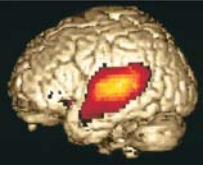


Slide 1

Sensory System

- Introduction
 - Sensory information
 - Sent by receptors
 - Interpreted by the brain



Slide 2

Sensory System

- 5 Types of receptors
 - Mechanoreceptors
 - Thermoreceptors
 - Pain receptors
 - Chemoreceptors
 - Photoreceptors

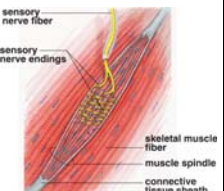
Slide 3

Sensory System

- Mechanoreceptors = proprioceptors
 - Reflex actions
 - Muscle tone (body's equilibrium and posture)
 - Muscle regulations
 - Stretch
 - Length
 - Position

All due to

- Muscle Spindle!
- Resulting in the knee-jerk reflex



Slide 4

Sensory System

– Cutaneous receptors = MANY TYPES!
• Be familiar with this figure (dermis v epidermis)

The diagram shows a cross-section of the skin with various receptors. Labels include: free nerve endings (pain, heat, cold), Merkel disks (touch), Krause end bulbs (touch), root hair plexus (touch), epidermis, Meissner corpuscles (touch), Pacinian corpuscles (pressure), and Ruffini endings (pressure). The dermis is also labeled.

Slide 5

Sensory System

– Cutaneous receptors = MANY TYPES!
• Be familiar with this figure

- Thermo-
- Pain receptors
 - Found through out the body
 - Test damaged tissues
 - » Chemical stimulation to these receptors
 - » Ibuprofen inhibits these chemical synthesis

The diagram is similar to Slide 4, showing a cross-section of the skin with various receptors. Labels include: free nerve endings (pain, heat, cold), Merkel disks (touch), Krause end bulbs (touch), root hair plexus (touch), epidermis, Meissner corpuscles (touch), Pacinian corpuscles (pressure), and Ruffini endings (pressure). The dermis is also labeled.

Slide 6

Sensory System

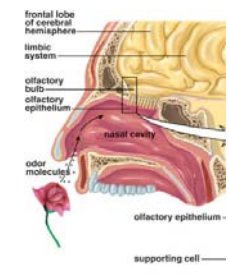
- Senses of Taste & Smell
 - Chemoreceptors involved
 - Taste buds
 - Tongue epithelium on papillae

The diagram shows the tongue and its papillae. Labels include: tongue, papillae, taste buds, taste pores, supporting cell, sensory nerve fiber, microvilli, taste cell, and connective tissue. A scale bar indicates 10 µm.

Slide 7

Sensory System

- Senses of Taste & Smell
 - Roof of nasal cavity
 - Olfactory epithelium contains olfactory cells
 - Specialized neurons
 - Specific molecules excite differently

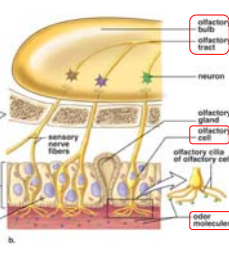


ib

Slide 8

Sensory System

- Senses of Taste & Smell
 - Roof of nasal cavity
 - Olfactory epithelium contains olfactory cells
 - Specialized neurons
 - Specific molecules excite differently

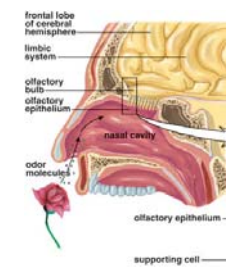


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Slide 9

Sensory System

- Senses of Taste & Smell
 - Smell and memory!
 - Direct link to the limbic system
 - Triggers memory

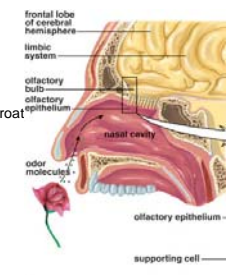


ib

Slide 10

Sensory System


- Senses of Taste & Smell
 - Work together!!
 - Connection at back of throat
- Colds
 - Effect the passage in the nasal cavity



Slide 11

Sensory System

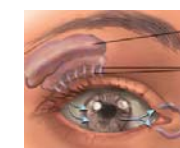
- Sense of Vision
 - Photoreceptors
 - Eyes
 - Location: orbits
 - Frontal, lacrimal, ethmoid, zygomatic maxilla, sphenoid & palatine



Slide 12

Sensory System

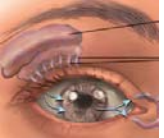
- Sense of Vision : Eyes : Accessory organs
 - Eyebrows, eyelids and eyelashes
 - Lacrimal apparatus
 - Extrinsic muscles



Slide 13

Sensory System

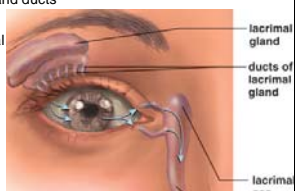
- Sense of Vision : Eyes : Accessory organs
 - Eyebrows
 - Thick hairs along supraorbital ridge
 - Protection
 - Sun
 - Perspiration
 - Eyelids
 - Continuous with skin
 - Eyelashes
 - Hairs of the lid
 - Protection and sebaceous lubrication
 - Clogged = sty



Slide 14

Sensory System

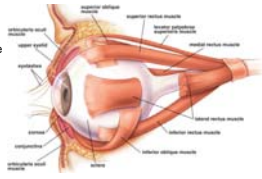
- Sense of Vision : Eyes : Accessory organs
 - Lacrimal apparatus
 - Tear production
 - Gland, sac and ducts
 - Medial flow
 - Nasolacrimal duct



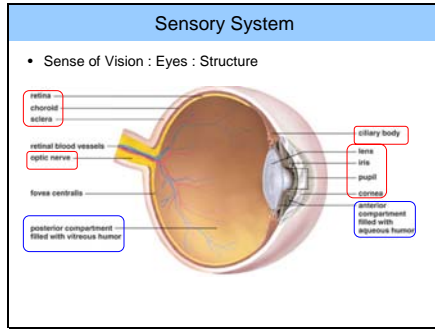
Slide 15

Sensory System

- Sense of Vision : Eyes : Accessory organs
 - Extrinsic muscles
 - Precise
 - Eye movement
 - Don't memorize



Slide 16



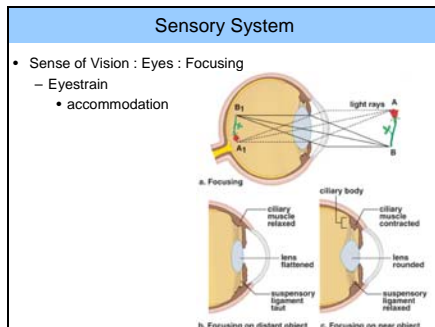
Slide 17

Sensory System

- Sense of Vision : Eyes : Structure

Part	Function
Sclera	Protects and supports eyeball
Cornea	Refracts light rays
Pupil	Admits light
Choroid	Absorbs stray light
Ciliary body	Holds lens in place, accommodation
Iris	Regulates light entrance
Retina	Contains sensory receptors for sight
Rods	Make black-and-white vision possible
Cones	Make color vision possible
Fovea centralis	Makes acute vision possible
Other	
Lens	Reflects and focuses light rays
Humors	Transmit light rays and support eyeball
Optic nerve	Transmits impulse to brain

Slide 18



Slide 19

Sensory System

- Sense of Vision : Pathway
 - Light is focused on photoreceptors in the retina

a. Drawing of retina

Slide 20

Sensory System

- Sense of Vision : Pathway
 - Light is focused on photoreceptors in the retina
 - Cones
 - Color vision
 - Contain pigments
 - Fine detail
 - Rods
 - Gray shades
 - Night vision
 - Peripheral vision
 - Perception of movement

Cone cell Rod cell

Slide 21

Sensory System

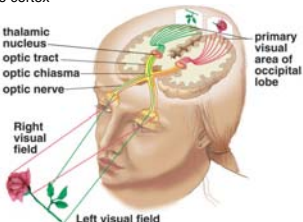
- Sense of Vision : Pathway
 - Light is focused on photoreceptors in the retina
- Blind spot
 - NO cones or rods
- Macular degeneration
 - Destroyed R or C
 - Blindness

a. Drawing of retina

Slide 22

Sensory System

- Sense of Vision : Pathway
 - Retina to cortex




Labels in diagram: thalamic nucleus, optic tract, optic chiasma, optic nerve, Right visual field, Left visual field, primary visual area of occipital lobe.

Slide 23

Sensory System

- Sense of Hearing
 - Mechanoreceptors
 - Hair cells
 - Stereocilia
 - » Long microvilli



Label in image: stereocilia

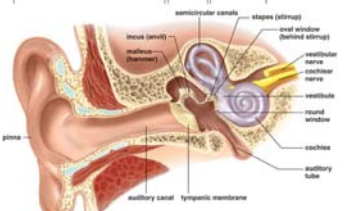
Scale bar: 2 μ m

Slide 24

Sensory System

- Sense of Hearing : Structures : Know this figure

Follow sound waves



Labels in diagram: pinna, auditory canal, tympanic membrane, malleus, incus (anvil), stapes (stirrup), vestibular nerve, cochlear nerve, vestibule, round window, cochlea, auditory tube, semicircular canals.

Slide 25

Sensory System

- Sense of Hearing : Structures : Functions

Part	Medium	Function	Mechanoreceptor
Outer Ear	Air		
Pinna		Collects sound waves	—
Auditory canal		Filters air	—
Middle Ear	Air		
Tympanic membrane and ossicles		Amplify sound waves	—
Auditory tube		Equalizes air pressure	—
Inner Ear	Fluid		
Cochlea (contains spiral organ)		Hearing	Stereocilia embedded in tectorial membrane
Semicircular canals		Rotational equilibrium	Stereocilia embedded in cupula
Vestibule (contains utricle and saccule)		Gravitational equilibrium	Stereocilia embedded in otolithic membrane

Slide 26

Sensory System

- Sense of Equilibrium
 - Vertigo
 - Dizziness and rotation sensation

The diagrams illustrate the internal structures of the vestibular system. Part (a) shows the rotational equilibrium receptors in the ampullae of the semicircular canals, which contain fluid and a central cupula. Part (b) shows the gravitational equilibrium receptors in the utricle and saccule of the vestibule, which contain fluid and a gelatinous otolithic membrane with embedded stereocilia. Labels include: utricle, ampulla, hair cell, supporting cell, vestibular nerve, stereocilia, otolithic membrane, and cupula.

a. Rotational equilibrium: receptors in ampullae of semicircular canals.
b. Gravitational equilibrium: receptors in utricle and saccule of vestibule.

Slide 27

Sensory System

- Age
 - Hearing
 - Osteoclerosis
 - Over growth of inner ear bones
 - May affect balance
 - Vision
 - Macular degeneration
 - Glaucoma anterior portion changes shape
 - Cataracts
 - Lens = opaque and can not transmit light
 - Due to sun?

Sensory System

- Sense of Equilibrium
 - Vertigo
 - Dizziness and rotation sensation

The diagrams illustrate the internal structures of the vestibular system. The top-left diagram shows the utricle, with labels for the cupula, hair cell, supporting cell, and vestibular nerve. The top-right diagram shows the saccule, with labels for the striated membrane, hair cell, supporting cell, and vestibular nerve. The bottom-left diagram shows the base of the saccule, with a label for the base of the saccule. The bottom-right diagram shows the macula, with a label for the macula membrane.

A. Rotational equilibrium: receptors in respect of semicircular canal **B. Gravitational equilibrium: receptors in utricle and saccule of vestibule**
