www.HealthHits.info

www.facebook.com/HealthHitsPod

www.twitter.com/HealthHitsPod

HealthHitsPod@gmail.com

Hello and welcome to the Health Hits podcast.

*

I'm your host Tom Fisher.

And this episode has been somewhat delayed due to the side effects experienced when researching this weeks topic. My good friends and I were on a stag do in Liverpool and we conducted what was initially a controlled trial but which quickly became a blinded trial. Or at least a blind drunk trial.

Yes this week we are talking about alcohol. What it is, where it comes from, and how we use and abuse it.

We'll also discover the exciting possibility of a hangover free future, and I'm going to drink something I probably shouldn't.

*

So when we talk about alcohol, we are usually referring to a specific type of alcohol called ethanol. There are lots of other types of liquids that are classified an alcohol compound, methanol is one, but we will find out later why they aren't or at least shouldn't be drunk.

How is it made?

Ethanol is a naturally occurring compound that forms when yeast breaks down the sugars in fruits to form carbon dioxide and ethanol. This is known as fermentation. Our stone age ancestors may have noticed a strange and delicious flavour in fallen fruits and harnessed the action of these yeasts to create their own alcohol. Its thought that an alcoholic drink made with honey called Mead may have been made as early as 10,000BC.

In the Epic of Gilgamesh, the earliest surviving work of literature written over 4000 years ago there is reference to Siduri, the Babylonian Goddess of wine, beer, and general merry-making. Its clear that even this long ago wine and beer manufacture was an established and widespread practice.

There are plenty of references to these drinks in Greek, Roman, Chinese and Indian literature too.

Beer and wine are made from fermenting the sugars in barley and grapes respectively. Hops are added to adjust the flavour of beer, and different grape varieties will produce different flavours. The process will usually produce a flavoured liquid that is made up of 3-14 per cent of pure alcohol.

Spirits or hard liquor are distilled. And the distillation process involves taking lower strength alcohol liquids and removing some of the water and other dilatants to produce something over the 20% mark but usually higher.

The first evidence of distillation taking place comes from the Greek scientists working in the Egyptian city of Alexandria in the 1st century AD.

So that's how it comes into being, but what happens when we actually drink the stuff?

Well you swallow alcohol and it goes down your oesophagus and into your stomach. Around 20% of it is absorbed through the wall of the stomach and into the bloodstream, the other 80% travels through the stomach and is then absorbed through the wall of the small intestine. The small intestine is designed to absorb nutrients from our diet so its no surprise that this is where the alcohol reaches the bloodstream.

As the old says goes, "Eating is cheating", and on an empty stomach there will be a rapid rise and peak of blood alcohol levels within minutes but this peak will be lower and slower if you're eating as well.

There are not many things that can cross the blood-brain barrier and enter the brain circulation, but alcohol is one of them.

After one or two drinks you will get increased production of dopamine and start to feel good, you may experience a buzz or tingling sensation.

A couple more drinks and your behavioural inhibitory centres start to become depressed, leading to less inhibition, being more confident, telling better stories and being generally hilarious.

Keep drinking though and you increase the production of the neurotransmitter GABA which slows visual and auditory processing, as well as inhibiting clear thinking.

Its about this time that you'll probably knock over your glass whilst exaggerating the size of the fish you once caught. "It was THIS big".

You may be experiencing an increased sexual urge but due to the inhibitory effects on the hypothalamus and pituitary at the base of the brain it may be that your appetite cannot be supported by your performance.

A few drinks later and your cerebellum starts to feel it. This is the smaller area at the back and below the main cerebral cortex, and deals with coordination. But coordination is now just a fond memory as you sway and stagger and ultimately fall down.

And now your medulla, the region of the brain that controls breathing, temperature, consciousness, is being suppressed too, and its time to go to bed.

Of course you might be wondering – but what about the fighting? Well a Scandinavian study from a few years ago found that it wasn't the type of alcohol or the level of intoxication that was the key factor in getting aggressive or fighting, but actually the drinker's personality type. They found that people who have a strong tendency to suppress feelings of anger when sober, tend to lose this control after drinking.

So violent drunks may be perfectly pleasant when sober, but they are perhaps not dealing with stress in the best way and it comes out when drunk.

So it's the next morning. You survived the night. But how?

Well its your liver you can thank for that. It has an enzyme called alcohol dehydrogenase that breaks the alcohol down into acetaldehyde, which in itself is toxic, then various other stages break that down further to carbon dioxide and water.

It's the enzyme that breaks the acetaldehyde down that is missing in around 35% of East Asians, and so it builds up and can result in quite dramatic facial flushing.

Sometimes people will drink methanol as an alcohol substitute. But who knows why because when the liver breaks methanol down it forms formaldehyde and then formic acid. Formaldehyde can be used as an embalming fluid to preserve cadavers and formic acid is what lots of ants use as a poison. So unsurprisingly the toxic effects on the central nervous system are devastating.

However, if you take someone who has drunk methanol and make them drink ethanol, or normal alcohol, the liver will preferentially break down the ethanol and leave the methanol unbroken, where it is eventually passed out intact through the kidneys.

So back to the liver.

When people drink too much alcohol over an extended period of time, it can lead to fat deposits on the liver, known as fatty liver. It can lead to hepatitis, or inflammation of the liver. And in 1 in 10 people with a heavy drinking history over 10 years it can lead to scarring which is known as cirrhosis.

The liver does far more than just break down alcohol, and we'll probably cover its important functions in another episode but essentially alcohol-related liver disease can cause fatigue, nausea, jaundice, fluid retention, confusion and in some cases catastrophic bleeding.

Alcohol can also cause physical dependence.

Rewinding back a few minutes we talked about how alcohol temporarily affects the levels of various neurotransmitters in the brain,

The brain will respond to extended, ongoing exposure to alcohol by changing the amount of neurotransmitter it produces, to try and compensate for these effects.

So essentially the brain starts to function more normally by expecting alcohol to be there and if you take the alcohol away you find that the balance of neurotransmitters is wrong and it produces unpleasant effects, what we know as withdrawal.

Its for this reason that heavy drinkers must never stop cold turkey like you might safely do with smoking because you can get a syndrome called delirium tremens. This is where you get shakes, confusion, hallucinations and seizures, all driven by the imbalance of neurotransmitters.

Delirium Tremens is also the name of a strong Belgian beer served in a bar called Delirium in Brussels. Now you can't say I am not thorough in my research because I have drunk this beer, but I'm afraid it was quite strong so I don't really remember the flavour. Or very much else about that bar.

However, despite the name perhaps being a bit tasteless, it could be used as a treatment for alcohol withdrawal, and we often advise patients who are experiencing unpleasant symptoms to drink a very small amount of alcohol to take the edge off as their body's readjust towards the alcohol free state.

Coming back to short term alcohol use, I just want to talk about hangovers.

A hangover is the experience of a broad range of symptoms that can include fatigue, headache, muscle aches, sensitivity to light, raised blood pressure, raised heart rate, dizziness, low mood, irritability.

Some researchers assert that its actually just a mild form of alcohol withdrawal, others think that its more of a direct physical process. The toxic metabolite acetaldehyde directly damages tissue, alcohol itself is a diuretic so we pee more and become dehydrated, the natural salt balance in the blood is disturbed, the effect of the alcohol on the liver can cause low blood sugar as well as an increased build-up of the toxic waste compound lactate.

It should be quite clear that drinking to intoxication is a bad idea. But it happens. And if it happens occasionally that doesn't necessarily make you a dangerous or reckless drinker.

But if you find that you are ending an evening having drunk too much what can you do to reduce the fallout tomorrow morning?

Well some of the papers I have read appear to have been published in the Journal of the Barn Door Obvious, stating that reduced alcohol intake will reduce hangover side effects. Also that the intensity of the hangover will reduce with the passage of time. Obviously.

But what about something useful? Well not smoking will help. Lots of people will smoke when they've had a few drinks. This is likely due to that effect on the behavioural inhibitory centres in the brain and reduced self control when drinking. Smoking will boost dopamine levels, just like alcohol, so the impact of moving from a high dopamine level to a low dopamine level in the withdrawal phase during the hangover would be exaggerated.

The type of alcohol you drink may also play a part. Some alcohols contain what are known as congeners which are toxins in themselves but which contribute to the flavour and aroma of the drink. Bourbon contains very high levels of congeners, where as gin, rum and especially vodka are have virtually none.

Spend a year living and teaching in Moscow and remember someone once telling that if they drank the finest vodka they would never have a hangover. So I suppose I shouldn't've scoffed. But he also told me he could drink a bottle and would not get drunk and be fit to drive so you can see why I doubted his credibility as a source.

Other interventions which seem to have some evidence is drinking plenty of water before bed to reduce the impact of dehydration, but also drinking fruit juice, which presumably counteracts the effect of falling blood sugar on the body and the brain.

The future of drinking may actually not need to rely on any of these techniques because of a recently developed substance called alcosynth. This has been developed by British Professor David Nutt, a fascinating man who spent part of his career researching here in Oxford, and who has often been an outspoken critic of current drug policy.

He is naturally being guarded about what alcosynth actually is, until his IP rights are secured, but he claims it will have a very similar effect on the brain as alcohol but is virtually calorie free, and when broken down doesn't contain that toxic compound acetaldehyde. And so liver damage and hangover may be consigned to the history books after 12,000 years, as early as 2050.

I'll post links to the relevant articles on the site.

So I hope this has been interesting, I've certainly learnt a lot whilst researching this episode. And to finish I'm going to briefly cover something that I get asked a surprising amount:

Can you get drunk from the alcohol in hand sanitisers?

Well its perhaps not that strange a question because alcohol-based sanitisers are on all the walls in GP surgeries and on the ends of every patient's bed in a hospital. And given some patients in those beds are going to have chronic alcoholism, what happens if they are tempted to drink from these bottles?

Well most alcohol sanitisers contain ethanol, the same as alcoholic drinks. This is usually at a concentration of 60% or higher, a vodka or bourbon would be 40%. It kills bacteria by damaging their proteins or dissolving the membrane that surrounds and protects the contents of the bacterial cell.

But on its own the alcohol could be drunk. However, the manufacturers recognise this and mix the ethanol with a variety of compounds that make it undrinkable.

Denatured ethanol like what's in this Carex Complete Hand Gel contains the non toxic but terrible tasting Denatonium. Its what is used in varnish to prevent nail biting and supposedly makes the hand gel undrinkable.

In the interests of science I'm going to try a little bit, not enough to be harmful but enough to give you a flavour as it were, of what it tastes like. I would not advise that you do this at home, and the bitterant has been added to specifically to discourage this sort of behaviour.

I'm just adding it to a teaspoon, perhaps a quarter or so of a teaspoon, and I'll end by saying thank you for listening and please do get in touch via facebook or twitter @HealthHitsPod or the site www.HealthHits.info.

Again, this is not something to try at home and I'm already having second thoughts, but lets see what it tastes like.

You can listen to the podcast to hear the unintelligible sounds I made but the short version is that it is horrible and there is no way anyone would be able to drink that

Thank you so much for listening and please joint me again for another episode of Health Hits.