

W E E K 5

ALTERATIONS IN SENSORY FUNCTION

CHAPTER 15

DISORDERS OF
THE EYES, EARS AND
OTHER SENSORY ORGANS

LECTURE OBJECTIVES

- Describe the general functions and structures of the ear and eye.
- Describe the general manifestations of hearing impairment.
- Explain how conductive and sensorineural mechanisms of hearing loss differ in etiology and treatment.
- Identify the predisposing factors, clinical manifestations, and management of otitis media.
- Describe the general manifestations of visual impairment.
- Describe the causes, clinical manifestations, and management of common visual disorders, including errors of refraction, strabismus, cataract, and retinopathies.
- Distinguish between open-angle and acute angle-closure glaucoma.
- Differentiate the two forms of macular degeneration.
- Describe the causes, clinical manifestations, and management of smell and taste disorders.

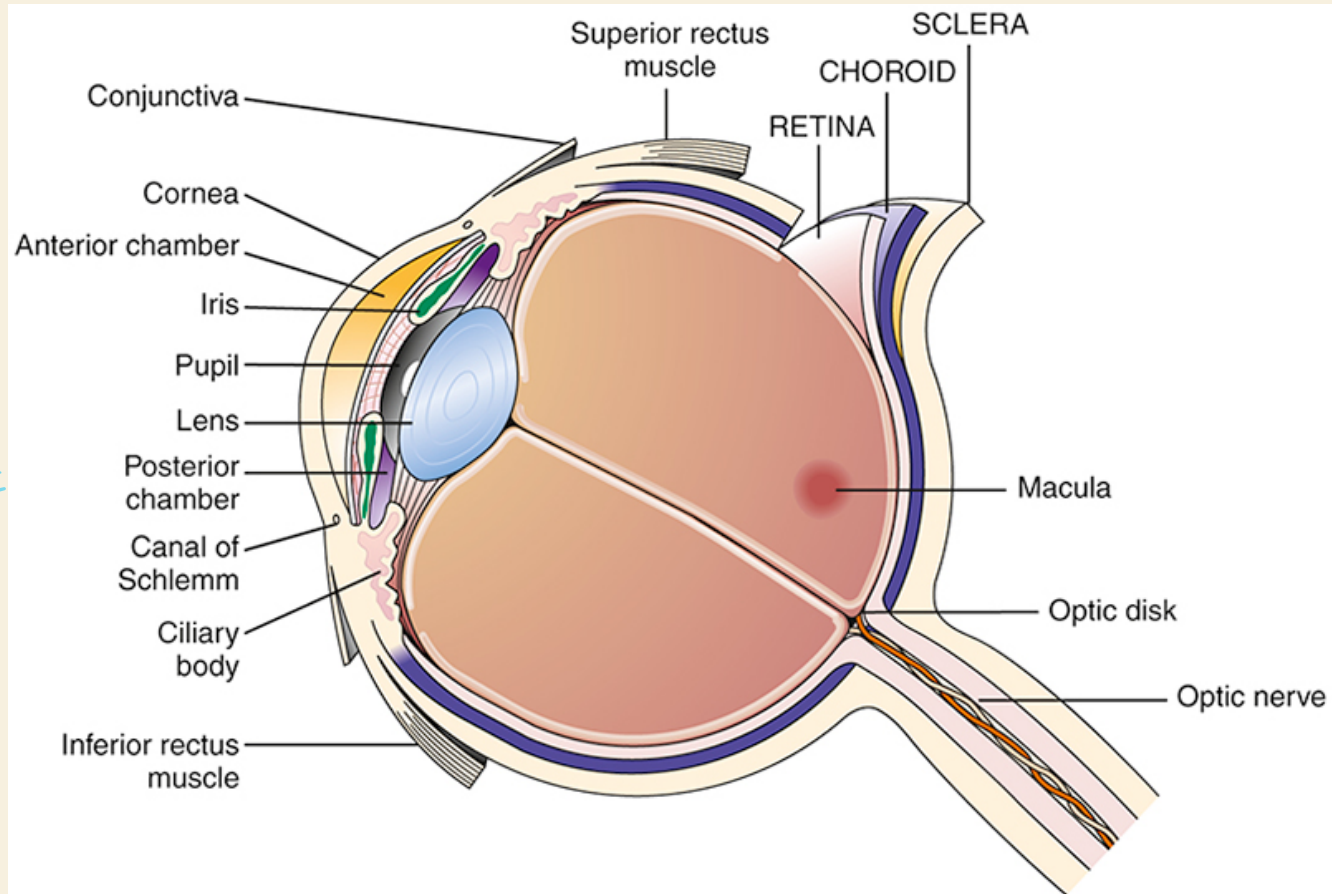


T H E E Y E

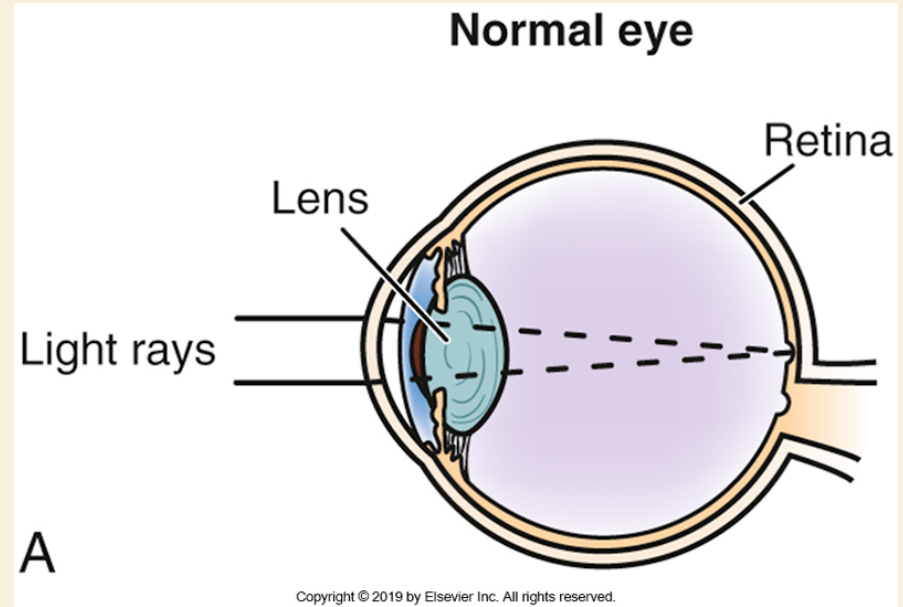
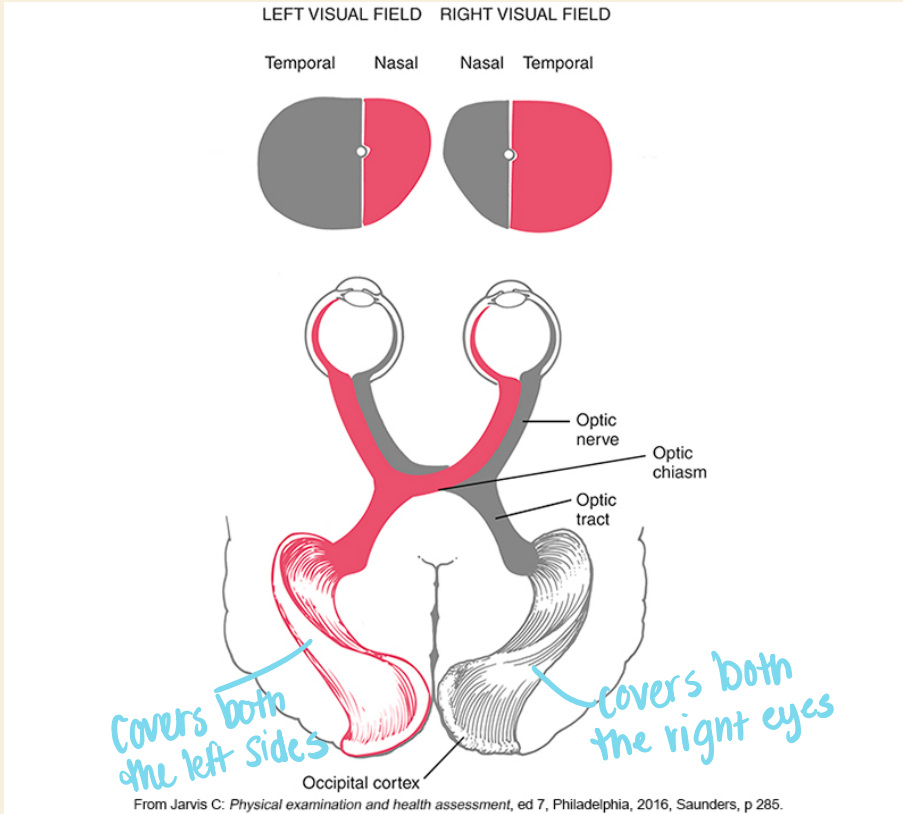
STRUCTURE OF THE EYE

• Kinda like a camera

• retina is a ray of nerve cells on the back of the eye - holds stuff in



VISUAL PATHWAYS



Rods - night vision / dark vision

VISUAL IMPAIRMENT

Infancy or early childhood - eye tests

• might do a history and physical to figure out the problem

Older children - may be having trouble in school

• As we get older our color vision gets worse

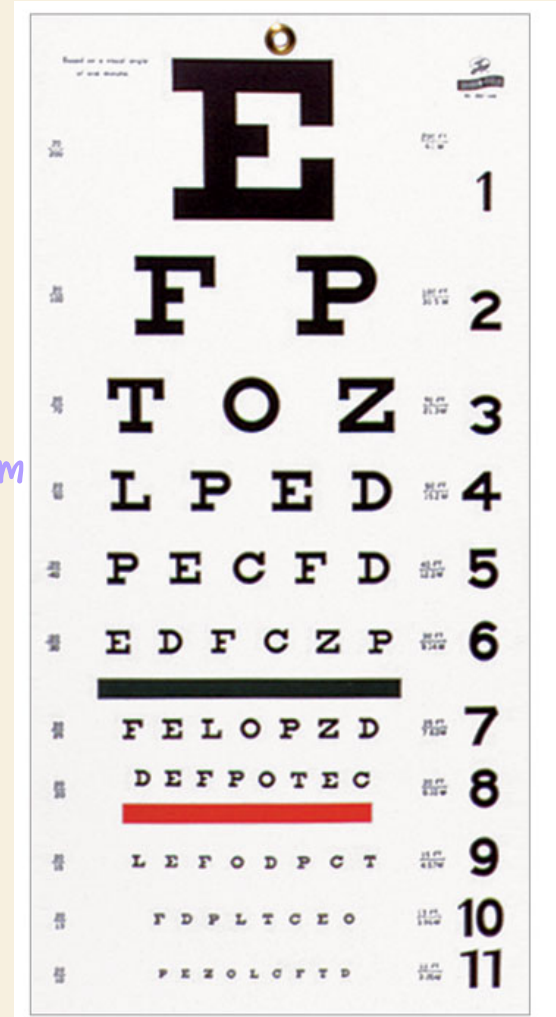
In adults

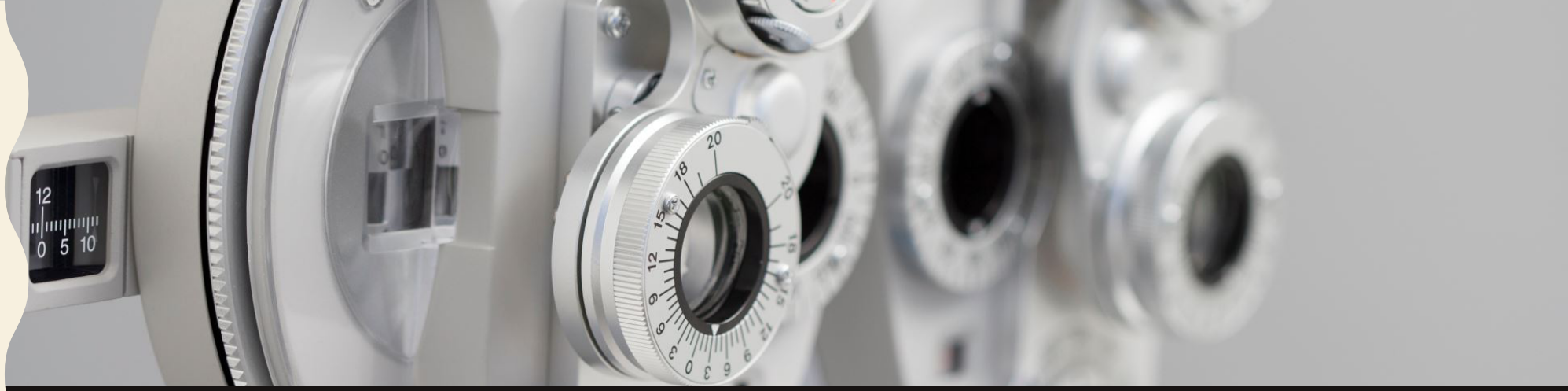
Elderly - bad vision causes people not to be able to do daily living things

• could have headaches from muscle pain

• person might squint or tilt head

• red eye is irritation of the eye





DISORDERS OF THE EYE

ERRORS OF REFRACTION

** overall light is not hitting retina the way it should*

Can be born with this

N Myopia - *are able to see things up close*

- Nearsightedness

- Concave lenses - *lense has to have inward bend*

• Hyperopia - *can't see things far away*

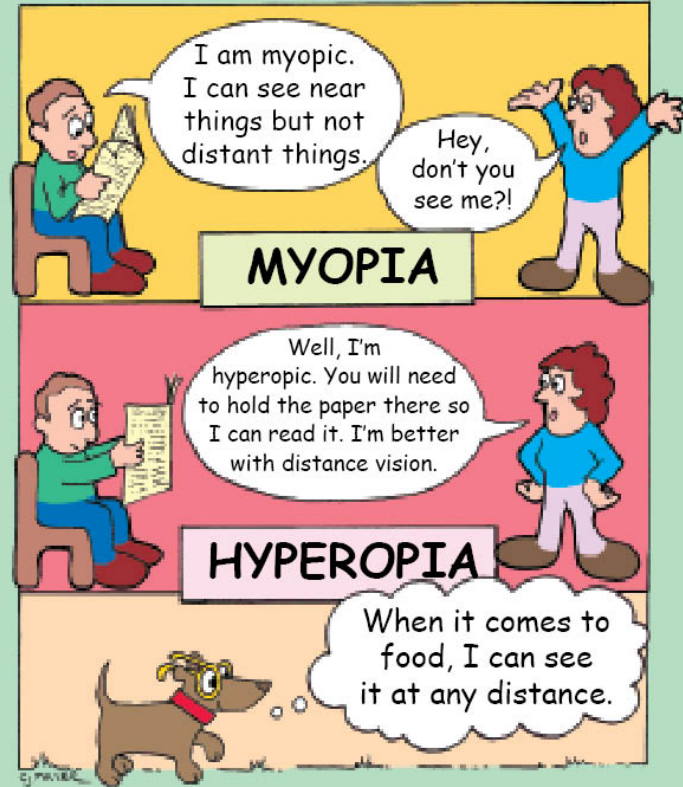
- Farsightedness

- Convex lenses - *lense has outward bend*

the eye is shorter than normal

• *irregular curvature of the Cornea - Stigmatism*

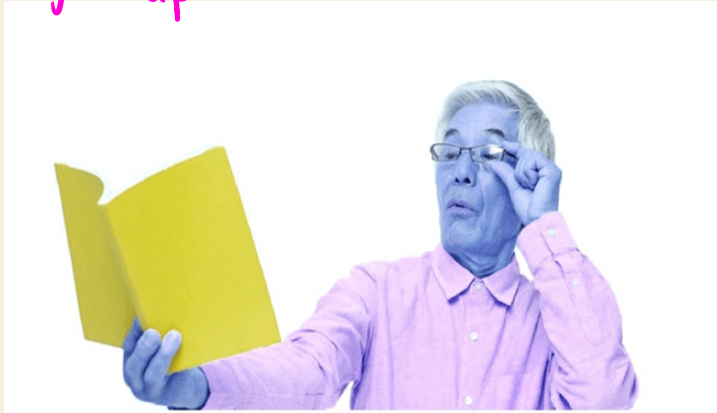
ALTERATIONS IN REFRACTION



ERRORS OF REFRACTION

the lense can not
stretch and return
back to normal as
easily

PRESBYOPIA - loss of ability for the
lense to accomidate → lose ability to see
objects up near



↑
treat this with reading glasses

ASTIGMATISM - irregular curvature
in the lense. streaking lins off light



↑
corrected by glasses with opposite
curvature

AGE-RELATED DISORDERS

↙ seeing two of things

↖ may be squinting or have issues picking up an object

STRABISMUS (crossed) misalignment of the eyes.



- muscular component, also set points of the eyes are off
and end points

a lot of times this forms from untreated strabismus

also helps with getting setpoint of vision correct

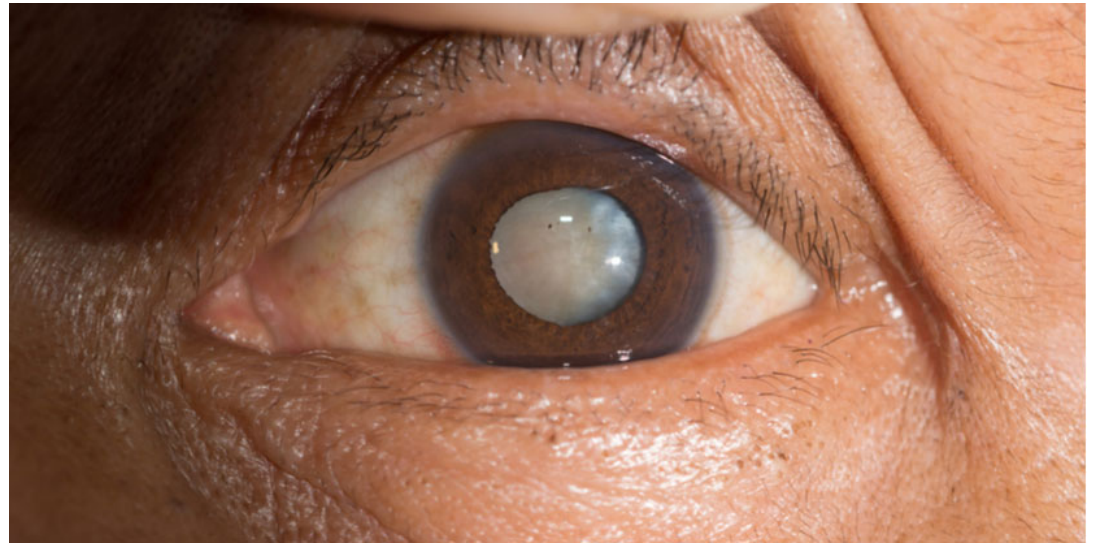
AMBLIOMPIA - puts a patch over the good eye so the other eye has to realign and readjust



or sometimes people get surgery

C A T A R A C T S

- Clouding; overall brightness is reduced.
- can lead to eventual loss of sight
- vision is blurry and color perception gets worse



- Cause of cataracts - aging, trauma, congenital factors, certain type of medications (cortical steroids)
- Cataract surgery - cataract is scraped off with hypersonic knife, then a lense is put in
↑
breaks cataract apart

RETINOPATHY

↑
abnormality of the Retina

opatho- abnormal or bad

- Retinal detachment - caused from trauma, diabetes, high blood pressure, glucose has a oxidative stress on cells

→ ripping and tearing of the retina in the vitreous

- pulls away tissue from other tissue

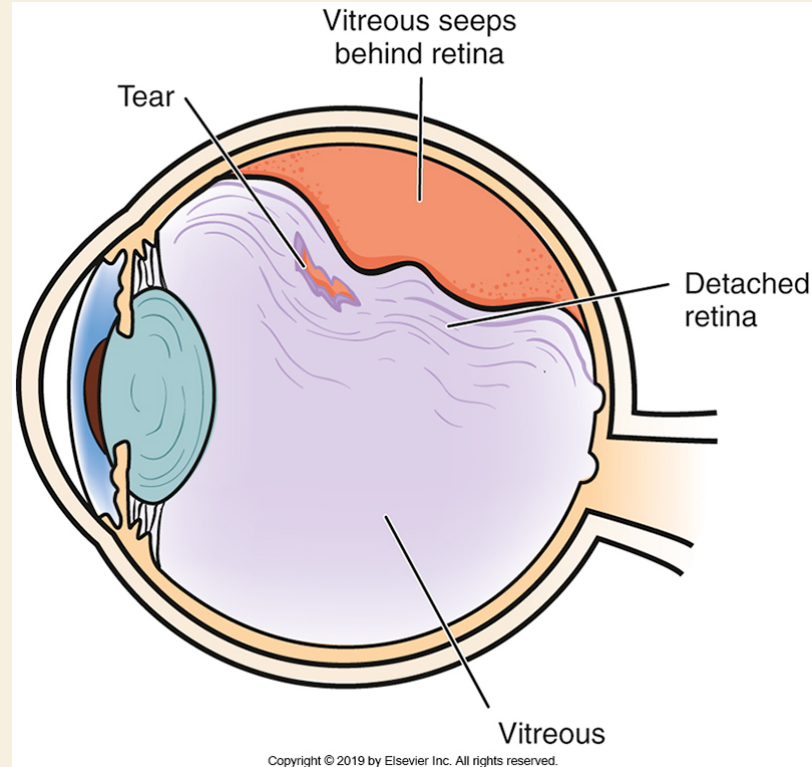
→ types: exudative, contraction, and spontaneous

↓
Serous or blood
behind retina

↓
fibrous tissue
pulls away

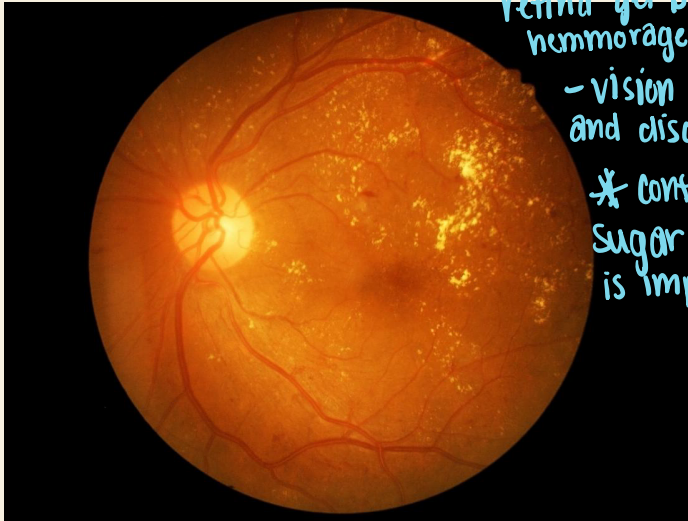
↓
retina pulls
forward out of
place

Treatment - close tear and Retina



RETINOPATHY

DIABETIC RETINOPATHY



- Blood vessels over retina get bulges and hemorrhage happens.
- vision is darkened and distorted
* controlling blood sugar for diabetics is important

proliferative - new vasculature growing, leads to leaking and retinal detachment

MACULAR DEGENERATION - progressive

loss of central vision
- lines are typically wavy

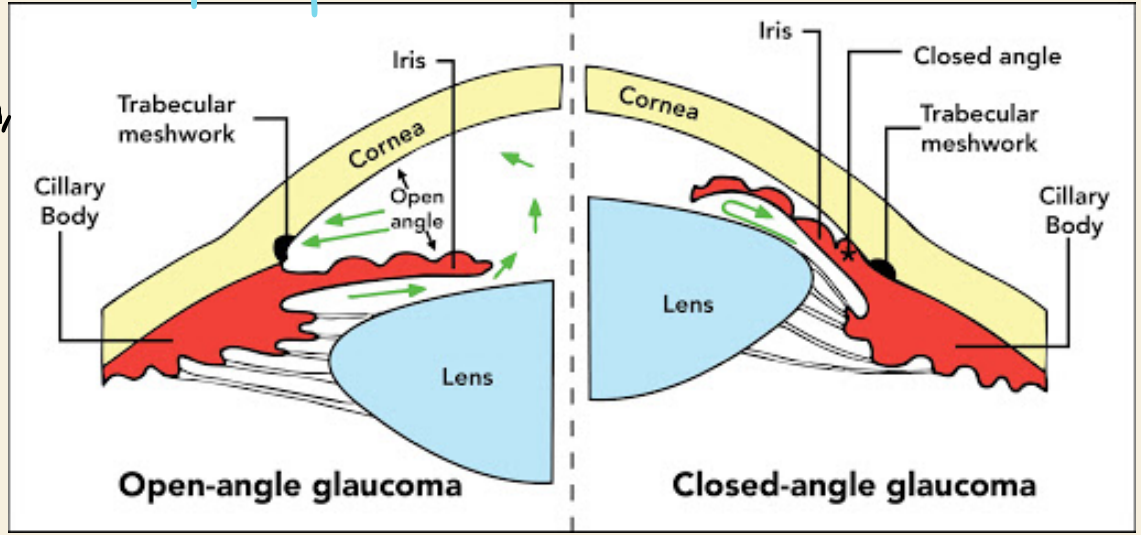


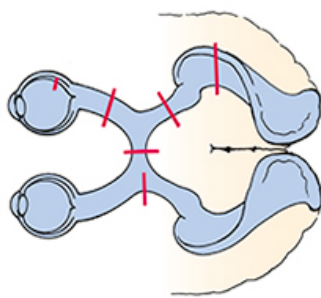
Wet - exudative, drainage issue
Dry - Atrophic (shrinking)

GLAUCOMA

- Chronic Open-Angle — *not enough drainage; so increase drainage* — increase in intraocular pressure because there is not enough outflow of aqueous humor
- Acute Angle Closure — angle between pupil and cornea is blocked off so no aqueous humor can be pulled out so builds up more pressure

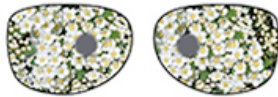
Severe eye pain, nausea, vomiting, the eye is red, and possibly surgery



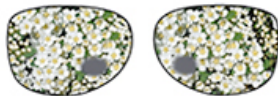


1. Retinal damage

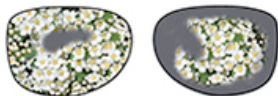
- Macula—central blind area (e.g., diabetes):



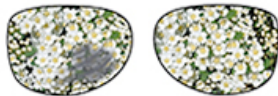
- Localized damage—blind spot (scotoma) corresponding to particular area:



- Increasing intraocular pressure—decrease in peripheral vision (e.g., glaucoma). Starts with paracentral scotoma in early stage:



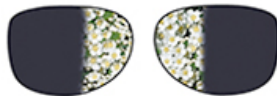
- Retinal detachment. Person has shadow or diminished vision in one quadrant or one half of visual field:



2. Lesion in globe or optic nerve. Injury here yields one blind eye, or unilateral blindness:



3. Lesion at optic chiasm (e.g., pituitary tumor)—injury to crossing fibers only yields a loss of the nasal part of each retina and a loss of both temporal visual fields. Bitemporal (heteronymous) hemianopsia:



4. Lesion of outer uncrossed fibers at optic chiasm (e.g., aneurysm of left internal carotid artery exerts pressure on uncrossed fibers). Injury yields left nasal hemianopsia:



5. Lesion of right optic tract or right optic radiation. Visual field loss in right nasal and left temporal fields. Loss of same half of visual field in both eyes is homonymous hemianopsia:



VISUAL FIELD LOSS



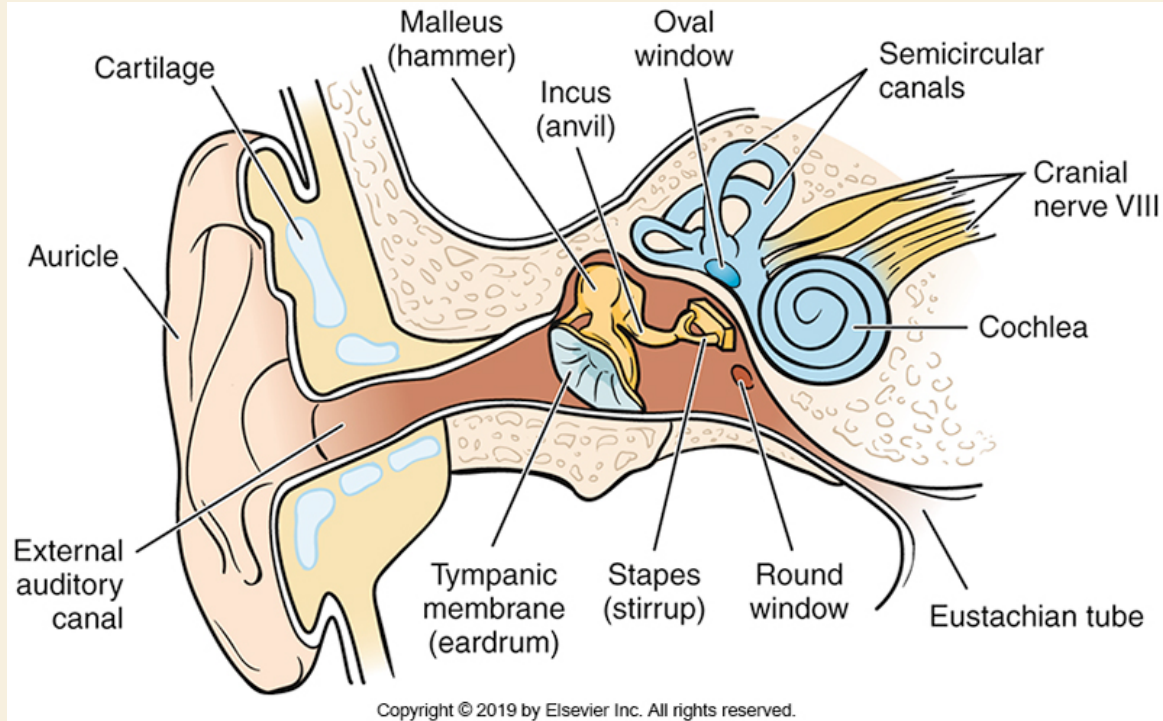
INTERVENTIONS

— enough light, glare reduced light, talk to a blind patient and let them know your there

THE EAR

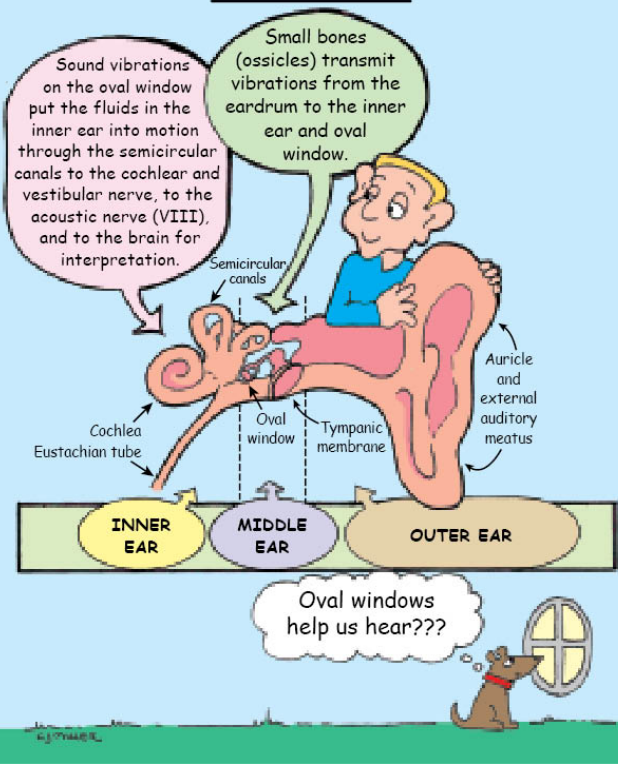
are the microphone





STRUCTURE OF THE EAR

NORMAL EAR



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FUNCTION OF THE EAR

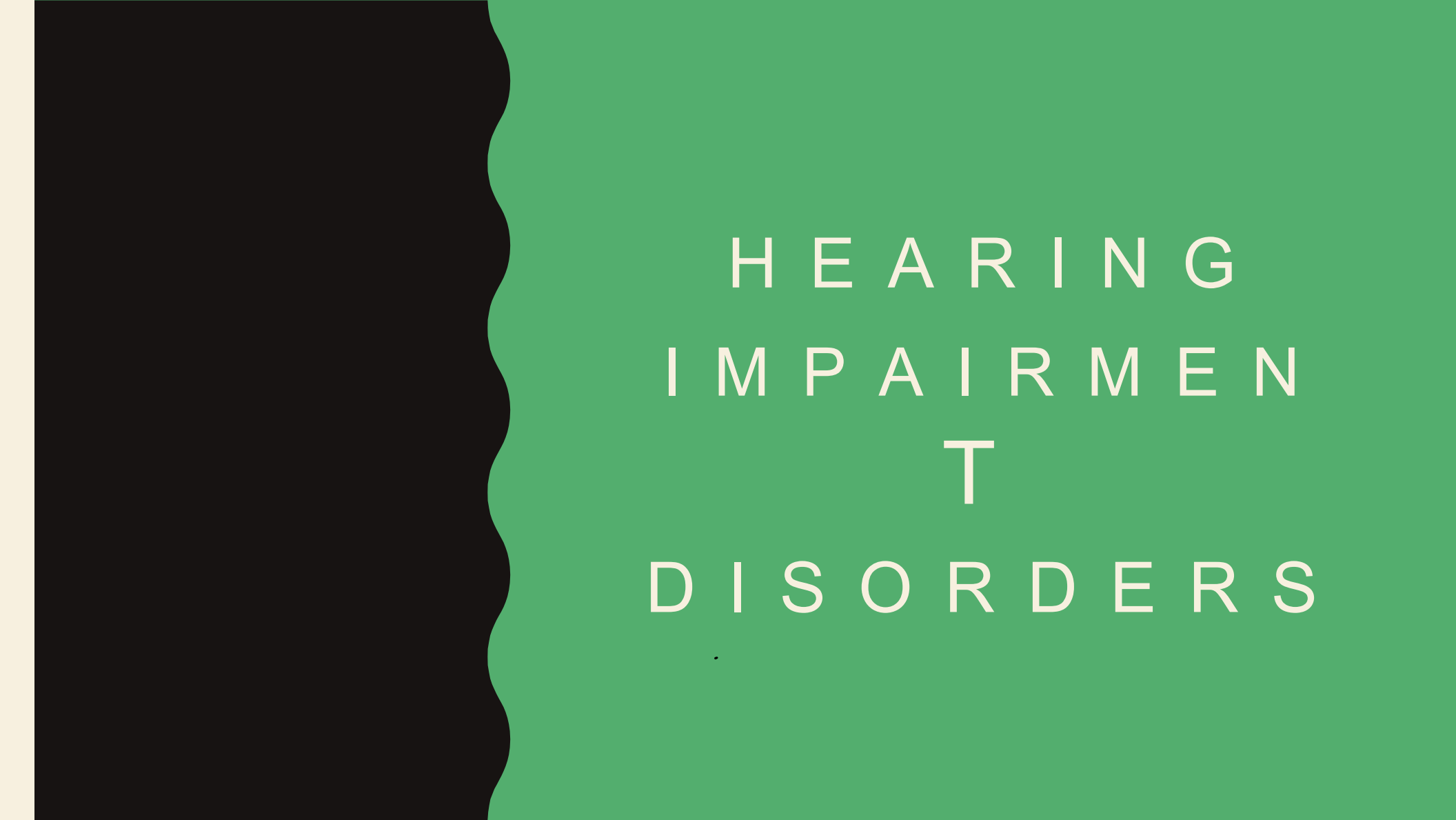
HEARING IMPAIRMENT

General manifestations

Not paying attention, interrupt more, talk louder,
Withdrawal from social situations, doesn't have same response
to loud noises, articulation and development of speech

Geriatric considerations

- bones of hearing are less flexible, Cochlea degenerates,



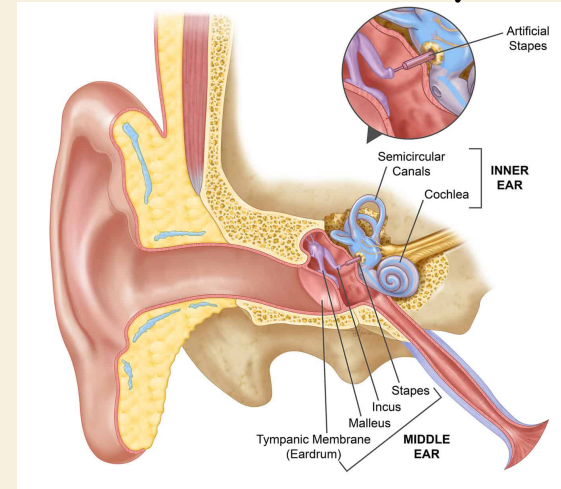
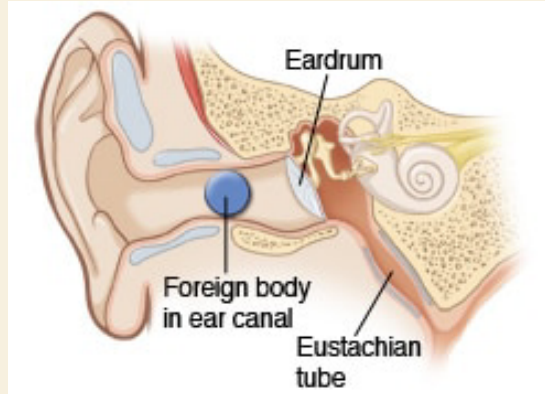
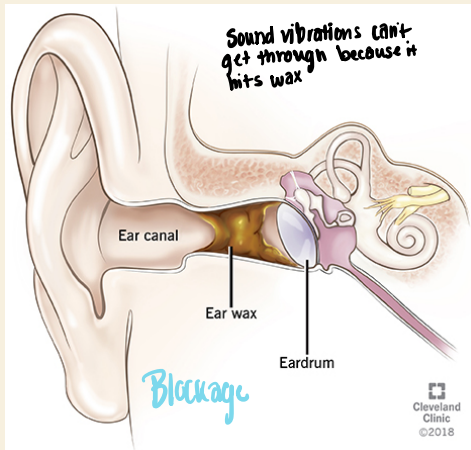
HEARING
IMPAIRMENT
T
DISORDERS

CONDUCTIVE HEARING IMPAIRMENTS

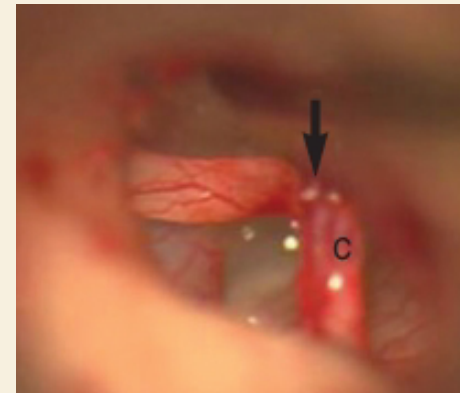
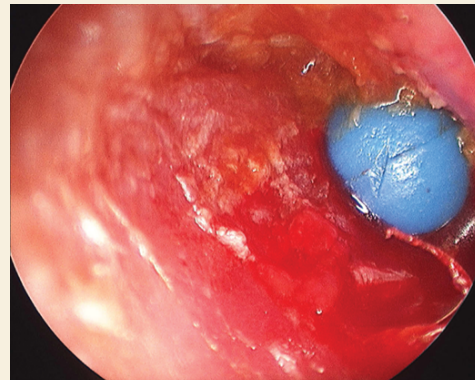
← can't reach, blockage or dysfunction

- Obstruction - ear wax
- mass loading
- stiffness effect
- discontinuity

- external ear, ear canal and middle ear



-some may get ears Flushed



Cochlear implants are a possibility

SENSORINEURAL HEARING IMPAIRMENTS

the inner ear

-in the inner ear cochlear damage
- cause - loud noises, trauma, ototoxic drugs

- Ototoxic medications - **Notice sign early + Switch medication**
 - aminoglycoside antibiotics, salicylates, quinine and related antimalarials, and cytotoxic antineoplastic drugs
- Trauma - **Form of loud noises consistently exposed to - over 85 decibels will damage your ear**

First - temporary
Second - permanent

• lawn mowers
• weed eaters
• noisy jobs



SENSORINEURAL HEARING IMPAIRMENTS CONT'

- Presbycusis - hearing loss in older adults (slow + gradual)
 - Sensory - Atrophy and degeneration of sensory supporting cells
 - Neural - loss of neurons
 - Metabolic - Atrophy of wall of the cochlea
 - Mechanical - easy physical change to ear
- Meniere's syndrome - accumulation of endolymph with degeneration of the cochlea with tinitis and vertigo
 - there is medications to help with symptoms
 - surgery to drain endolymph



OTITIS MEDIA

- Inflammation of the middle ear - *Tympanic membrane becomes inflamed.*
- Acute Otitis Media
- Chronic Otitis Media

→ *Cause: poor function of eustachian tubes, children have more fluid collection*

→ *Cause: short duration, from respiratory problems, treated by antibiotics, sometimes put tubes in ear to keep fluid out*

→ *Cause: lasting longer than 12 weeks, damages tympanic membrane → conductive hearing loss. Clean out infection.*



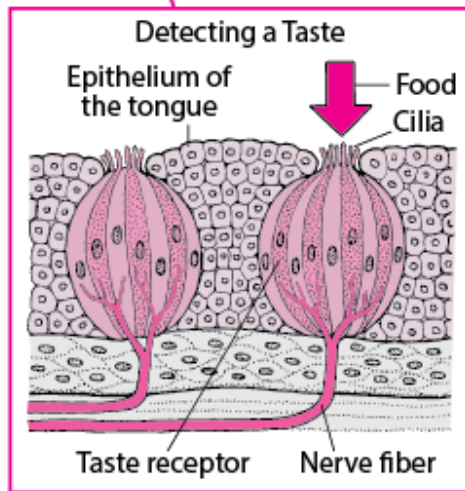
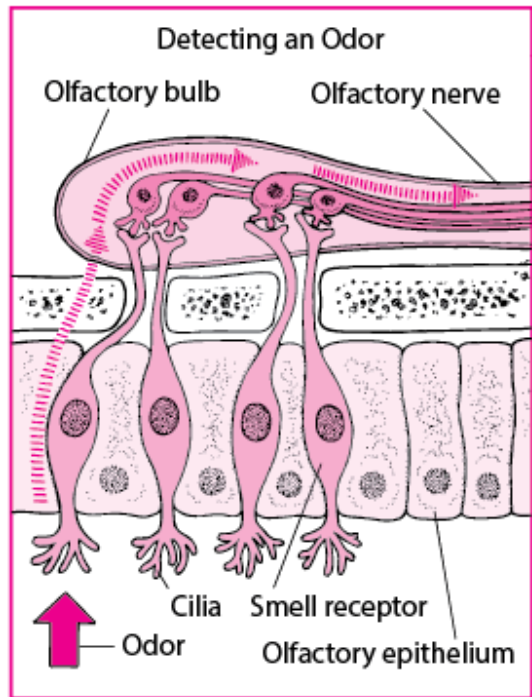
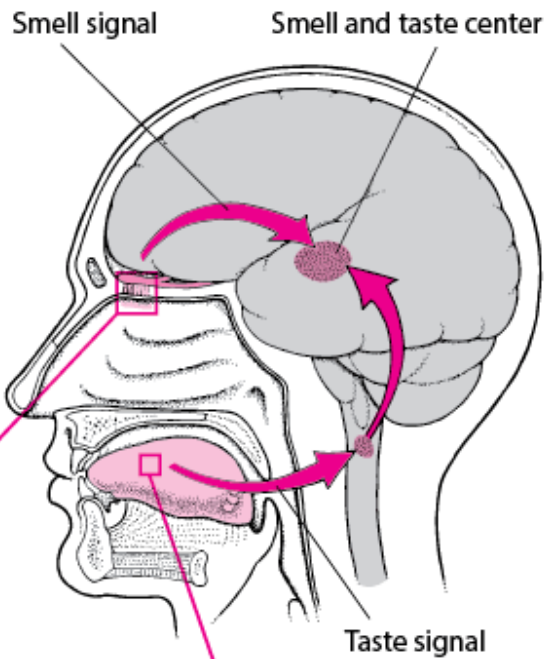


INTERVENTIONS

- Help to amplify and collect Sound waves

S M E L L A N D
T A S T E





STRUCTURE OF SMELL AND TASTE

- both have neuro pathways messages get sent through brain

Olfactory = Smell

gustatory - taste

DISORDERS OF SMELL AND TASTE

Causes

- physical injuries
- dental problems

Diagnostics

- different tests for taste and smell
- eliminate cause so things can go to normal
- some surgeries can disrupt pathways

Treatment

CHAPTER 24

COMPLICATIONS OF AGING

All systems slow
down

Things wear out
things don't function
The body is slower.

THE AGING PROCESS

- Rate and effects of aging vary among individuals.
- May not match chronological age
- Rate of changes depend on...
- Overall, women live longer than men.
- General reduction in function occurs throughout body
- Hormonal changes

REPRODUCTIVE SYSTEM

- Females

- Menopause

- Hot flashes
 - less estrogen and progesterone
 - Atrophy and deterioration of vagina
 - Sexual intercourse more painful
less secretions

- Males

- Benign prostatic hypertrophy

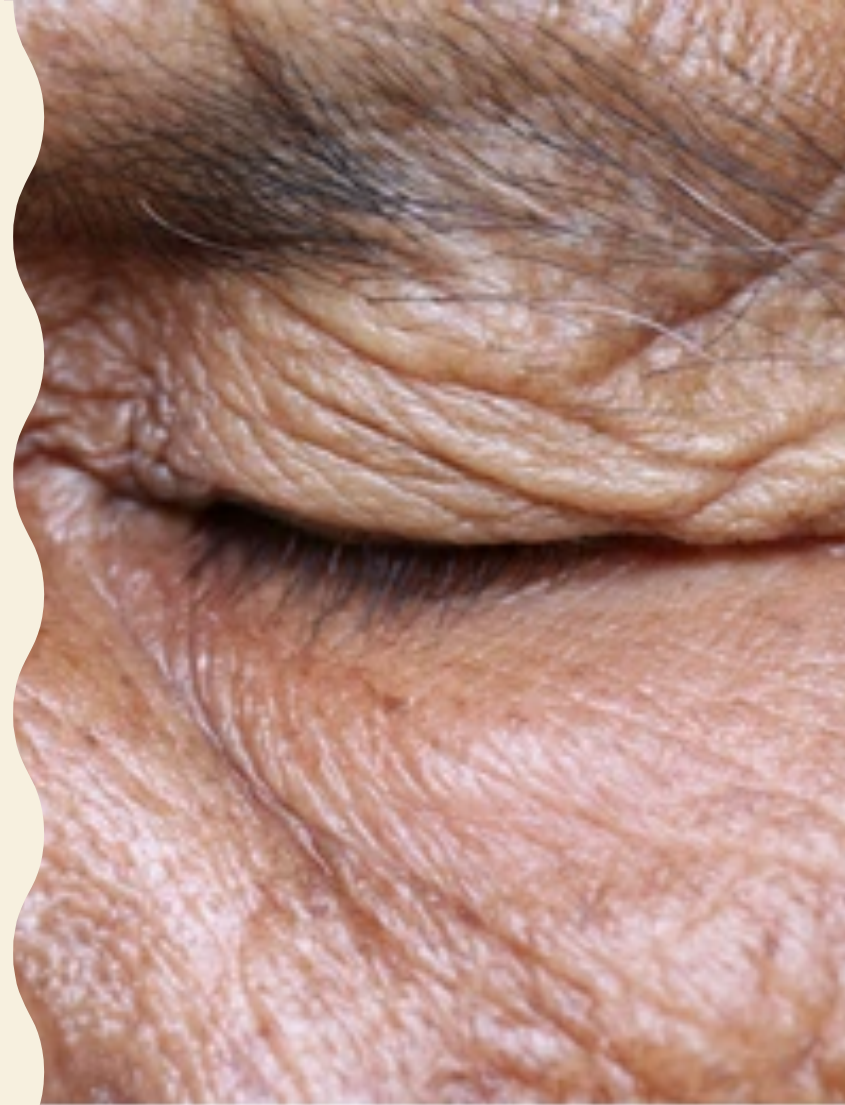
- testosterone decreases
 - sperm production reduced
 - BPH - enlargement of prostate
 - decreased testies

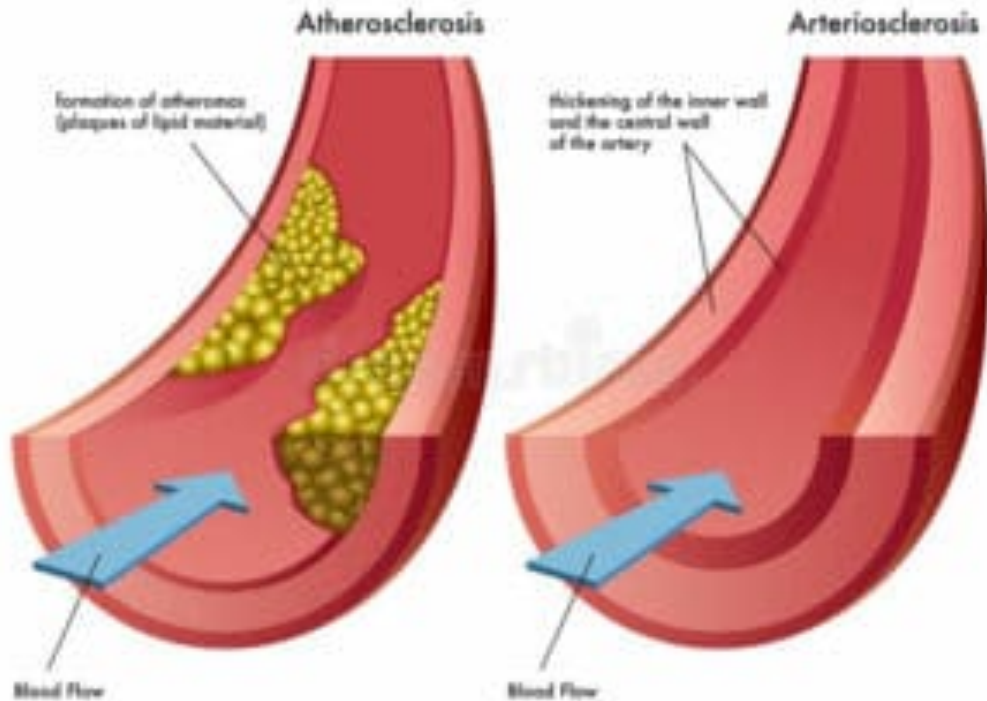
INTEGUMENTAR Y

- Exposure
- Skin thins
 - Appears wrinkled
 - Elastic fibers reduced
 - Collagen fibers less flexible
- Lesions include skin tags, keratoses, and lentigines.
- Hair becomes gray and thins.
 - Melanocytes are reduced in number.

} loses elasticity

- environmental can have effect on how skin ages





CARDIOVASCULAR

Muscle fibers decrease

Reduced strength of contractions

Arteriosclerosis vs Atherosclerosis

Strength of muscles start atrophy - lose strength

Arteriosclerosis - walls of vessels become thick and lose elasticity heart has to work to push blood through.

Atherosclerosis - plaque and cholesterol building up in pipes. Heart Attacks, anginas, Strokes

Preventable to some extent

MUSCULOSKEL ETAL

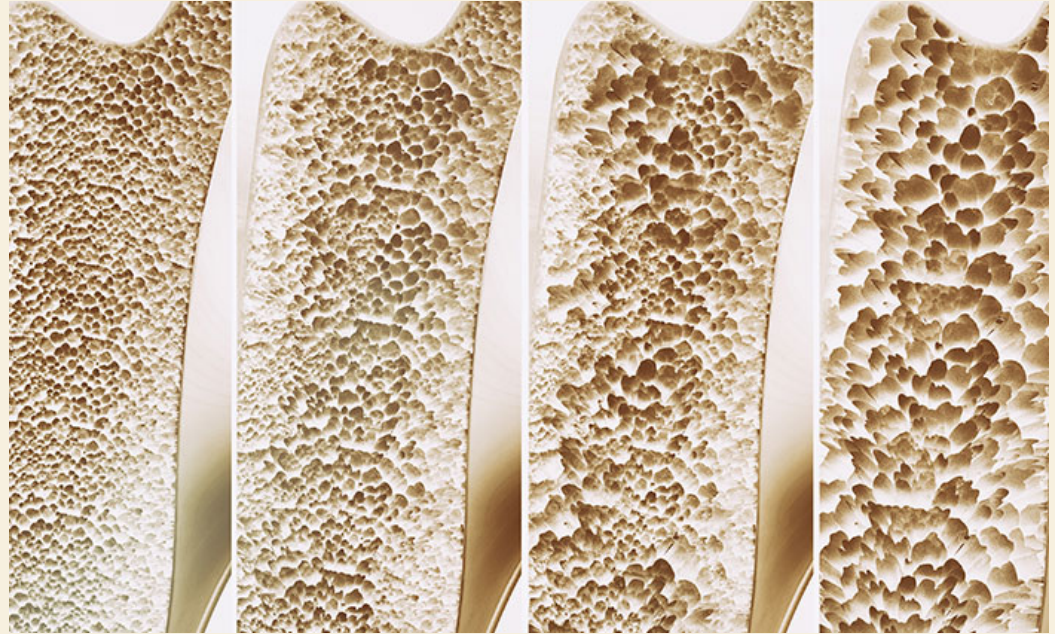
extra wear and tear on joints, weight
degeneration of cartilage on joints,
people's jobs may impact joints

Bone ends up rubbing
of bone

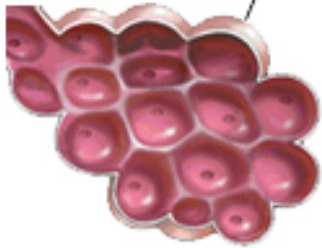
- Osteoporosis
- Osteoarthritis

lose calcium and bone mass,
more fragile, much weaker, see
in menopausal women. low
estrogen increases this. Decrease
or don't take much calcium or
Vitamin C.

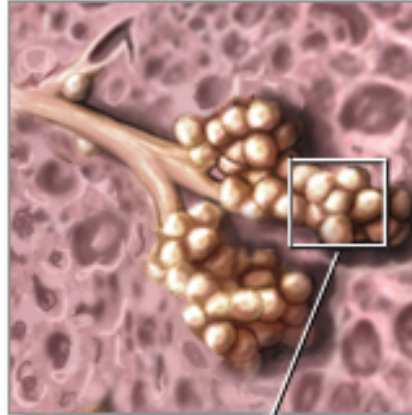
Treatment - weight bearing activities.
Increase vitamin C and vitamin D. Increase
estrogen.



Younger



Older



RESPIRATORY

gases aren't exchanged very well

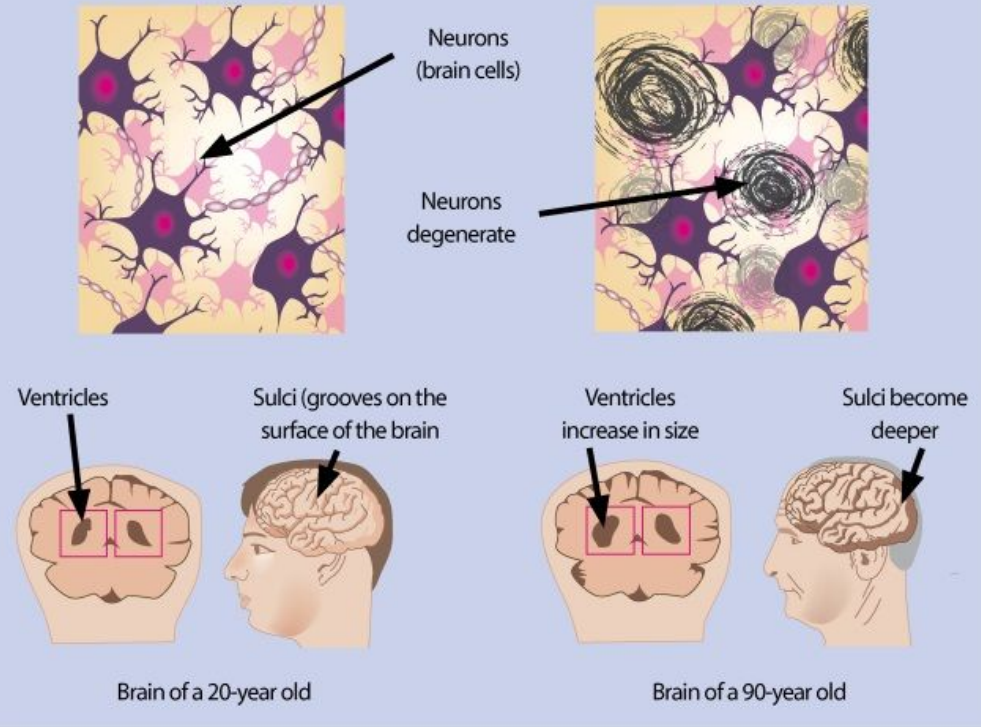
- Ventilation is limited
- Expiration is reduced
- Vascular changes

- Alveoli gets smaller, rib cage gets stiffer
- coughing is more difficult

NERVOUS SYSTEM

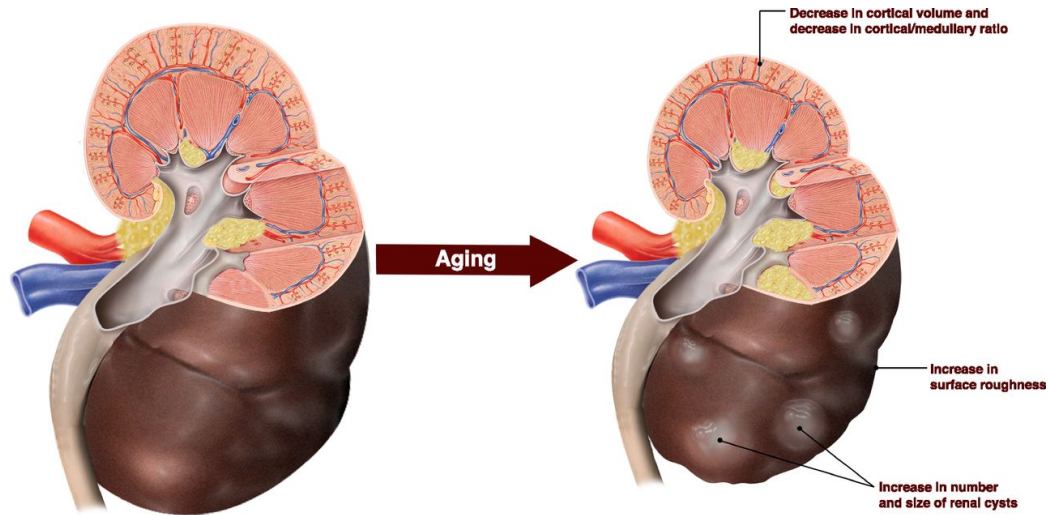
- Natural reduction of brain mass
- Slower response time
- Decreased reflexes
- Short-term memory relapses – *especially in elderly*
- Vision, Hearing and Taste changes (As discussed in chapter 15)

Fig 1. Three age-related changes in the brain



GASTROINTESTINAL

- Atrophy of mucosa and glands
 - Reduces digestive secretion
 - Impaired absorption of vitamin B₁₂, calcium, and iron *-don't absorb nutrients as well*
- Constipation common in older adults
 - Frequently leads to hemorrhoids



RENAL

Kidney function reduced

Weakened urinary sphincter and bladder

Nocturia (frequent urination)

Incontinence (involuntary voiding of urine) **CONTROL ISSUES**

- filters don't work like they once did, not good at balancing electrolytes

- reduction of filters in kidneys do not excrete drugs very well



Q U E S T I O
N S ?

REFERENCES

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