

Chapter 12 – Sense organs

- I. General properties of receptors**
 - a. Info transmission types**
 - i. Modality – type of info/sensation it produces**
 - 1. ex: eye info = light, seeing “stars”
 - ii. Location – brain’s interpretation of how big the stimulus**
 - 1. ex: touch may be as big as 7 mm apart, 2 touches w/i 5 cm feels as one touch
 - iii. Intensity – 3 types of info**
 - 1. stimulus rises, firing freq. increases
 - 2. rising intensity causes a recruitment of more nerves
 - 3. brain registers number of nerves sending signal
 - iv. Duration – nerves will change their firing over time**
 - 1. ex: growing “used to” hot water, strong smells
- II. Classification of receptors**
 - a. Modality classification**
 - i. Chemo – chemicals: odors, tastes, body fluid composition**
 - ii. Thermo – heat/cold**
 - iii. Nociceptors – pain**
 - iv. Mechano – physical stress: vibration, touch, pressure, stretch, tension**
 - v. Photo – light**
 - b. Origins of stimuli classification**
 - i. Interoceptors – internal organs: pain, nausea, stretch, pressure**
 - ii. Proprioceptors – position/movements of body/parts**
 - iii. Exteroceptors – stimuli external to body: vision, hearing, taste, smell, touch, cutaneous pain**
 - c. Distribution of receptors classification**
 - i. General (somesthetic) senses – all parts of the body**
 - ii. Special senses – limited to head & innervated by cranial nerves: vision, hearing, equilibrium, taste, smell**
- III. General senses**
 - a. Unencapsulated – open dendrites**
 - i. Warm/cold receptors, pain receptors**
 - ii. Tactile (Merkel) discs – fine touch, in epidermis**
 - iii. Hair receptors**
 - b. Encapsulated – wrapped in glial cells or connective tissue**
 - i. Meissner corpuscles – light touch & texture, in dermis**
 - ii. Krause end bulbs – same as above, in mucus membranes**
 - iii. Pacinian corpuscles – pressure receptors/tickle/vibration, in dermis**
 - iv. Ruffini corpuscles – heavy touch/stretching of skin, in dermis**
 - c. Pain – making body aware of damage, 2 types of receptors**
 - i. Fast pain – sharp; .5 to 2.0 m/sec; slow pain – dull**
 - ii. Bradykinin = chemical secreted to stimulate pain signal**

iii. Pain pathway

1. 1st order neuron sends signal to dorsal horn of sp. cord
2. 2nd order neuron sends signal to thalamus
3. 3rd order sends to cerebral cortex
4. spinothalamic tract pass through to thalamus; spinoreticular tract go straight to cerebral cortex

IV. Chemical senses

a. Taste – gestation; taste buds = papillae

- i. Filiform– rough; texture of food, no taste
- ii. Foliate – sides of tongue, disappear by 2/3 years old
- iii. Fungiform – tip & sides of tongue
- iv. Vallate – V at rear of tongue
- v. Each has pore that leads to hair, triggering nerve fiber
- vi. Taste sensations
 1. salty
 2. sweet
 3. sour
 4. bitter
 5. umami – “meaty”

b. smell – olfaction

- i. olfactory hairs → cell → nerve fascicle through ethmoid → olfactory tract → olfactory bulb → temporal lobe (conscious of smell) → hippocampus (smell memory) → amygdale (emotional response); also from bulb to hypothalamus → reticular formation (visceral response to smell)

V. Hearing/balance

a. Auditory canal → tympanic membrane → malleus → incus → stapes → oval window → cochlea → hairs → receptors → vestibulocochlear nerve → thalamus → auditory cortex of temporal lobe

b. Equilibrium

- i. Semicircular canals (X, Y, Z axes)
- ii. Fluids respond to orientation, influence hairs inside
 1. stimulus reaches eye nerves

VI. Vision

a. Page 613 eye parts

b. Photoreceptor cells

- i. Rods – light/dark, night vision
- ii. Cones – color
 1. blue
 2. green
 3. red

c. Bipolar cells

- i. 1st order neurons of visual pathway, converges signals

d. Ganglion cells

- i. light intensity

e. Depth perception

f. Disorders

- i. Hyperopia – farsightedness (eyeball too short)**
- ii. Myopia – nearsightedness (eyeball too long)**
- iii. Astigmatism – cornea misshaped, unfocused light**
- iv.**