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
  utricles detect horizontal linear acceleration
  utriculus: 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 (antihistammine)
scopolamine (anticholinergic)