

## BALANCE ORGANS

revised 02Feb2016

Marieb, p 530-533, Martini 5th: 557-574, Martini 6th: 590-594,  
8th: 588-592, 10th: 590-596

### VESTIBULAR APPARATUS: (p 593)

located in the vestibule portion of inner ear

Detect static vs dynamic equilibrium

### LINEAR: (static balance maintained here) (p 596)

**maculae** (groups of hair cells) in

**saccules** (little sac), sense **vertical**

**utricle** detect **horizontal** linear acceleration

utricle: **small bag**

sensory cilia (**stereocilia**) from **hair cells** project  
into otolithic membrane with **otoliths**

acceleration flexes hairs, transduction to nervous impulse, carried by vestibular nerve

bent in one direction: **increase** depolarization (many nerve impulses)

other direction: **decrease** depolarization (few nerve impulses)

interpreted as linear acceleration

### ROTATIONAL acceleration: (p 594)

**semicircular canals**: three canals at right angles, superior & posterior,

anterior: nod yes,

posterior: tilt sideways

lateral: shake no

contain **crista ampularis** (crista) which detect rotational acceleration

stereocilia of hair cells project into gelatinous **cupola** floats in endolymph

rotation causes endolymph to flow past cupola, flexes hair cells, triggers nervous impulse.

**Nystagmus** is reflex adjustment mediated by **superior colliculi**, aids eyes in tracking when head is turning

also called vestibulo-ocular reflex (VOR) moves eyes in opposite direction of turning head

**"Doll's eyes reflex"** in unconscious patients, manually turn head side to side. Eyes should go in opposite direction

absence of doll's eye reflex suggests serious brain injury

**motion sickness**: **visual** input disagrees with **balance** input (or multiple input from two balance organs)

histamine, acetylcholine and norepinephrine are released in the brain.

warning signs      excessive salivation  
                                 pallor  
                                 rapid deep breathing  
                                 sweating

Anti motion sickness drugs: Dramamine (antihistamine)

scopolamine (anticholinergic)

