long time, it was considered a consequence of excessive alcohol consumption, but today non-alcoholic fatty liver disease (NAFLD) is the more common form. Its causes include excessive calorie intake, a sugar-rich diet, lack of physical activity, and overweight. Even slim individuals can be affected—especially if they consume large amounts of fructose, for example through soft drinks. Both forms share the same outcome: the liver stores fat, gradually becomes inflamed, and slowly loses its ability to regenerate.

When the Energy Switch Tips

During the breakdown of alcohol, two key substances are produced: acetaldehyde, a toxic intermediate, and NADH, the reduced form of the coenzyme NAD^+ (nicotinamide adenine dinucleotide).

An Organ Under Constant Strain

Goose, pastries, and mulled wine—the Advent season is a feast for the senses. Yet while we indulge, the liver is working at full capacity. It filters blood, breaks down alcohol, produces bile, stores sugar and fats—and does so without pause. Especially during the Christmas season, it reaches its limits: too much fat, too much sugar, too much alcohol, and too little sleep. The result can be fatty liver disease—a silent but widespread condition..

Excess weight caused by unhealthy eating is, alongside alcohol consumption, the greatest enemy of our liver. Both can lead to fatty liver disease and ultimately to liver cirrhosis (special stamp Italy 2013 against childhood obesity; vignette Austria 1909 intended to warn of the dangers of alcohol).

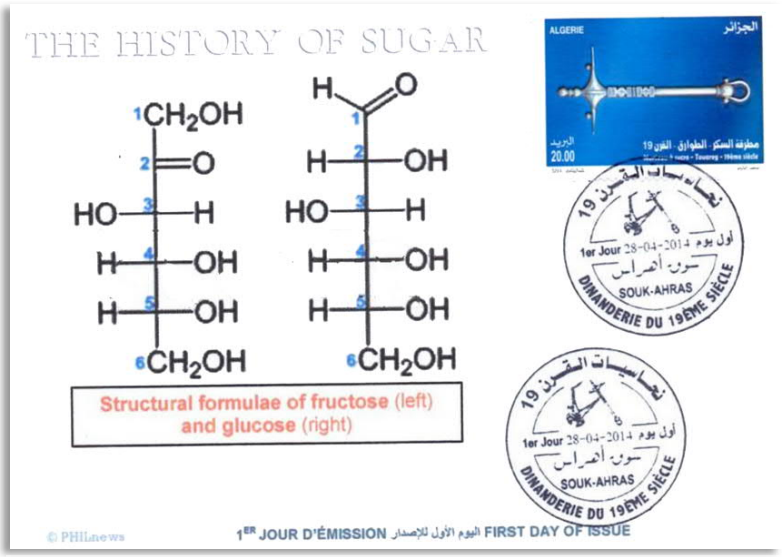
On this stamp, life is symbolically shattered by alcohol—figuratively, one could also say that health, above all the liver, is destroyed (Argentina, 1989).

Under normal conditions, there is a balance between NAD^+ and NADH. This ratio—the NADH/NAD^+ ratio—regulates whether cells generate energy (when NAD^+ predominates) or store energy (when NADH predominates). During alcohol metabolism, however, large amounts of NAD^+ are reduced to NADH. The ratio rises, and cellular metabolism is thrown off balance. A high NADH/NAD^+ ratio inhibits fat breakdown (β-oxidation), activates fat synthesis, blocks gluconeogenesis, and leads to an increase in lactic acid. Biochemically, the liver "believes" it is in a state of energy surplus and begins to store fat. At the same time, acetaldehyde and free radicals trigger inflammatory processes that damage liver cells and impair regeneration.[10].

[10] Lu Y, Cederbaum AI. J Gastroenterol Hepatol. 2008;23(Suppl 1):S44-S48; Hoek JB, Pastorino JG. Semin Liver Dis. 2004;24(3):257-272.

Sugar Is Not All the Same

The same principle applies—albeit through a different pathway—in the case of excessive sugar consumption. Fructose, or fruit sugar, is the real culprit here, not glucose.



Although the sugars glucose and fructose are chemically very similar, they are metabolized differently in the body (FDC Algeria 2014).

Glucose is metabolized in almost all cells of the body, whereas fructose is processed exclusively in the liver—and without hormonal regulation by insulin. This means that fructose reaches the liver at full concentration and is directly converted into fat. Especially when energy stores are already filled, this leads to fat accumulation and—like alcohol—raises the NADH/NAD$^+$ ratio. Fat breakdown decreases, oxidative stress increases, and non-alcoholic fatty liver disease develops, which is biochemically almost identical to the alcoholic form. In short:

> ***Fructose Acts Like Alcohol — Only Without the Intoxication***[11].

Liver Time – The Body's Night Shift

Whether or not one sleeps well through the night is not always determined by the quality of the mattress (Lithuania 2023; Publibel No. 864, 1949).

ZBetween 1 and 3 a.m., the liver operates at peak performance. During this so-called "liver time," detoxification, glycogen storage, and cellular repair processes reach their maximum. This phase is part of the circadian metabolic rhythm.

Eating late or consuming alcohol disrupts this biological cycle: the liver is then occupied with digestion instead of regeneration. Chronically disturbed liver rhythms are now regarded as a risk factor for fatty liver disease, insulin resistance, and metabolic disorders. Traditional Chinese medicine has described the liver time for centuries as a phase of cleansing—an observation that modern chronobiology increasingly confirms.[12].

> *Those who regularly wake up between 1 and 3 a.m. often experience the effects of an overburdened liver.*

Small Breaks, Big Impact

The liver has a remarkable capacity for regeneration. When it is relieved—through abstaining from alcohol, reducing sugar intake, and increasing physical activity—a fatty liver can completely regress. Just a few weeks are often enough to improve liver values and metabolism. Adequate sleep and a regular daily rhythm are equally important, allowing the liver to make optimal use of its nighttime regeneration phase.

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[11] Ter Horst KW, Serlie MJ. Nutrients. 2017;9(9):981; Yu S, Li C, Ji G, Zhang L. Nutrients. 2021;13(12):4201; Abdelmalek MF, et al. Nat Rev Gastroenterol Hepatol. 2010;7(5):251-264; Stanhope KL, Havel PJ. Ann N Y Acad Sci. 2010;1190:15-24.

[12] Reinke H, Asher G. Gastroenterology. 2016;150(3):574-580; Zhou P, Zhang Y, Ma Y, et al. Am J Physiol Gastrointest Liver Physiol. 2020;319(3):G433-G447; Huether G. Z Gastroenterol. 2018;56(Suppl 1):P64. (deutsche Übersicht, Kongressabstract)

An earlier evening meal, alcohol-free days, and a walk after festive meals are often more effective than radical diets.

A Silent Organ That Wants to Be Heard

The liver, shown here in a rudimentary form on an advertising postal item issued by Dr. Falk Pharma GmbH of Freiburg im Breisgau, could be compared to a mailbox that works perfectly well—until it becomes overfilled… (Italy, first day cover 2008).

Perhaps the liver is like an old mailbox: reliable, tireless, filled to the brim day after day. It receives our mail—sugar, fat, alcohol, medications—and quietly keeps working. But when it becomes too full, eventually everything gets stuck.

The Christmas season is a good opportunity to give it a break. Less mulled wine, fewer late meals, a bit more sleep—often that alone is enough to say thank you. And if you like, write an actual card again—with a stamp, calm, and consideration. The liver would finally get some time off. And we would start the new year feeling lighter.