Alcohol Facts & Physiology

Curricular Area:	**Science**
CfE Level(s):	Third
CfE Experiences & Outcomes:	HWB, 3-15a, 3-16a, 3-38a, 3-41b 3-43a. TCH 3-04a
Objectives:	Increase learner's knowledge of the effects of alcohol on the body. Encourage discussion around the facts and myths of effects of alcohol on the body.

Interactive ICT resources i. e 3D model of body parts and interactive tools which can be used on a smart board can be found at:

- www.bbc.co.uk/science/humanbody/body/index_interactivebody.shtml
- www.healthline.com/human-body-maps

Further resources (model of pickled liver, beer goggles etc) can be obtained by contacting your Health Improvement Senior for Schools.

Suggested Activity

Work in groups to create an outline of the human body. The larger you can do this the better (drawing around someone works well).

Draw or write the organs onto the body model.

Refer to the factsheet below and note down the main facts about how alcohol affects the body on sticky notes. The facts can be placed inside the large body outline in the right places.

Further questions might also include:

- In the body, name two areas where alcohol is absorbed after swallowing?

- Alcohol is transported via the blood to all the organs of the body. Name the organ that causes blurred vision and reduced coordination when under the influence of alcohol?
- Name the organ that breaks down the bulk of the alcohol in a drinker's body?
- About 2-4% of the alcohol consumed leaves the body through urine. Name the organ that produces urine?
- A smaller portion of the alcohol leaves the body through sweat, exhaled air and saliva. Name the three areas of the body where this occurs?
- How can alcohol affect how a drinker grows?
- How can alcohol affect how drinkers feel about themselves and feel about other people?
- How can alcohol affect a drinker's facial expressions?
- Why can drinking alcohol lead to difficulties standing and walking?
- Why is the liver at particular risk in cases of prolonged and heavy drinking?
- How can alcohol affect a drinker's brain?
- How can alcohol affect a drinker psychologically?
- Is it possible to drink alcohol responsibly? If so, how?
- Do you think consuming a large amount of alcohol or 'binge drinking' could have harmful effects on the body? If so, why?

Fact Sheet: Alcohol and the journey through the body.

Into the mouth, down the oesophagus, through the stomach, into the blood.

First, it heads towards the stomach. Some alcohol will be absorbed by the stomach lining and make its way into the bloodstream. Stronger alcoholic drinks tend to be absorbed more quickly, especially shots.
Fizzy drinks, like champagne or mixers, can speed up the process as the carbon dioxide they contain accelerates alcohol's journey to the small intestine. How recently food has been eaten also makes a difference (the less food, the quicker the alcohol will arrive in the bloodstream).
The rest of the alcohol (about two thirds) keeps on going, squeezing into the bloodstream through the walls of the small intestine.
The blood carries the alcohol round the body.

Here's what it does when it gets to each destination:

The Brain
The amount of alcohol in the bloodstream ('blood alcohol concentration') will determine how much the brain is impaired - in other words, how drunk you feel and act.

Alcohol is a depressant which takes its toll on different parts of the brain:

Cerebral cortex: processes thoughts. When its function is depressed by alcohol, it can result in the following effects:
• become more talkative, self-confident and less inhibited.
• can't judge or think as clearly as usual, which is why daring a mate to jump out of a moving car can suddenly seem like a great idea.
• can have trouble seeing or hearing.
• can't feel pain as clearly. (This is because the alcohol is affecting the brain's ability to process information.)

Limbic system: controls emotions and memory.
Alcohol temporarily makes you feel good, so you're less likely to notice when something bad is happening around you.
The effects of alcohol mean that emotions tend to be exaggerated and your memory lost. If remembering nothing from the big night out wasn't enough, there's also research to suggest excessive alcohol can impair the ability to create new memories too.

Cerebellum: coordinates the movement of the muscles.
When the depressant effects of alcohol get here, this can result in un-coordination and the balance can be affected. So, even simple tasks like crossing the road are riskier.

Alcohol also temporarily numbs pain. So if you or your friends do have an injury, it could be more serious than you think.

The Heart
When there's alcohol flowing around the body, the heart beats faster. This is because alcohol is a 'vasodilator', which means it makes blood vessels relax allowing more blood to flow through the skin and tissues. As a result, the blood pressure will drop. To compensate, and to make sure the organs get all the blood they need, the heart rate increases.

The Kidneys and Bladder

The kidneys are there to filter blood. They make sure waste products are selectively expelled from the body, while useful things like proteins and amino acids are retained in the blood.
The kidneys also keep the amount of water in the body constant - until alcohol gets involved.
Alcohol is a diuretic (something that increases the amount of urine the body produces). When you drink too much the body ends up getting rid of more water than it absorbs, and you become dehydrated. As well as causing a parched throat the next morning, dehydration is also behind the headache, nausea and fatigue that makes up a hangover.
Alcohol also has an effect on the body’s production of an antidiuretic hormone (also called vasopressin) that usually tells the kidneys to reabsorb water that would otherwise end up in the bladder. Without this hormonal signal, the bladder fills up with all the water from the fluid that is taken in.

Lungs
As the alcohol in the blood travels to the lungs, some of it will evaporate into the air in the tiny lung sacs known as alveoli, and be exhaled from the body (‘alcohol breath').

Skin
The blood flow to the skin increases, giving a sweaty, flushed look.

Liver
The liver is responsible for breaking down (or 'metabolising') the alcohol in the body. Around 90% of the alcohol leaves the system this way. The liver breaks alcohol down into a chemical called acetaldehyde, which the body recognises as toxic. This is then broken down further into carbon dioxide and water, which the body can then get rid of.
The liver can only metabolise a certain amount of alcohol per hour (usually around one unit). The rate the body breaks down alcohol depends on body weight and gender. If you drink faster than the liver can get rid of it, the level of alcohol in the body rises - there’s a 'topping up effect'. This means it isn't just the alcohol you drink there and then that’s affecting you; it's what you’ve had over the last 12 hours or more as well. Alcohol keeps going through the body at the rate of one unit an hour. And as you continue drinking, you carry on 'topping up' the amount of alcohol in the body. Too much alcohol in the system can make you feel sick, slur words and pass out.

The remaining 10% of alcohol that isn't dealt with by the liver, ends its journey round the body through sweat, breath or directly through urine.

(Taken from Drinkaware, 2012)