

Exam 6 Material:

2/17/14

Visual System

- Info = energy waves (*7-21)
- Type = photoreceptors
- Components of the eye:
 - Cornea and lens: focus image (7-26)
 - (glasses = poorly shaped eyeball)
 - Retina: transforms into signal
 - Receptors at back
 - Afferent in front
 - Where afferents exit = no receptors = blind spot
- Coding
 - 2 kinds of receptors
 1. Rods – activated more in low light conditions *dim light
 2. Cones - *bright light
 - Lose color as light gets dimmer
 - Black and white = rods
 - Colors = cones

Color Vision = based on three cone pigments (blue green and red) *(7-32)

- What about yellow? Multiple cones are activated
- Color blind? Issue with cones, but not missing cones, “lacking” pigments, curves (7-32) are shifting
 - Most common = red-green colorblind
 - 10-20% of white males are color blind

Chemosensory System

- Info = dissolved chemicals
- Type = chemoreceptors
- Components
 - External: taste and smell
 - Internal: pH, [O₂], [CO₂] ect.
- Taste – in mouth and throat (why you get an after taste with some foods)
 - Lots of surface area = more receptors (7-47)
 - Categories of taste
 1. Salt: Na⁺ channels (tasting salty)
 2. Sour: H⁺ blocks K⁺ channels
 3. Sweet: sugars bind (turn sugar into energy)
 4. Bitter: various substances bind (things we don't want to typically ingest)
**compounds you don't want too much in your body because too much = toxic (ex. Bitter beer face, too much beer is BAD)
 5. Umami: glutamate/MSG binds (enjoyable flavor, flavorful) *MSG will always be preferred (need Umami to run cell metabolic pathway)

6. Likely adding a fat receptor soon

- Olfaction: in nasal passages (7-48)
 - Receptors
 - Differ in type and quantity
 - Last only about two months
 - (why you get used to smell of house, but can smell your friends houses)

Perception

- How we interpret these signals (cerebral)
- Often signals combine (e.g. "taste")
 - Ex. This is why you can't taste soup when you're sick)
- Better at detection than consciously aware

Types of Muscle

1. Skeletal (*9-1): striated
 - To bone via tendons
 - Supports and moves skeleton
 - Voluntary control
2. Cardiac (*9-1): striated
 - Heart muscle
 - Involuntary control/autonomic
3. Smooth muscle (*9-1): not striated aka smooth
 - Sheets surrounding organs
 - Make organs smaller/bigger
 - Contraction alters flow
 - Autonomic/involuntary

2/19/14

Anatomy of a Skeletal Muscle

- Muscle -> organ
- Myofibers
 - Muscle cell/fiber
 - Multi-nucleated
- Myofibrils
 - Bundles
- Myofilaments
 - Basic structure
 - Thick = myosin
 - Thin = actin
- Sarcoplasmic reticulum (SR)
 - Surrounds myofibrils; Holds Ca^{+2}
- Transverse tubules (TT)
 - Plasma membrane extensions; IF channels

- Mitochondria (tons) *(9-6)

Anatomy of a Myofilament

- Z line (disc) = thin connections
- Sarcomere = functional unit (z to z); change in size
- I band = only thin; light band; change in size
- A band = length of thick; dark band; no change in size
- M line = midpoint between z's
- H zone = only thick; change in size
- Myofilaments
 - Actin: thin filament; double helix chain; myosin site
 - Tropomyosin (: bound to actin; long
 - Troponin: bound to tm and actin; small; Ca⁺² site *(9-3)
 - Myosin: thick filament; golf-clubish; actin and ATP sites
 - Cross bridge: flexible; causes movement
 - At rest, tropomyosin blocks actin-myosin binding *(9-3) *(9-11)

Innervation of Muscle

- Motor neurons
 - AKA somatic efferents
 - Axon ending branch
 - 1 N -> many M
 - 1 M <- 1N
- Motor unit
 - 1 neuron + its myofibers *(9-7)
 - *(9-8) *(9-9)

Muscle Function

- Contraction
 - AP conducted along PM (into TTs)
 - In SR, voltage-gated Ca⁺² channels open
 - Ca⁺² binds to troponin
 - Tropomyosin moves
 - -> myosin site exposed
 - Myosin (ADP and PI) binds to actin

2/21/14

Muscle Function Continued

- Crossbridge Cycling: series of conformation changes *(9-15)
 - Myosin (ADP and PI) binds actin ...bind a protein to a protein = shape change
 - (changing binding site shape changes the affinity)
 - Releases ADP and PI (changing shape makes it harder for them to hold onto ADP and PI so they come off)
 - Flex of cross-bridge