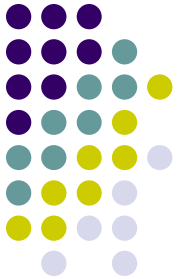
Q

Lens Measurements

- Lens measurements
  - Birth: # mm equatorial, # mm anteroposterior

A

Lens Measurements



- Lens measurements
  - Birth: 6.4 mm equatorial, 3.5 mm anteroposterior

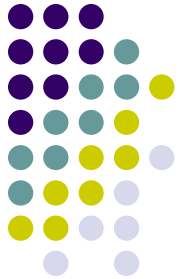
Q

Lens Measurements

- Lens measurements
  - Birth: 6.4 mm equatorial, 3.5 mm anteroposterior
  - Adult: # to # mm equatorial, # mm anteroposterior

A

Lens Measurements



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  - Birth: 6.4 mm equatorial, 3.5 mm anteroposterior
  - Adult: 9-10 mm equatorial, 5.0 mm anteroposterior

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  - Birth: 6.4 mm equatorial, 3.5 mm anteroposterior
  - Adult: 9-10 mm equatorial, 5.0 mm anteroposterior

Cataract surgeons will sometimes employ an age-based rule of thumb for guesstimating the A-P depth of a lens—what is it?

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A-P depth = 'Four (point) pt age' (eg, the A-P depth of the lens in a 65 y.o. is ~4.65 mm)

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The fact that the magnitude of this number correlates with age implies that the lens never stops getting thicker. Is this the case?

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It is indeed

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What is the cause of this thickening? That is, does it result from enlargement of existing cells/structures, or the creation of new cells (ie, replication)?

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It's both—but it must be stressed that replication is the driving force.

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Which cells are doing the replicating?

of existing cells/structures, or the creation of new cells (ie, replication)?

It's both—but it must be stressed that **replication is the driving force**.

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Lens Measurements

- Lens measurements
  - Birth: 6.4 mm equatorial, 3.5 mm anteroposterior
  - Adult: 9-10 mm equatorial, 5.0 mm anteroposterior

Which cells are doing the replicating?
The lens epithelial cells (these are the only cells in the lens that are mitotically active)

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Where are the lens epithelial cells found?

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Q/A

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Which cells are doing the replicating?
The lens epithelial cells (these are the only cells in the lens that are mitotically active)

Where are the lens epithelial cells found?
They line the inner v outer aspect of the anterior v posterior capsule

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Where are the lens epithelial cells found?
They line the inner aspect of the anterior capsule all the way out to the [redacted] region

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Where are the lens epithelial cells found?
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Where are the lens epithelial cells found?
They line the inner aspect of the anterior capsule all the way out to the equatorial region. They are _____ in shape

squamous?
columnar?
cuboidal?

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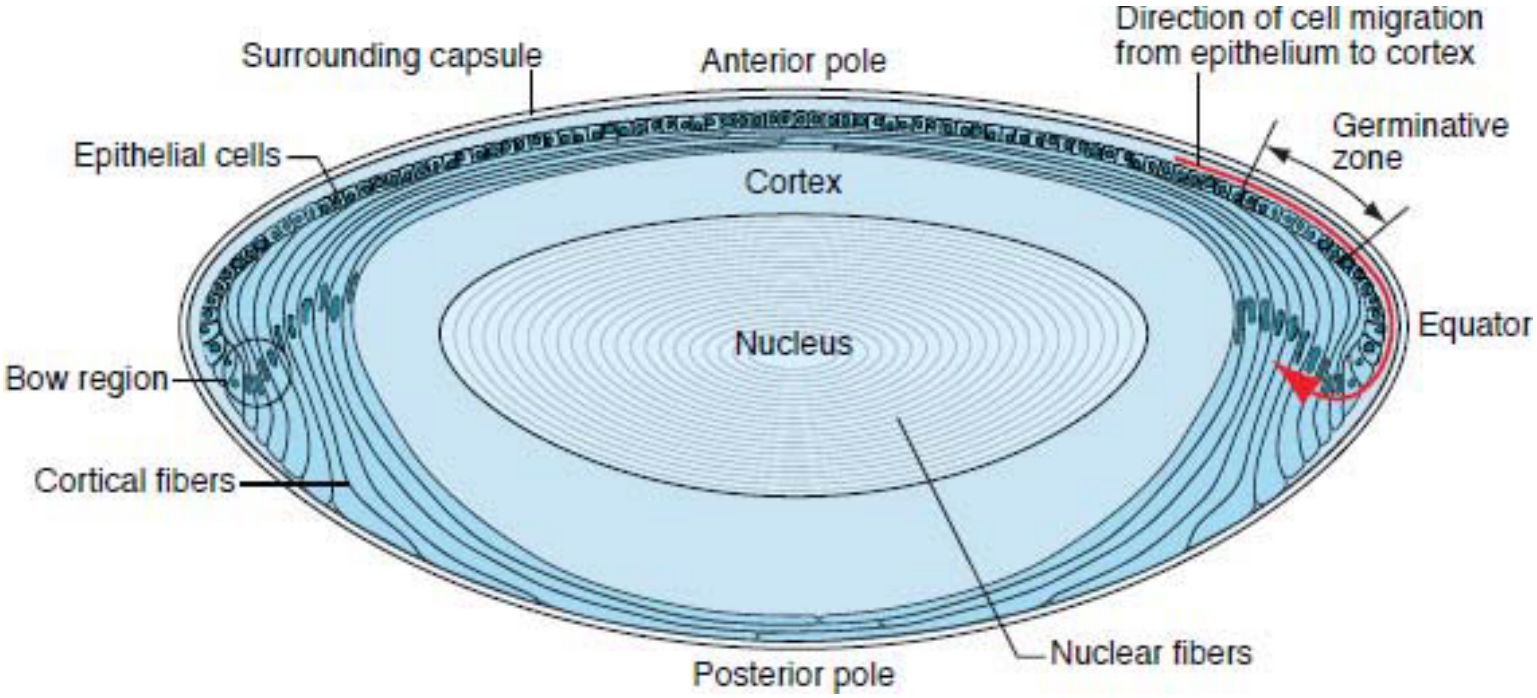

Lens epi cells and their relation to the capsule, GZ, and bow region

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the process of terminal differentiation into lens fibers, including loss of organelles and elongation. It is
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Is this pronounced 'bow' as in 'bow tie,' or bow as in 'take a bow'?

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Is this pronounced 'bow' as in 'bow tie,' or bow as in 'take a bow'?
It's pronounced 'bow' as in 'the bow of a ship' (which is what it looks like in cross-section; look back at the Figure)

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- With age…
  - Lens curvature [increases *vs* decreases] → [↑ or ↓] refractive power

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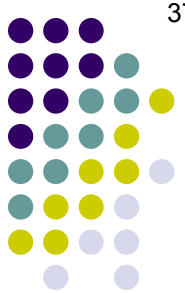
  - Lens curvature increases → ↑ refractive power
  - Refractive index [increases *vs* decreases] → [↑ or ↓] refractive power

A

Lens Measurements



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So which do people become with age—more myopic or more hyperopic?

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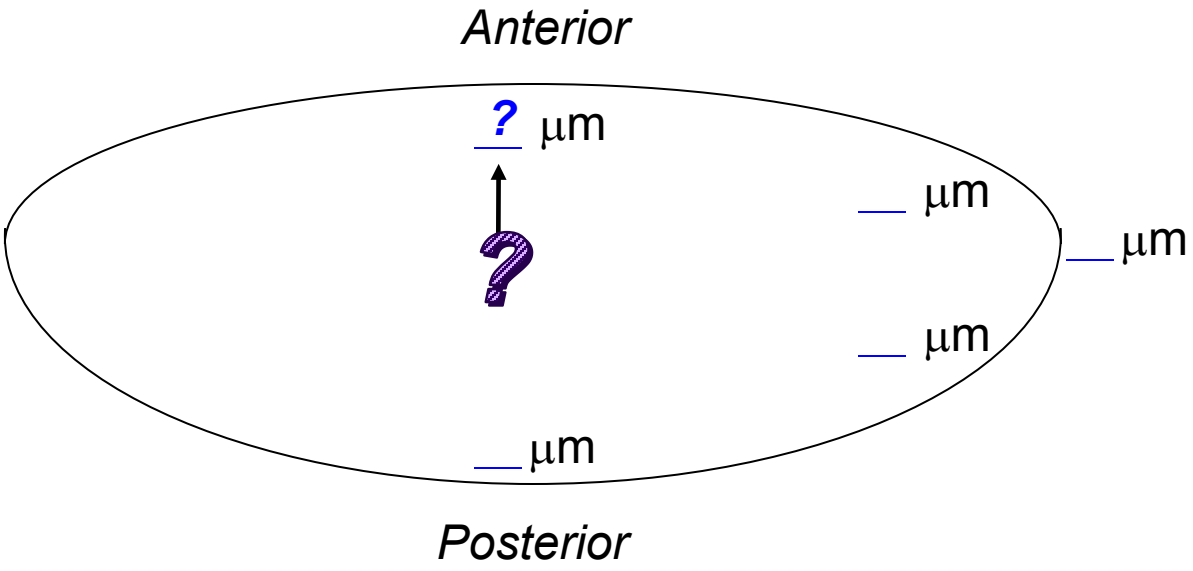
  - Lens curvature increases → ↑ refractive power
  - Refractive index decreases → ↓ refractive power

So which do people become with age—more myopic or more hyperopic?
As the change in an individual's refraction is a function of the interplay between these, it can be either

Q

Lens Measurements

Lens capsule thickness: Fill in the blanks



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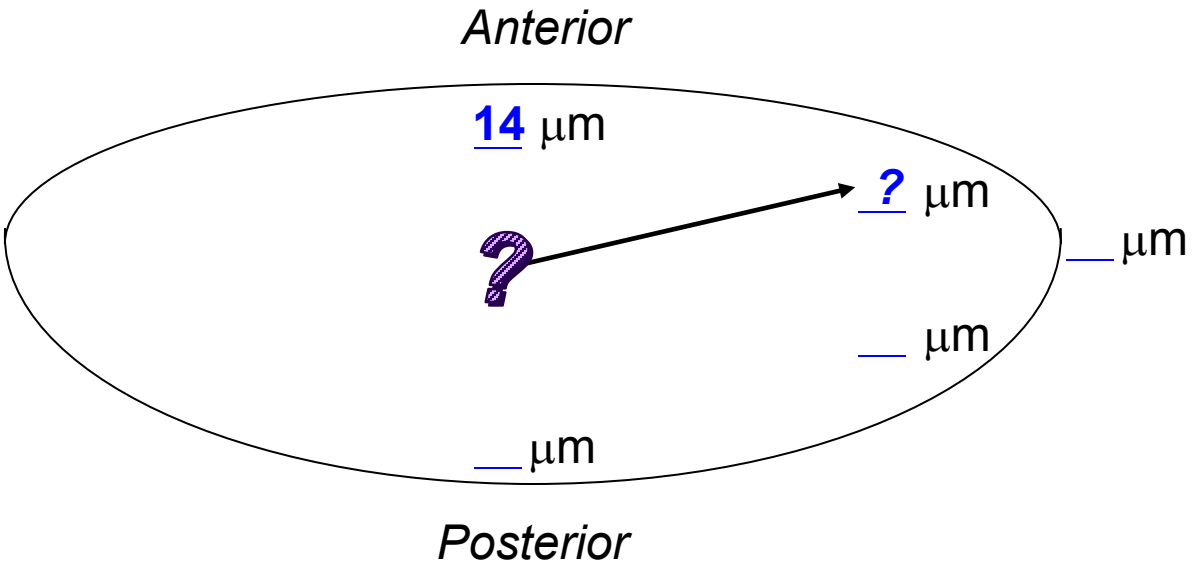

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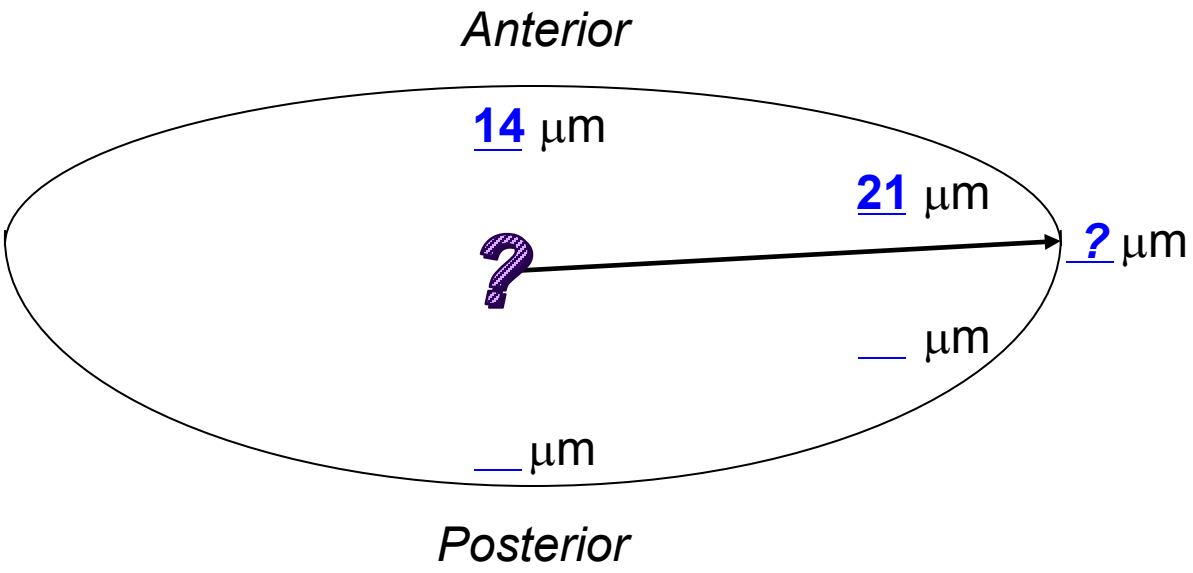

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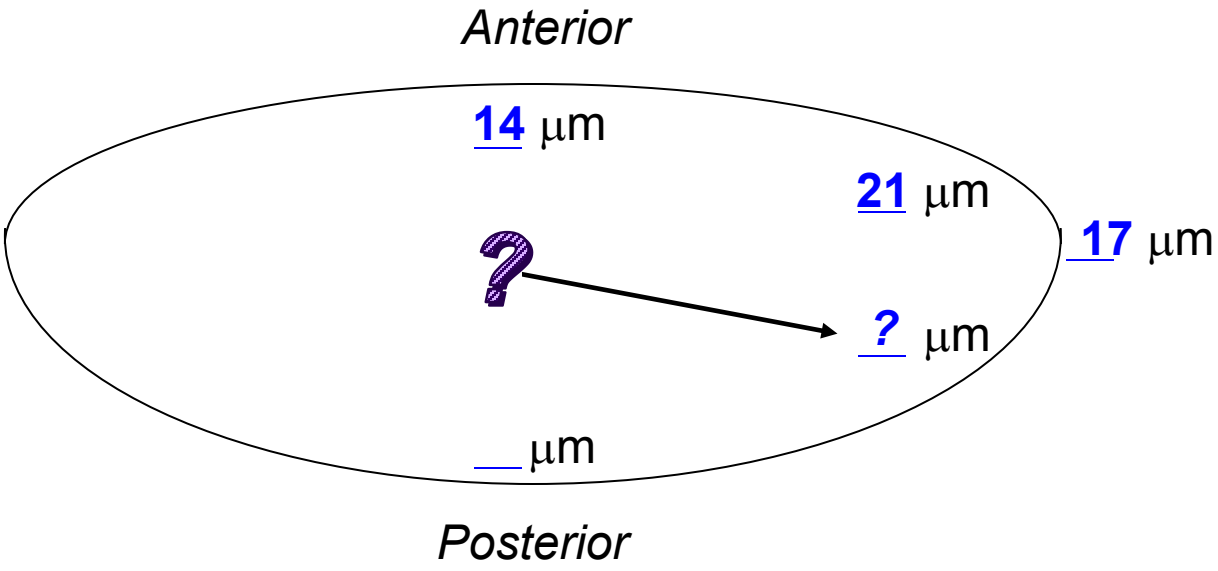

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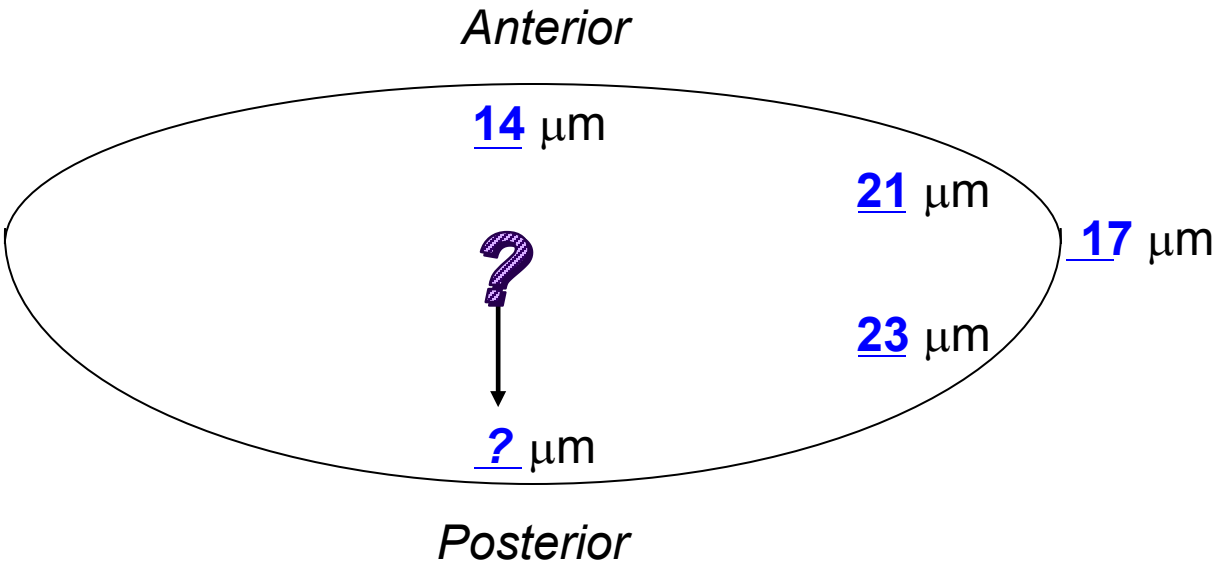

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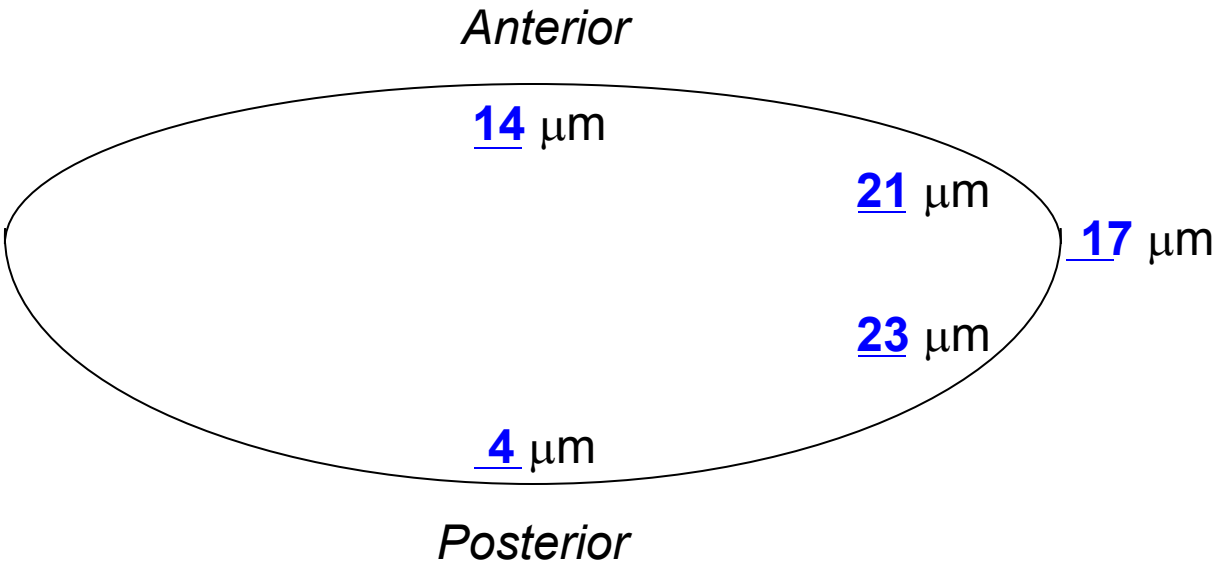

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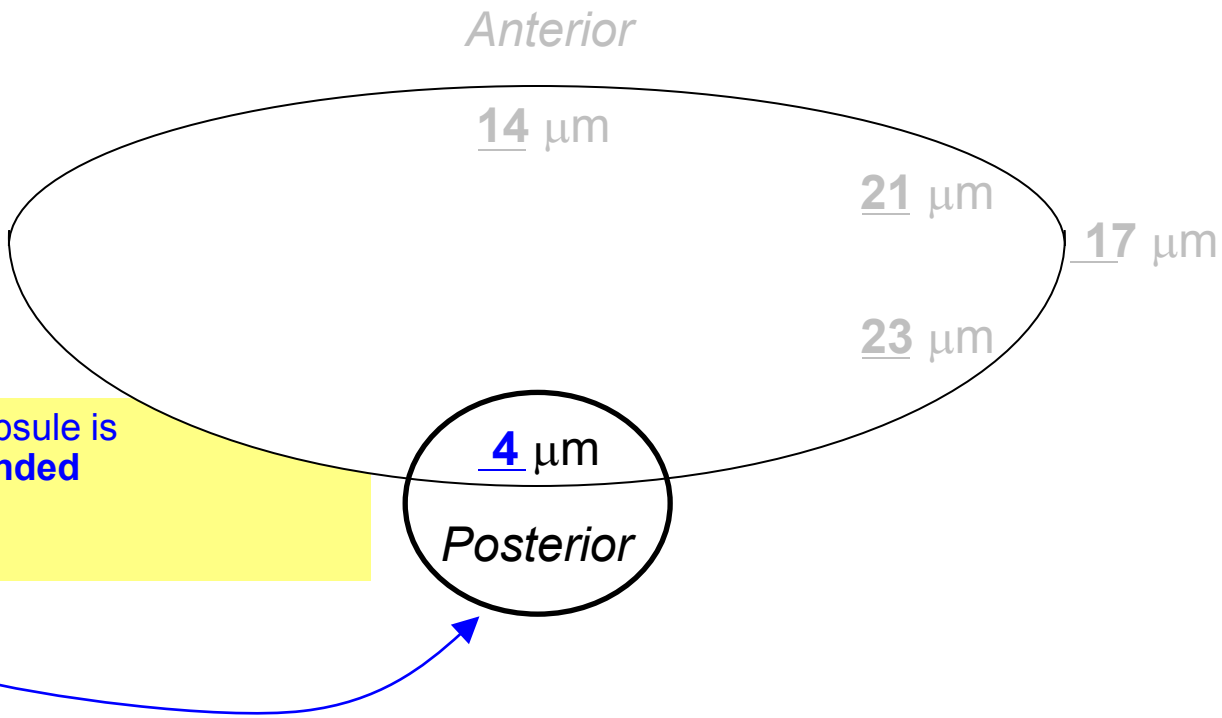

At 4 μm, the posterior capsule is so thin it is **always distended**

No question—proceed when ready

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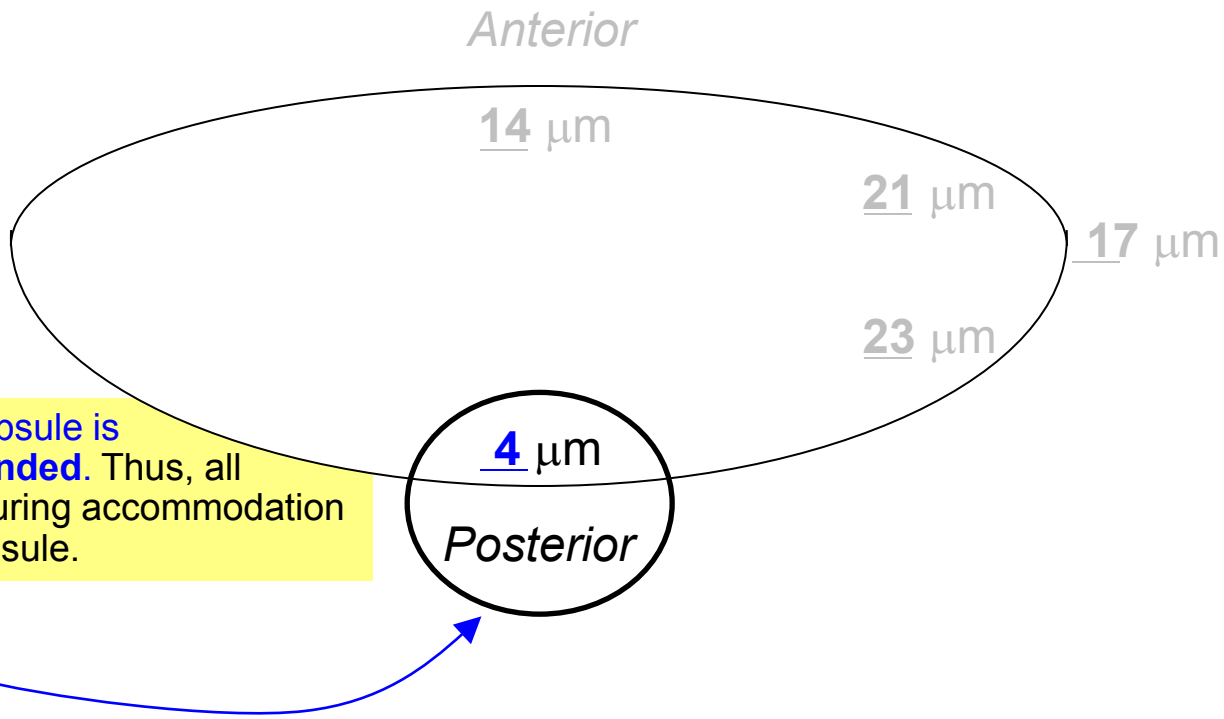
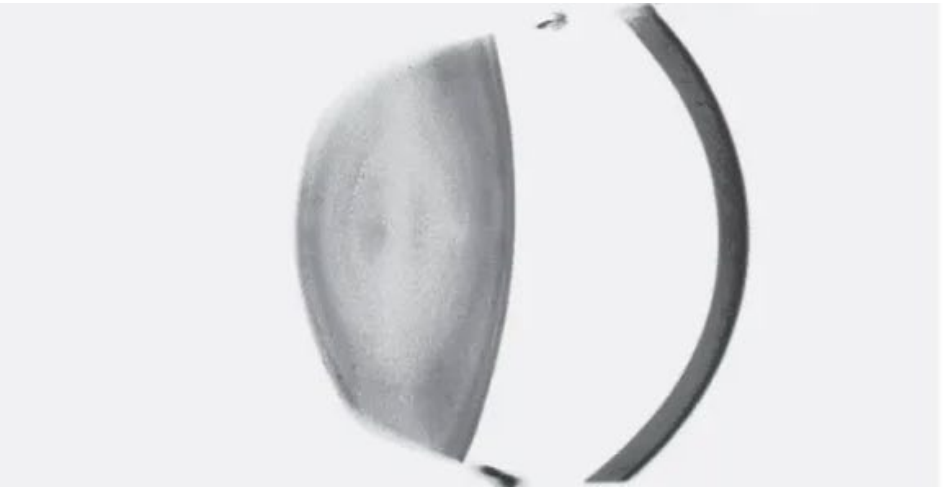


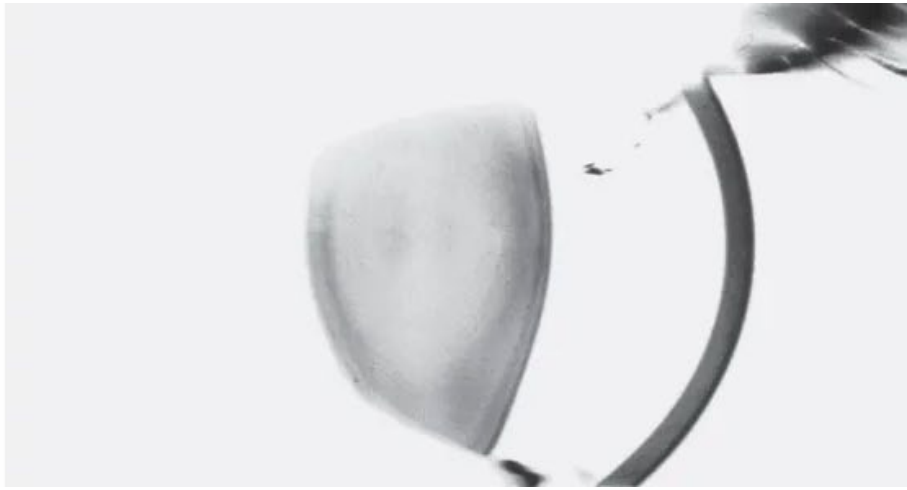
At 4 μm, the posterior capsule is so thin it is **always distended**. Thus, all changes in lens shape during accommodation occur at the ***anterior*** capsule.

No question—proceed when ready

Lens Measurements



A



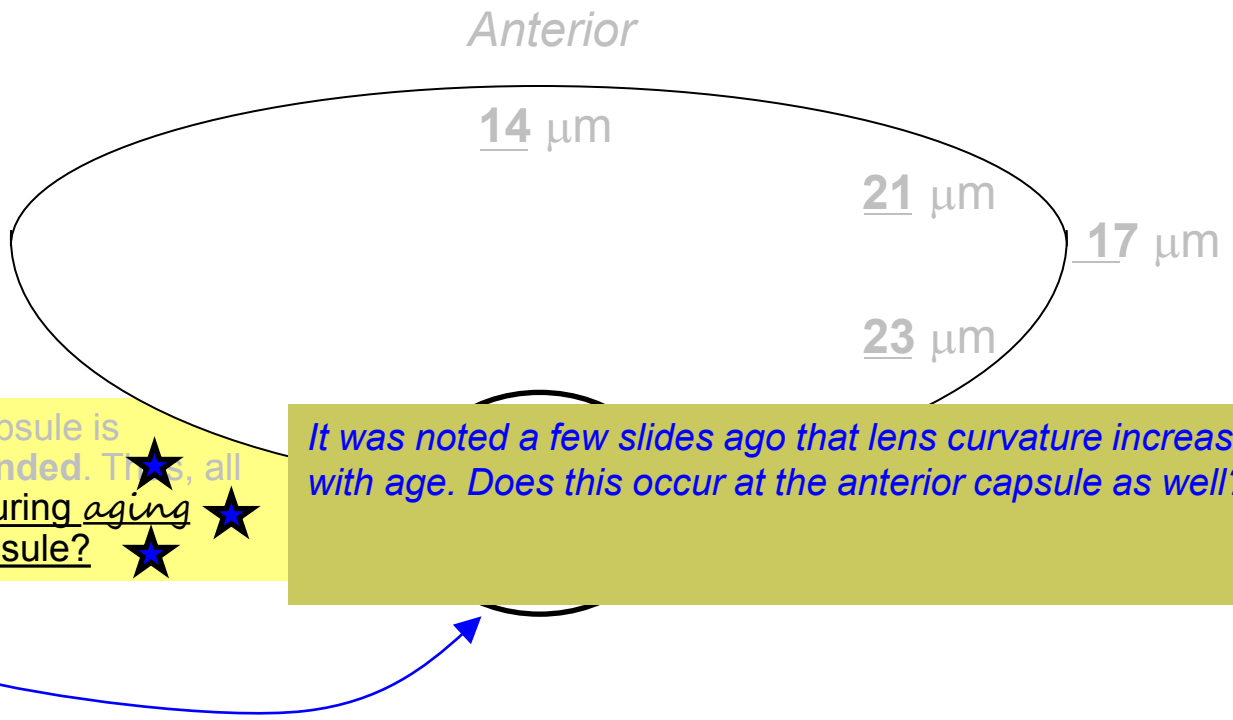
B

The lens of a 25-year-old woman demonstrated by Scheimpflug photography. The lens is in the nonaccommodative state in *A*, and accommodating in *B*.

Q

Lens Measurements

Lens capsule thickness: Fill in the blanks



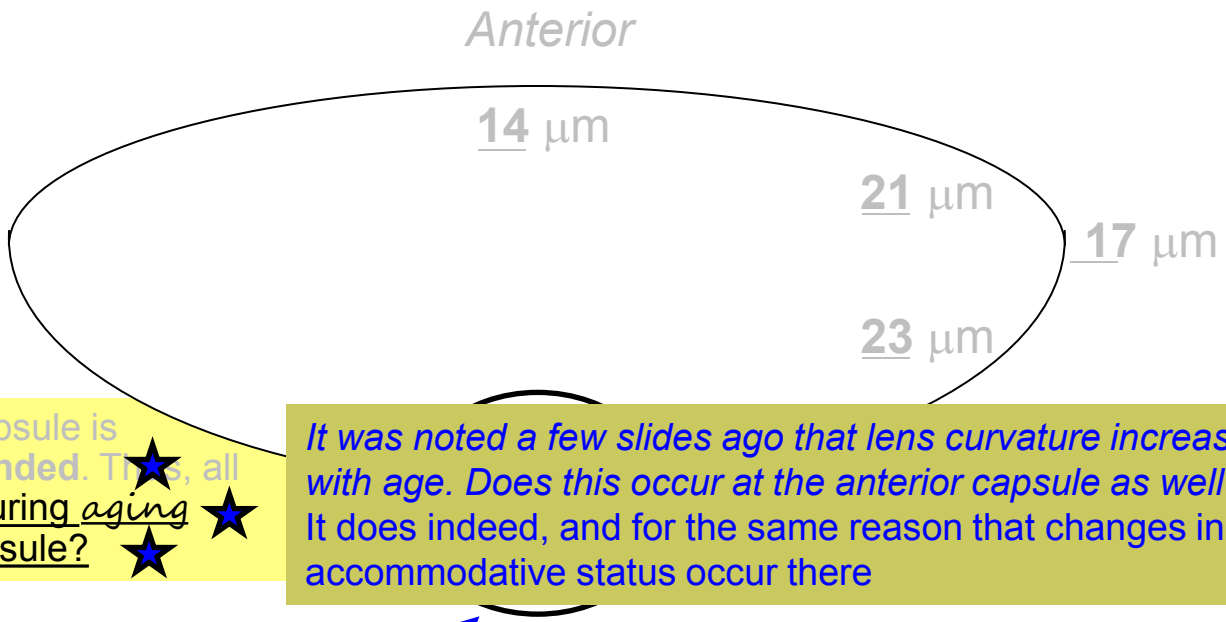
At 4 μm, the posterior capsule is so thin it is **always distended**. Thus, all changes in lens shape during *aging* occur at the ***anterior*** capsule?

It was noted a few slides ago that lens curvature increases with age. Does this occur at the anterior capsule as well?

A

Lens Measurements

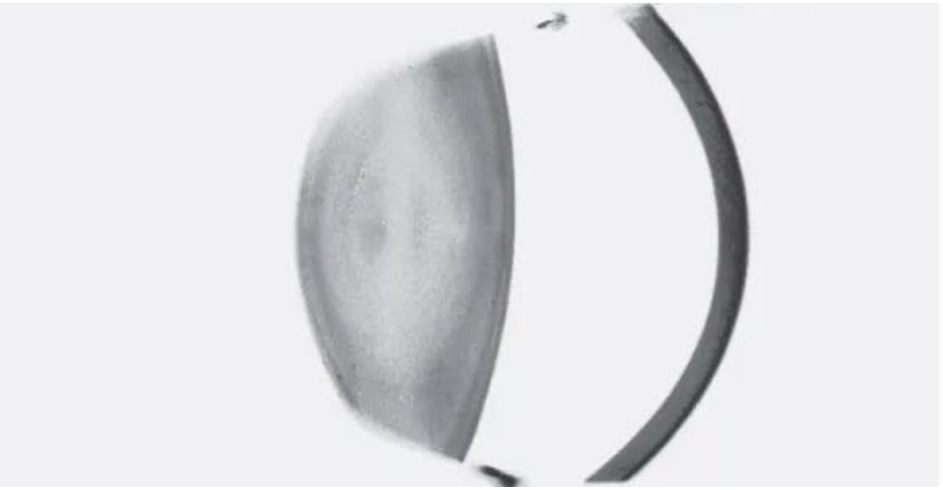
Lens capsule thickness: Fill in the blanks



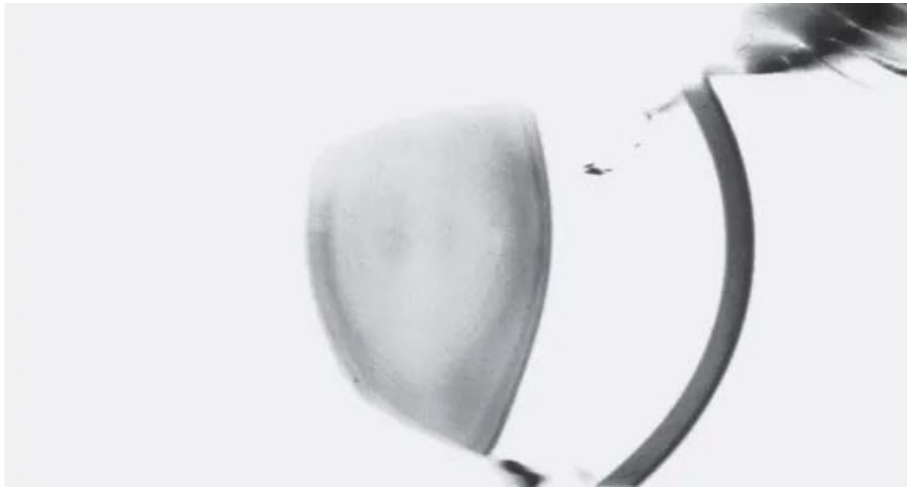
At 4 μm, the posterior capsule is so thin it is **always distended**. Thus, all changes in lens shape during *aging* occur at the ***anterior*** capsule?

It was noted a few slides ago that lens curvature increases with age. Does this occur at the anterior capsule as well?
It does indeed, and for the same reason that changes in accommodative status occur there

Lens Measurements



A



B

The lens of a 25-year-old woman demonstrated by Scheimpflug photography. The lens is in the nonaccommodative state in *A*, and accommodating in *B*. Note that the anterior radius of curvature is shortened in the latter case.

Q

Lens Measurements

- Zonules
  - Embryologically, the [1º vs 2º vs 3º] *vitreous*

A

Lens Measurements

- Zonules
  - Embryologically, the *tertiary vitreous*

Q

Lens Measurements

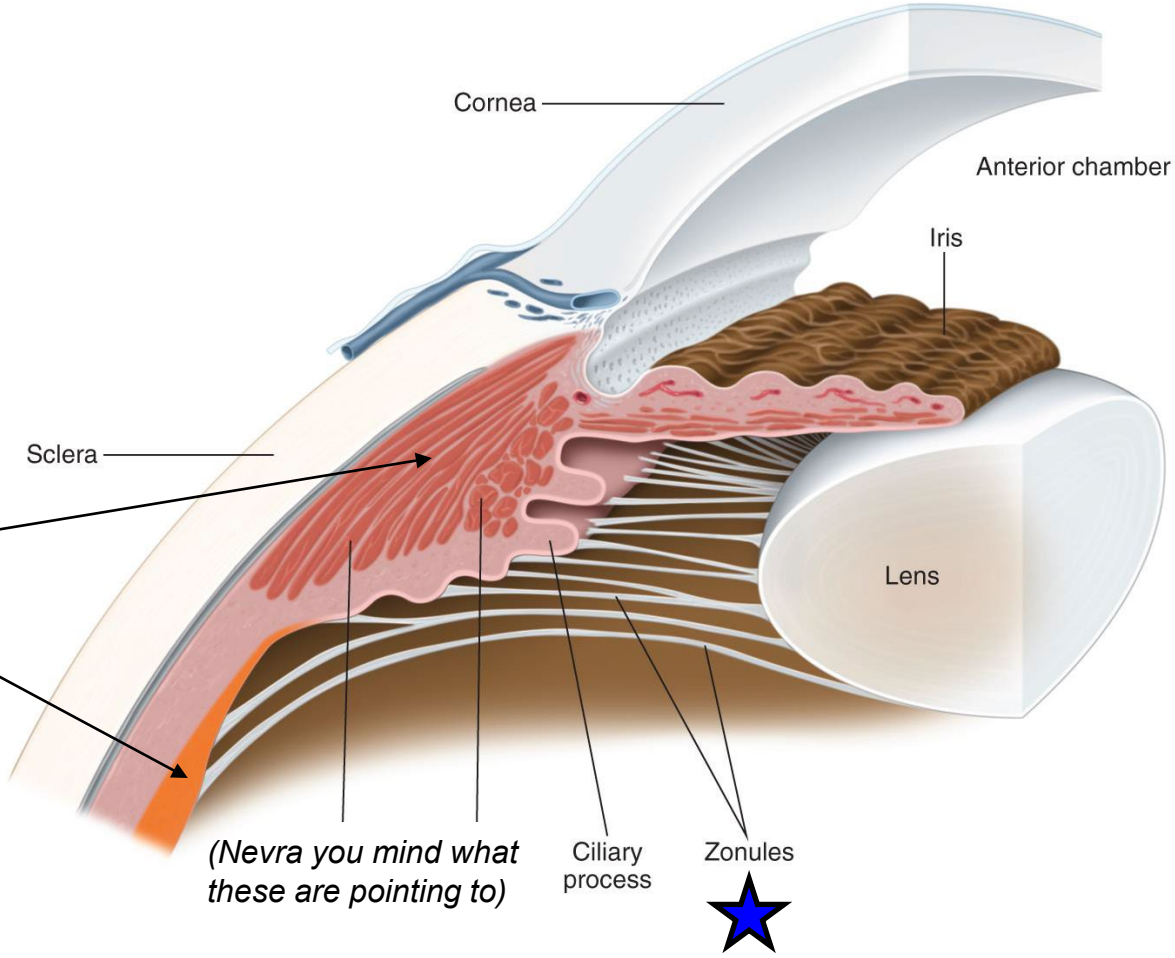
- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the very specific tissue of the pigmented vs nonpigmented epithelium of the specific portion 1 and specific portion 2 of the ciliary body

A

Lens Measurements

- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body

Lens Measurements



Pars plicata

Pars plana

(Nevra you mind what these are pointing to)

Q

Lens Measurements

- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) ***?***

    2) ***?***

    3) ***?***

A

Lens Measurements

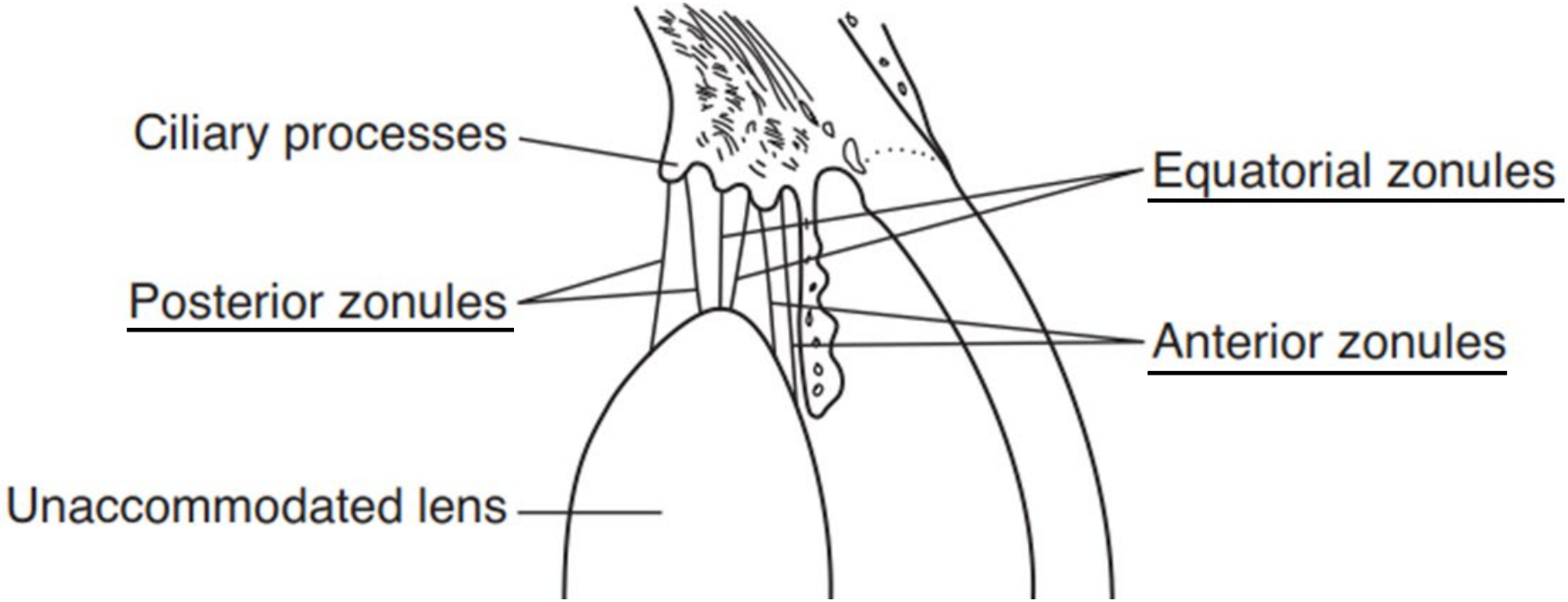
- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) *Equatorial*

    2) *Anterior*

    3) *Posterior*

Lens Measurements



Zonular insertions on the lens

Q

Lens Measurements

- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) *Equatorial*: Insert at the same location (duh)

    2) *Anterior*

    3) *Posterior*

A

Lens Measurements

- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) *Equatorial*: Insert at the equator (duh)

    2) *Anterior*

    3) *Posterior*

Q

Lens Measurements

- Zonules
  - Embryologically, the *tertiary* *vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) *Equatorial*: Insert at the equator (duh)
    - These zonules regress vs strengthen with age

    2) *Anterior*

    3) *Posterior*

A

Lens Measurements

- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) *Equatorial*: Insert at the equator (duh)
       - These zonules regress with age

    2) *Anterior*

    3) *Posterior*

Q

Lens Measurements

- Zonules
  - Embryologically, the *tertiary* *vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) *Equatorial*: Insert at the equator (duh)
       - These zonules regress with age

    2) *Anterior*: Insert [ ] mm anterior to equator

    3) *Posterior*

A

Lens Measurements

- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) *Equatorial*: Insert at the equator (duh)
       - These zonules regress with age

    2) *Anterior*: Insert 1.5 mm anterior to equator

    3) *Posterior*

Q

Lens Measurements

- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) *Equatorial*: Insert at the equator (duh)
       - These zonules regress with age

    2) *Anterior*: Insert 1.5 mm anterior to equator

    3) *Posterior*: Insert [ ] mm posterior to equator

A

Lens Measurements

- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

    1) *Equatorial*: Insert at the equator (duh)
       - These zonules regress with age

    2) *Anterior*: Insert 1.5 mm anterior to equator

    3) *Posterior*: Insert 1.25 mm posterior to equator

Lens Measurements

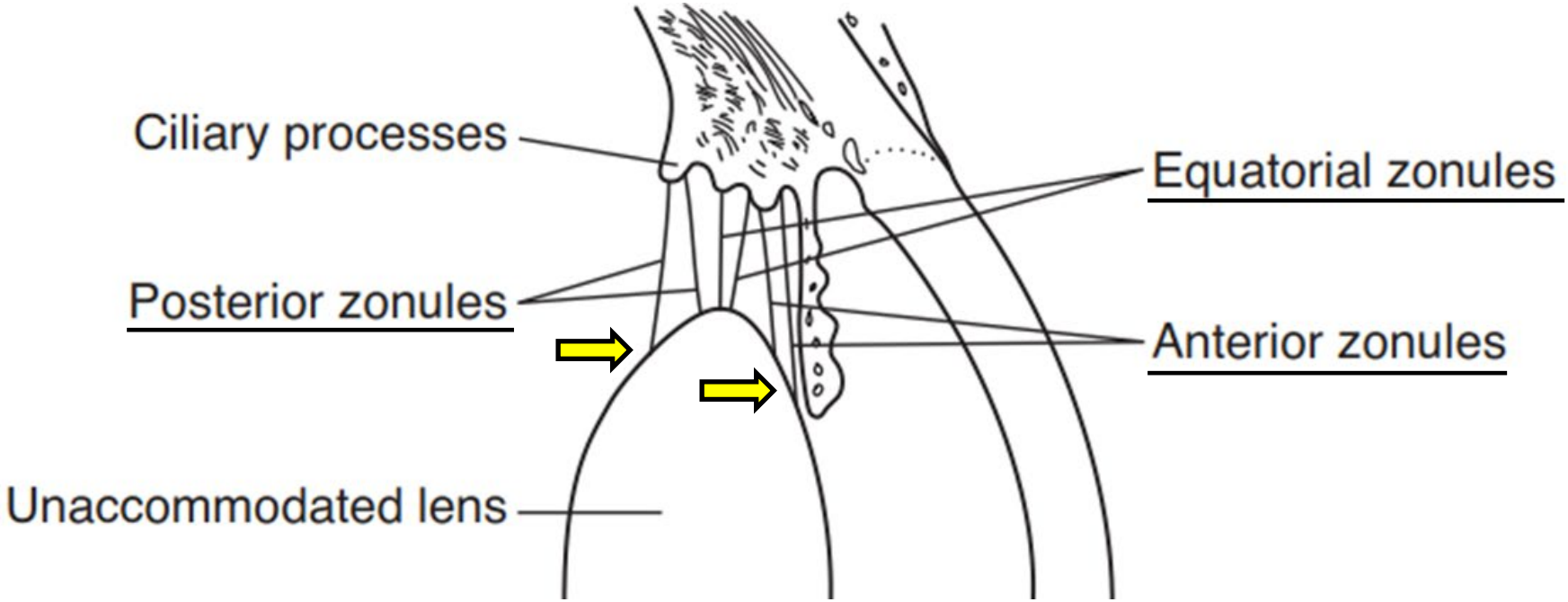
- Zonules
  - Embryologically, the *tertiary vitreous*
  - Originate from the basal lamina of the nonpigmented epithelium of the pars plana and pars plicata of the ciliary body
  - Three sets of fibers:

Probably more important to remember the relative *insertions of the anterior and posterior zonules rather than the specific distances*

2) *Anterior*: Insert **more** centrally than the **posterior**

3) *Posterior*: Insert **less** centrally than the **anterior**

Lens Measurements



Same figure as a few slides ago, but this time *note the relative locations of the insertions of the anterior vs posterior zonules*

Q

Lens Measurements

- *What are the three lens/cataract layers* <u>as</u> <u>encountered in cataract surgery?</u>
  - ***?***
  - ***?***
  - ***?***

A

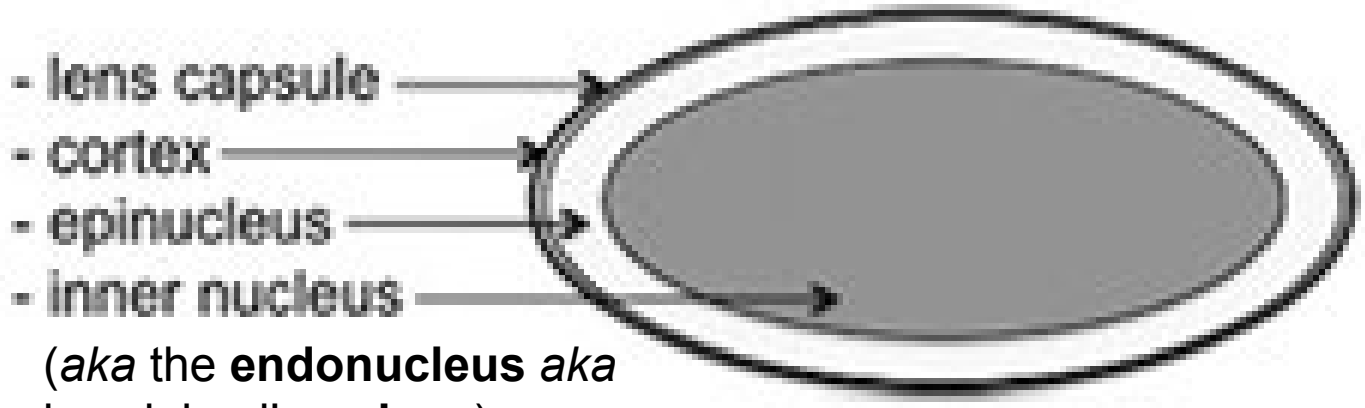
Lens Measurements

- *What are the three lens/cataract layers* <u>as encountered in cataract surgery?</u>
  - Nucleus
  - Epinucleus
  - Cortex

Lens Measurements

Surgical

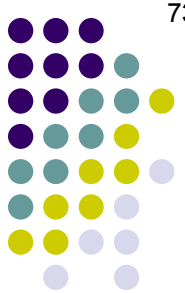
Layers of the lens:



(*aka* the **endonucleus** *aka* jes plain ol' **nucleus**)

Q

Lens Measurements



- *What are the three lens/cataract layers as encountered in cataract surgery? How do these layers differ from one another histologically?*
  - Nucleus: ***?***
  - Epinucleus: ***?***
  - Cortex: ***?***

A

Lens Measurements

- *What are the three lens/cataract layers as encountered in cataract surgery? How do these layers differ from one another histologically?*
  - Nucleus:
  - Epinucleus:
  - Cortex:

Trick question—they don't! These terms refer to differences in *appearance* and *behavior* of lens material encountered during cataract surgery. They are *descriptive* terms, not histological.

Q

Lens Measurements

- *What are the three lens/cataract layers as*

Briefly, how does each layer look and behave during cataract surgery?
Nucleus:

Epinucleus

Cortex

T

differences in ***appearance and behavior*** of lens material encountered during cataract surgery. They are *descriptive* terms, not histological.

A

Lens Measurements

- *What are the three lens/cataract layers as*

Briefly, how does each layer look and behave during cataract surgery?
Nucleus: Opaque, usually with an amber hue. The nucleus is firm, and cannot be aspirated from the eye until/unless it is broken up (emulsified, hence the term *phacoemulsification*).
Epinucleus

Cortex

T

differences in ***appearance and behavior*** of lens material encountered during cataract surgery. They are *descriptive* terms, not histological.

Q

Lens Measurements

- *What are the three lens/cataract layers as*

Briefly, how does each layer look and behave during cataract surgery?
Nucleus: Opaque, usually with an amber hue. The nucleus is firm, and cannot be aspirated from the eye until/unless it is broken up (emulsified, hence the term *phacoemulsification*).
Epinucleus:

Cortex

T

differences in ***appearance and behavior*** of lens material encountered during cataract surgery. They are *descriptive* terms, not histological.

A

Lens Measurements

- *What are the three lens/cataract layers as*

Briefly, how does each layer look and behave during cataract surgery?
Nucleus: Opaque, usually with an amber hue. The nucleus is firm, and cannot be aspirated from the eye until/unless it is broken up (emulsified, hence the term *phacoemulsification*).
Epinucleus: Clear to cloudy. The epinucleus is soft, and can be aspirated without emulsification (although emulsifying energy is often employed during epinucleus removal in order to make the process faster/more efficient).
Cortex

T

differences in ***appearance and behavior*** of lens material encountered during cataract surgery. They are *descriptive* terms, not histological.

Q

Lens Measurements

- *What are the three lens/cataract layers as*

Briefly, how does each layer look and behave during cataract surgery?
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Cortex:

T
differences in ***appearance and behavior*** of lens material encountered during cataract surgery. They are *descriptive* terms, not histological.

A

Lens Measurements

- *What are the three lens/cataract layers as*

Briefly, how does each layer look and behave during cataract surgery?
Nucleus: Opaque, usually with an amber hue. The nucleus is firm, and cannot be aspirated from the eye until/unless it is broken up (emulsified, hence the term *phacoemulsification*).
Epinucleus: Clear to cloudy. The epinucleus is soft, and can be aspirated without emulsification (although emulsifying energy is often employed during epinucleus removal in order to make the process faster/more efficient).
Cortex: Thin and wispy, the cortex is like a layer of tape stuck to the inner aspect of the capsule. Using aspiration and vacuum power, it is peeled off at the end of the case. It requires no emulsification.

T
differences in ***appearance and behavior*** of lens material encountered during cataract surgery. They are *descriptive* terms, not histological.