

Balance and Life

The presence of sensory and response systems is a universal attribute of life as we know it. All living organisms on Earth have the ability to sense and respond appropriately to changes in their internal and external environment. Organisms, including humans, must sense accurately before they can react, thus ensuring survival. If our senses are not providing us with reliable information, we may take an action which is inappropriate for the circumstances and this could lead to injury or death.

What Senses Do We Have?

Apart from the basic 5 senses we have, that is, sight, taste, smell, hearing, and touch. (Touch itself includes heat, cold, pressure, and pain.), we have many other senses - hunger, thirst, kinesthetic, etc. One of the most powerful of the other senses is the vestibular sense, provided by the vestibular system. It is our ability to sense body movement combined with our ability to maintain balance (equilibrium). The human body has a remarkable ability to sense and determine the direction and speed in which it is moving and maintain balance (postural equilibrium).

Control of Movement

Human beings have the ability to stand on a swiss ball, walk a tight rope, do repeated pirouettes in a ballet performance, combine twists and turns when diving, or perform triple toe loops while ice skating... all (usually) without losing balance and while keeping track of the relative position of arms and legs with respect to the rest of the body. Incredible!

How do we sense and control the movement so precisely? How do we maintain balance while putting ourselves through a wide variety of spinning and tumbling activities that are inherently "unbalancing"? When we are in motion, how do we know in what direction and at what speed we are moving?

Maintaining postural equilibrium, sensing movement, and maintaining an awareness of the relative location of our body parts under the gravitation of earth requires the precise integration of several of the body's sensory and response systems including visual, vestibular, somatosensory (touch, pressure, and stretch receptors in our skin, muscles, and joints), and auditory.

Acting together, these body systems constantly gather and interpret sensory information from all over the body and usually allow us to act on that information in a controlled way.

If You Don't Use It You Lose It

If we do not use and integrate this sensory information constantly we will lose our ability to interact with our environment and possibly cause ourselves injury. NASA has studied the impact of reduced sensory information (no gravity) encountered in space flight and how it affects an astronaut's sense of body orientation, movement, and balance?

Astronauts experience similar sensations of dizziness and disorientation during their first few days in the microgravity environment of space. Upon returning to Earth after prolonged exposure to microgravity, astronauts frequently have difficulty standing and walking upright, stabilizing their gaze, and walking or turning corners in a coordinated manner. An astronaut's sense of balance and body orientation takes time to re-adapt and integrate the sensory information due to gravity.

Poor balance or ability to adapt to changing conditions, will predispose athletes to injury, and may be the cause of disorientation and susceptibility to falling that some older people experience?