

Balance Issues

By Simon

Balance is often a problem for us. It's something that we learn as kids, it works automatically usually, and all of a sudden it doesn't work no more (One of us says that it is like "being a bit drunk, and then pulling a woolly hat down over your head so you can't see!").

How do I balance?

Anatomy; Semicircular canals in inner ear (SCCs)

Joint position sense

Visual input

Cerebellum (Mission Control for Balance)

Visual input is what we can see. If the sky is at the top of the picture and the ground is at the bottom, we are probably upright! If you put people into cubicles where ground and sky are pictures projected onto the walls, you can have fun watching the people fall over when you swap the pictures around. If you project moving pictures (like the view from a car window) onto a screen in front of someone, they get the impression that they are moving too. Just due to what they can see. If they close their eyes they won't feel like they are moving any more, and they probably won't fall over!

Joint Position Sense is information that our brain gets from tiny receptors in the muscles and ligaments, particularly those around joints. This tells the brain what position the joint is in (a straight or bent finger, for instance). We don't have to take a look, or feel a joint to know what position it is in. We just "know".

Semicircular canals are part of the inner ear but have nothing to do with hearing. One on each side; they are linked to the cochlea (this is what does the hearing bit). They are each made up of three small tubes, lined up in 3 planes at right angles. The tubes have

fluid in them and this fluid moves in the tubes when the whole organ moves, like fluid inside a plastic tube would start to move if you started to move the tube. The water would be going fairly slowly but it still moves. In the SCCs there are small collections of “hairs” with tiny pebble-like stones on them (otoliths). As the fluid in the SCCs starts to move, it, in turn, puts pressure on these small stones and they pass that pressure on down into the “hairs”, so the cell down below knows that something is going on. They can detect movement, such as changes in position, acceleration, deceleration, spinning, falling, and going upwards.

Cerebellum (the BIG MAN in charge of it all) is a large chunk of the brain sticking out low down at the back. It does all the sorting out to try to keep you standing straight and tall. It is a “computer” that collects all the info, from the eyes, SCCs, and the joints. It works out what position your bodily bits are in, whether you are moving and which direction; it then works out what you need to do with your muscles,

- 1) to keep balanced how you are
- 2) to correct any tendency you are having to become unstable
- 3) to move off and do something more interesting instead.

Why Do I Tend To Fall Over?

Individual parts of the system sometimes don't work properly, and feed in wrong data to Mission Control. Any of the bits that I mentioned above can stop feeding info in to the system, or start to send in duff stuff. Diseases that damage the sense organs, accidents, drugs (think of the effects of alcohol) are all examples of things that can do this. If Mission Control stops working properly because it has its own problems, you are in big trouble too.

Which bits of the system tend to fail

Vision is probably the commonest to go wrong. But blind people don't necessarily fall over all the time. They rely on the data that is coming in from the SCCs, and their joint position sense. If you

need to wear glasses to allow you to read, these make normal “round the house” vision more difficult and make people more unstable.

Joint position sense is probably most often affected by having the bit that does the sensing chopped off! For example; a leg amputated or a finger cut off in an accident.

The semi-circular canals can be affected by a condition called “labyrinthitis”. This is thought to be caused by virus infection of the SCCs. The poor patient has attacks of a dreadful spinning sensation. Often there is a lot of nausea and vomiting too.

If the cerebellum can’t “get it all together” then the game is up and we “All fall Down”! The cerebellum, itself, could be affected by a stroke, brain tumour (primary from the brain itself, or a secondary tumour that has spread from somewhere else), infection, a familial tendency to become ineffective (the inherited ataxias), or by the abnormal tissue found in some diseases like ECD.

Treatments

Vision You must have proper prescription spectacles. DON’T wear your reading specs when you are “out and about”. If both eyes can see but they are not working together (a squint) then glasses with prisms may help, or you can pretend to be a pirate and wear an eye-patch.

SCC For labyrinthitis doctors tend to prescribe anti-histamine drugs and medicines to try to stop the nausea and vomiting. Helping people to “re-train” their balance system is another line to go down. If you spend most of the time hanging on to things, then your own balance system takes a “rest”. Make the lazy thing work a bit.

Researchers are trying to find ways of helping people who have the “ataxias” that run in families. This is difficult because there are so few of them, but a lot more than us in the ECD club!

Tumours of the cerebellum are treated like other brain tumours, and after a stroke you just try to “get back” as much as you can.

Techniques and Tips

Wear your glasses on your head AND in front of your eyes. They are NOT a fashion accessory! Don’t keep them in a fancy case in your pocket, or hanging round your neck, or resting across your forehead. Put the light on, and don’t have things too dim. Be careful if you are already a bit unsteady, and you then have a **drinkie** or **two** (or even **three** maybe). Alcohol makes **everyone** a bit unsteady, and **we** already have a head-start. Get to know what it is safe to hang on to, and what will not be helpful. Some bits of furniture are great, while others can be hopeless. I find that it helps if you know a bit about a place BEFORE you go there. My wife and I even have little “scouting” trips to spy a place out in advance.

Try to practice balancing when it is safe to do so (I haven’t been able to stand on one leg while I put my pants on, for 5 years! I have to sit down, or I fall over!). “Stress” your balancing system, but not too hard. And have lots of carpets, cushions, and cuddly people to fall on!