

VESTIBULAR SYSTEM

The receptors for the vestibular system are located in the inner ears. The semi-circular canals on each side form arches in three different planes so that they are able to register movement of the head in any direction. The utricle and saccule are attached structures in the inner ear which register changes in gravity as an individual moves toward or away from the ground. This results in our perception of weight, - we feel heavier if we move rapidly upward, or feel lighter if we move rapidly downward (as in an elevator).

It has been said that gravity is the essential fact of life on earth; therefore it is not strange that the vestibular system, which relates us to gravity, is very closely connected with the entire physiology of the body. Most people have experienced motion sickness when the vestibular system is over-stimulated and signals the digestive system that there is a problem. The vestibular connections with the visual system make it possible to become motion sick just from seeing something moving. In fact, 90% of the cells on the visual cortex of the brain respond to vestibular stimulation.

The vestibular system strongly influences muscle tone, since it tells muscles how much they need to contract to counteract the downward pull of gravity. And, of course, the vestibular system is best known as it determines our ability to balance, to climb stairs, to walk easily, to adjust to changing levels, to react promptly, (recover our balance) when we step in a hole.

Such a pervasive system, which orients us in space, is the foundation with which all other sensory inputs must be correlated. A person who wakes up in a strange place can't process any other information until he can figure out where he is. If one is not getting reliable information from the vestibular system, the world is a very frightening place. It is safer not to move. Or, one can move very fast and hope for the best - but frequently fall and knock things over. Knowing where one is in space is the core ingredient of body concept, and some authorities insist that vestibular awareness of one's self in space is the basis for consciousness.

One could write pages about the relationship of the vestibular system to other systems. For example, the auditory system (hearing) also has its receptors in the inner ear. Therefore it is not surprising that deficits in hearing are very frequently accompanied by over or under-sensitivity in the vestibular receptors.

Vestibular sensations contribute to nervous system development both before and after birth. Normally the fetus moves very actively throughout gestation and this movement which is sensed by the fetus' vestibular receptors contributes importantly to brain development. After birth the infant tries very soon to hold his/her head up. Turning over, rolling, being held upright - most normal handling provides plenty of vestibular stimulation. Infants who are left for long periods in an infant seat, or who are otherwise deprived of movement through space, often have difficulties processing vestibular stimulation and have problems in organizing all other sensory inputs with the vestibular.

Typical children, from toddlers on through adolescents, provide themselves with an abundance of vestibular stimulation - jumping, swinging, turning somersaults, walking on top of the garden wall, riding skateboards, - mastering all varieties of movement through space. Today, many schools have removed swings and other playground equipment. So because of fear that a child might get hurt, children are damaged by lack of needed movement opportunities. Therapy, and/or enlightened parenting can help provide needed vestibular stimulation for special needs children. Parents of all children can make schools aware of the importance of playground time and playground equipment. Movement is the raw material for nervous system development!