

Equilibrium and Balance

- **In the human body, your equilibrium is the body's sense of position and movement including your sense of balance.**
- **A body achieves a state of equilibrium when opposing forces are equal or zero and the sum of all torques about any axis is zero.**
- **When a body is in motion the resultant forces are continually altered and the athlete will constantly need to adjust and re-adjust.**
- **The body uses multiple systems to keep the body balanced. These interrelated systems working as a team are the vestibular (inner ear) system, the visual (eye) system, and the proprioceptive system (receptors in the muscles and joints and spine).**
- **The ear is a sensory organ that is essential to our sense of balance. The organ of balance (the vestibular system) is found inside the inner ear. It is made up of three semicircular canals that depict the three (3) plains of movement: sagittal, coronal/frontal, and transverse. The semi-circular canals are filled with fluid. Each of the semicircular canals end in a space (ampullae) that has small hair cells in it. Whenever we turn our head, the fluid in the canals moves too. The sensory hair cells in the ear are bent by the moving fluid. The hair cells send directional information, based on the movement, to the brain via nerves. The information is processed by the vestibular system and then sent on to other organs that need this information, such as the eyes, joints or muscles. This allows us to keep our balance and know what position our body is in.**
- **In some situations, for example on a ship or airplane or spinning around with your head on bat, the sensory organs send contradictory messages to the brain. This can cause us to feel unwell, dizzy or nauseous.**

- **For most of us, vision is a term used to describe how clear things are. In reality, the impact of vision on our lives is much more profound than just the clarity of the images being perceived. Vision is also connected to our balance system.**
- **The role of vision in the control of balance is well documented. Vision can improve bipedal upright stability during standing and locomotion as part of the integrated sensory feedback system.**
- **The visual system not only gives us clear images, but also gives us our depth perception, motion perception, sense of light and color, and spatial awareness. ... The visual system sends signals to the vestibular system, which lets the brain know that we are moving through space and the world is not moving.**
- **The proprioceptive system is located in our muscles and joints. It provides us with a sense of body awareness and detects/controls force and pressure. The proprioceptive system also has an important regulatory role in sensory processing as proprioceptive input can assist in controlling responses to sensory stimuli.**
- **Proprioception includes the senses of position and movement of our limbs and trunk, the sense of effort, the sense of force, and the sense of heaviness.
Examples of proprioceptors are as follows: neuromuscular spindle, Golgi tendon organ, joint kinesthetic receptor, and vestibular apparatus.**
- **An example of proprioception includes; being able to walk or kick without looking at your feet or being able touch your nose with your eyes closed.**