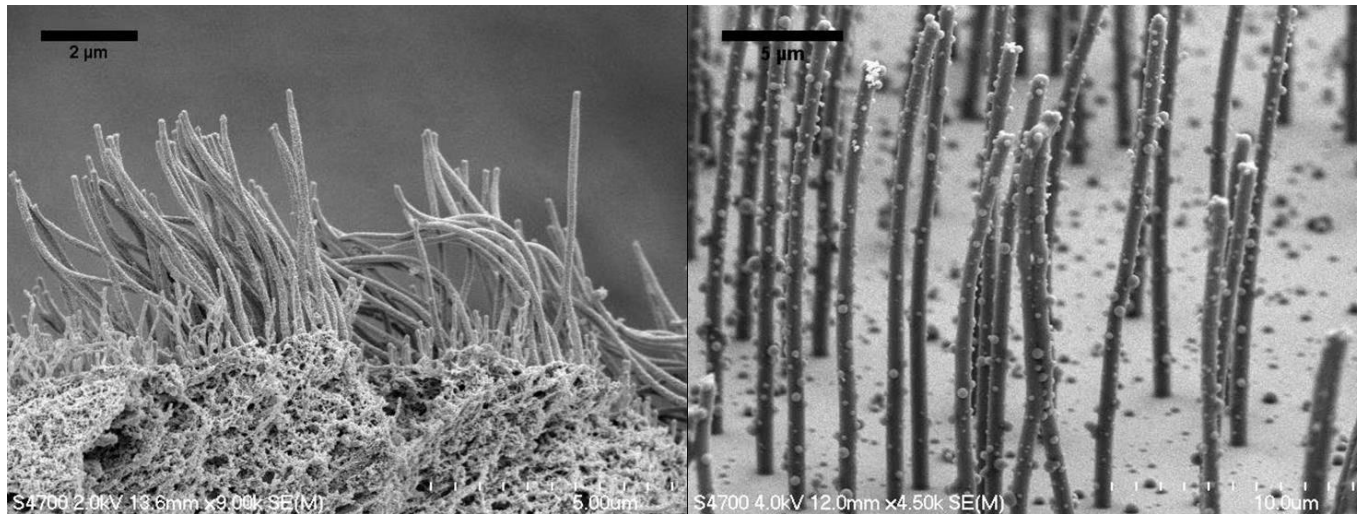


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# FOUNDATION MODULE(LGIS)



## Apical Cell Surface Specializations

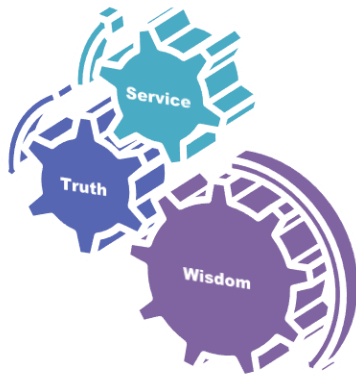
Presenter:

Dr. Mohtasham Hina

06-03-23

# Vision; The Dream/Tomorrow

- **Motto**



- To impart evidence based research oriented medical education
- To provide best possible patient care
- To inculcate the values of mutual respect and ethical practice of medicine

# Prof. Umar Teaching Strategy Model

- Lecture available on website :

<https://rmur.edu.pk/departments-of-anatomy/>

- **SDL Assessment**

1. Which type of epithelium is best suited for diffusion and filtration?

- A) Stratified squamous
- B) Simple squamous
- C) Pseudostratified columnar
- D) Transitional
- E) Stratified cuboidal

2. The presence of cilia is a characteristic feature of which epithelial tissue?

- A) Simple cuboidal
- B) Simple columnar
- C) Pseudostratified columnar
- D) Stratified squamous
- E) Transitional

**3.** The core structure of cilia is composed of which of the following arrangements of microtubules?

- A)  $9 + 0$
- B)  $9 + 2$
- C)  $9 + 3$
- D)  $8 + 2$
- E)  $10 + 2$

**4.** Which apical cell surface modification is non-motile and found in the epididymis, aiding in absorption?

- A) Cilia
- B) Microvilli
- C) Stereocilia
- D) Hemidesmosomes
- E) Tight junctions

**5.** Which of the following apical surface specializations is primarily involved in increasing the absorptive surface area of epithelial cells?

- A) Cilia
- B) Microvilli
- C) Stereocilia
- D) Desmosomes
- E) Flagella

1.b

2.c

3.b

4.c

5.b

# Learning Objectives

At the end of lecture 1<sup>st</sup> year students should be able to

- Different types of apical cell surface domains
- Explain histological structure of apical cell surface modifications
- Location and functions of modifications
- correlate clinical aspects of modifications
- To understand bio-physiological aspect of different types of modifications
- Read a research article
- Use digital library

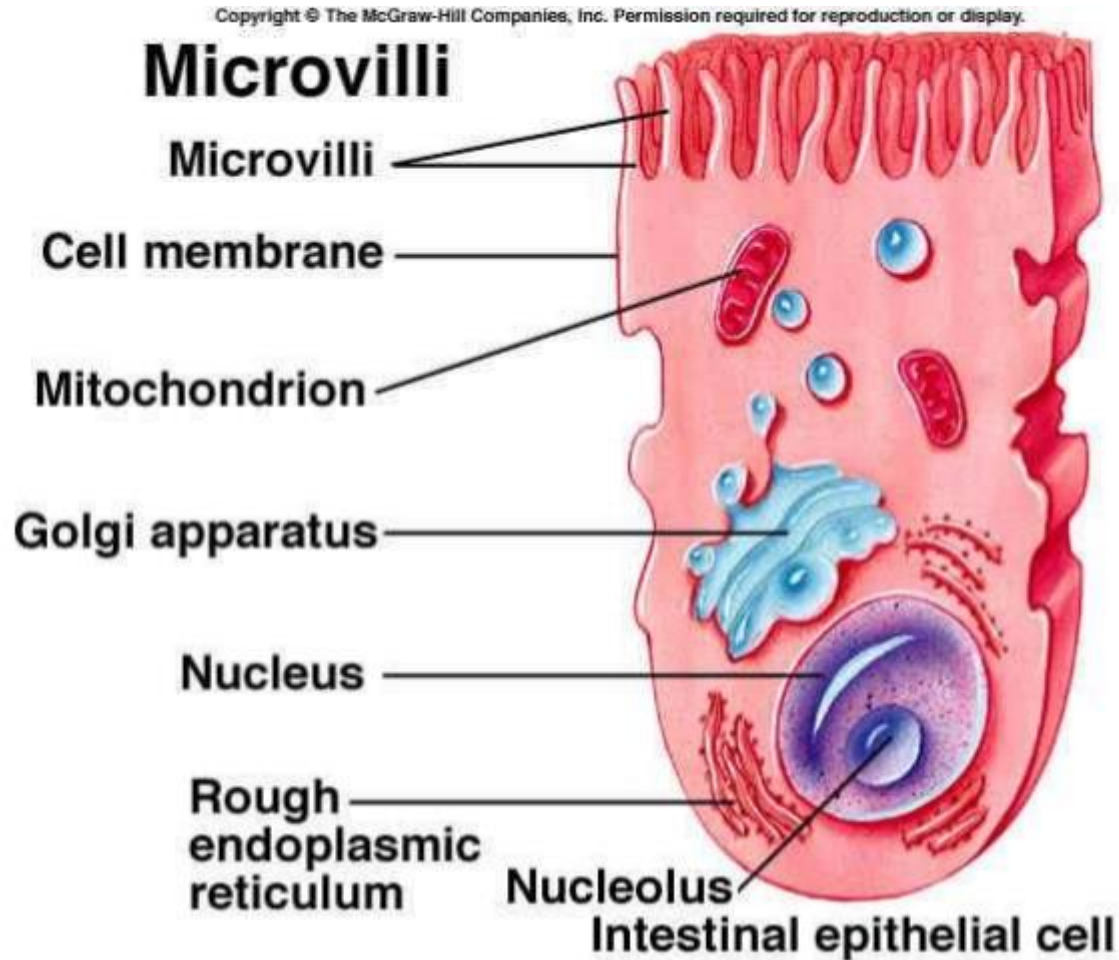
A 45 years male patient came to medical OPD with chest infection. He gave history of recurrent episodes of such infection since childhood. He also gave history of treatment failure for infertility as he was married for past 13 years.



# Apical cell surface modifications

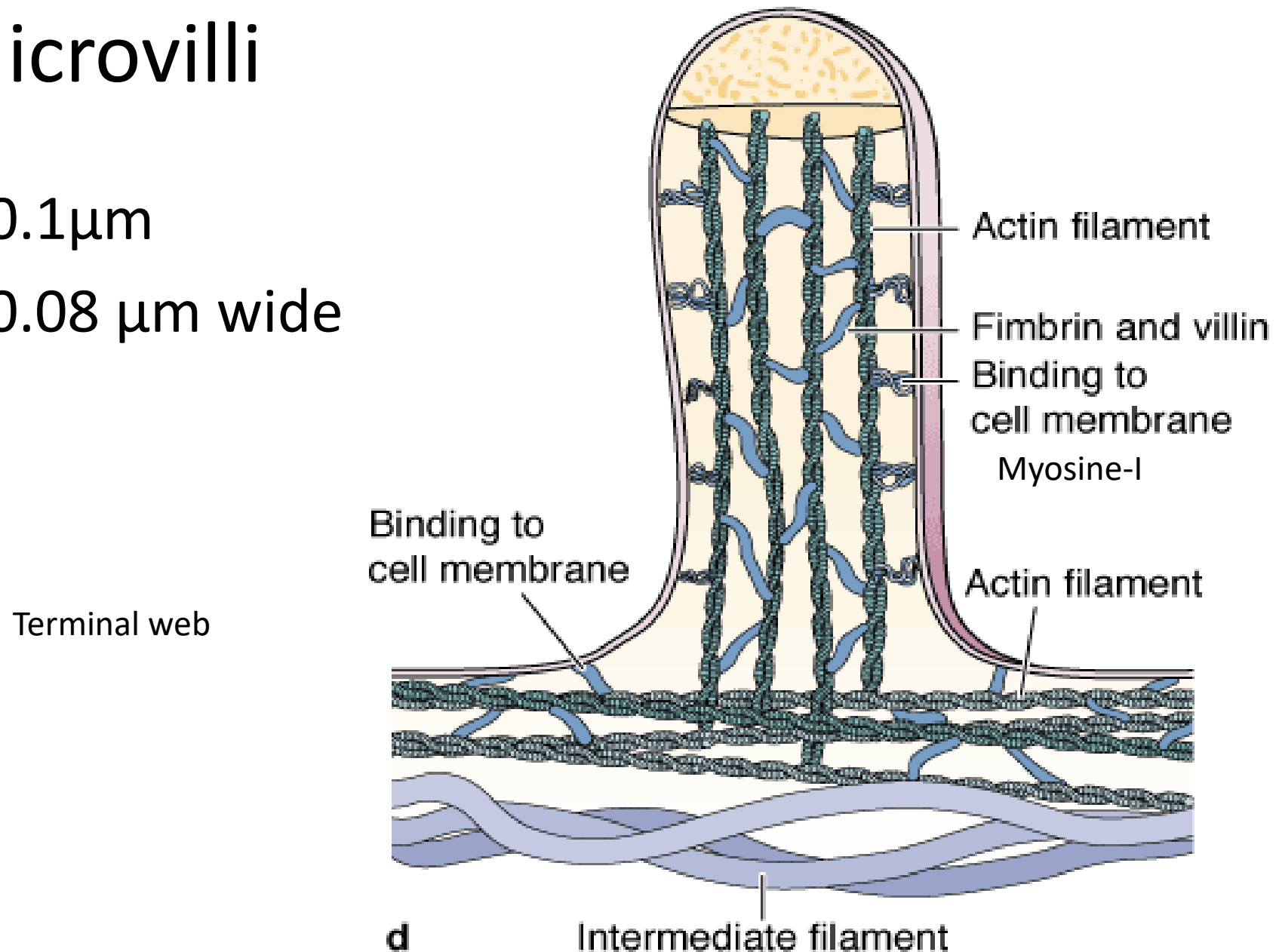
- Microvilli
- Cilia
- stereocilia

## Microvilli



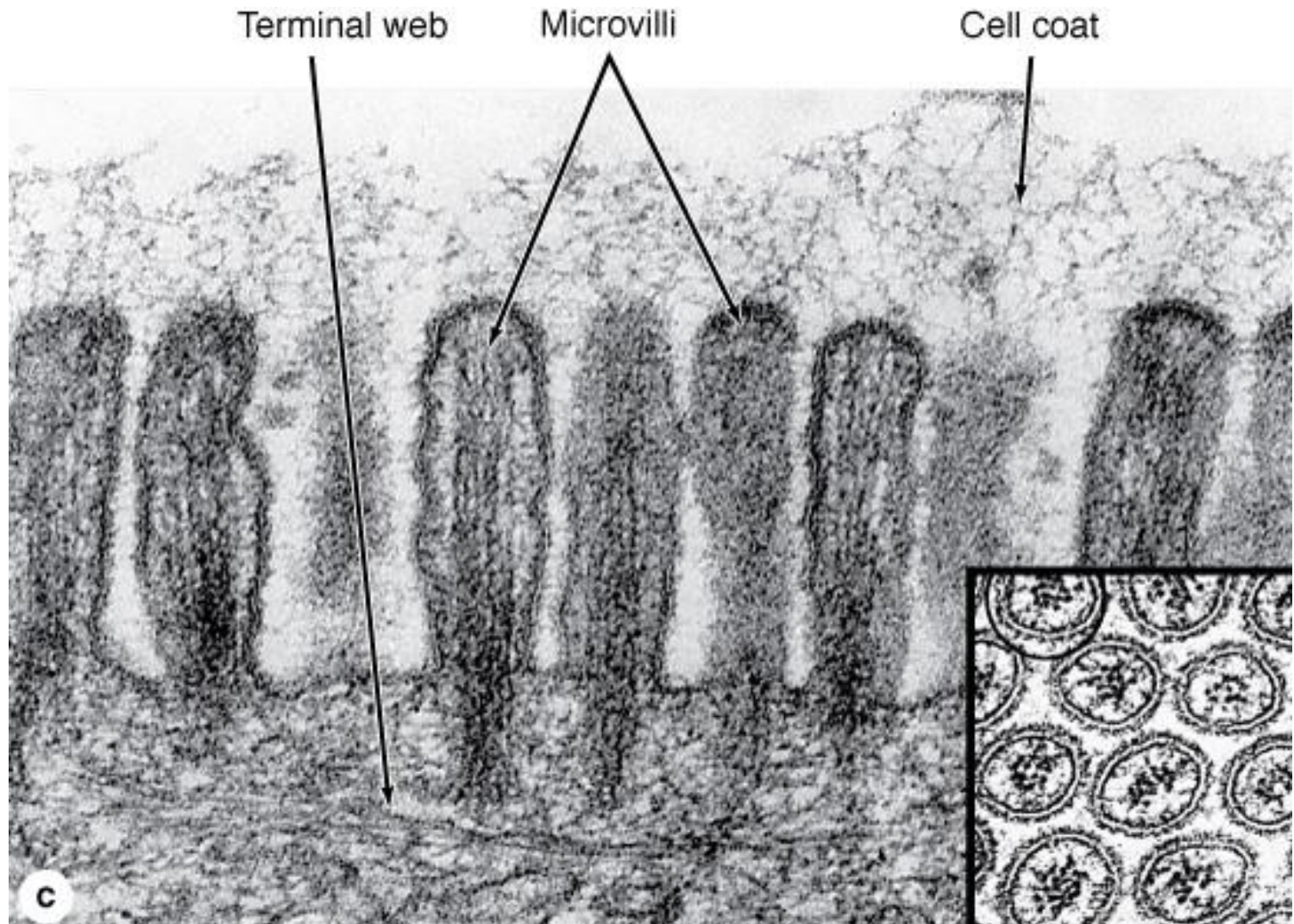
# Microvilli

- $0.1\mu\text{m}$
- $0.08\mu\text{m}$  wide



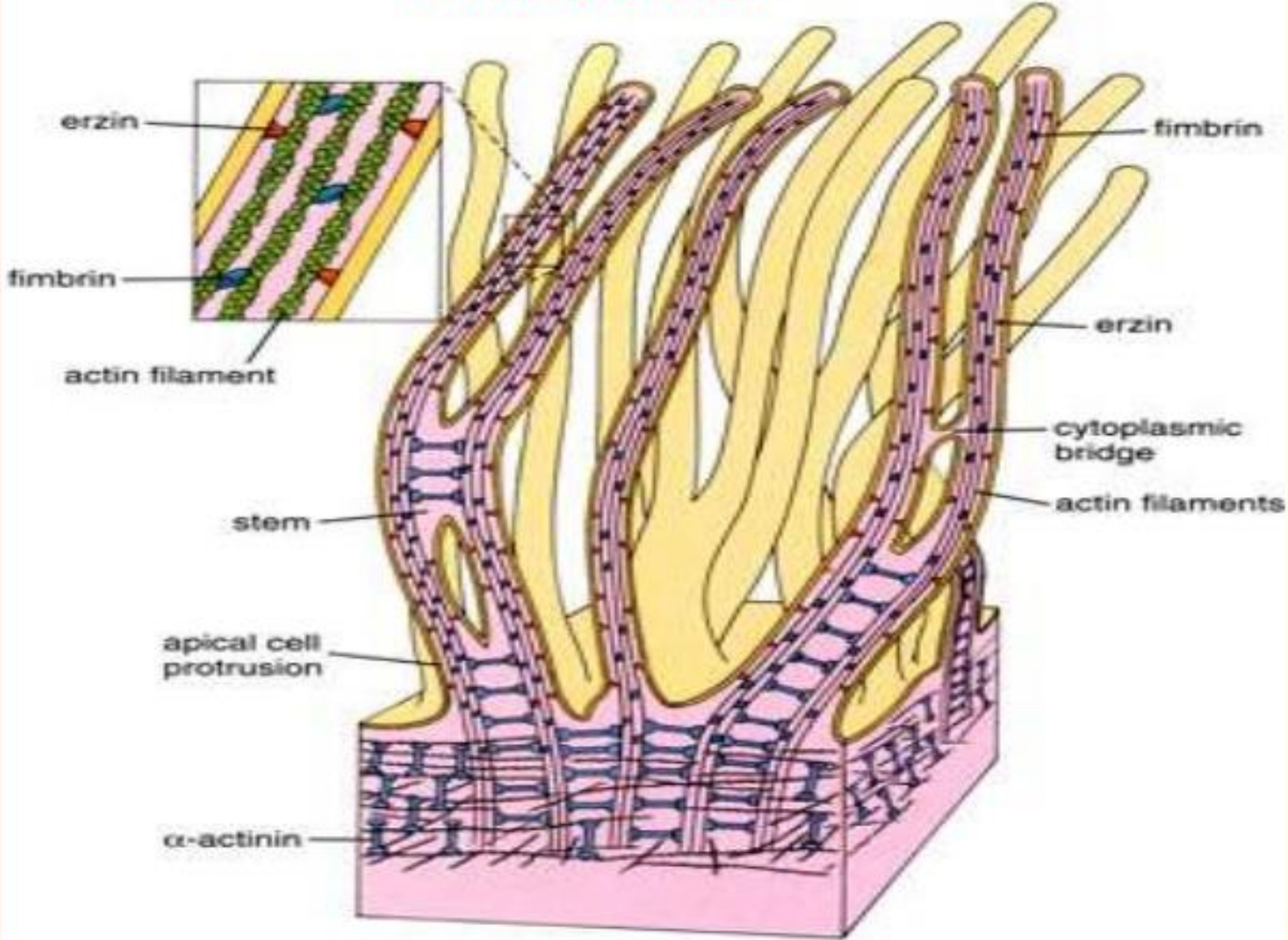
## Core Knowledge

# Microvilli

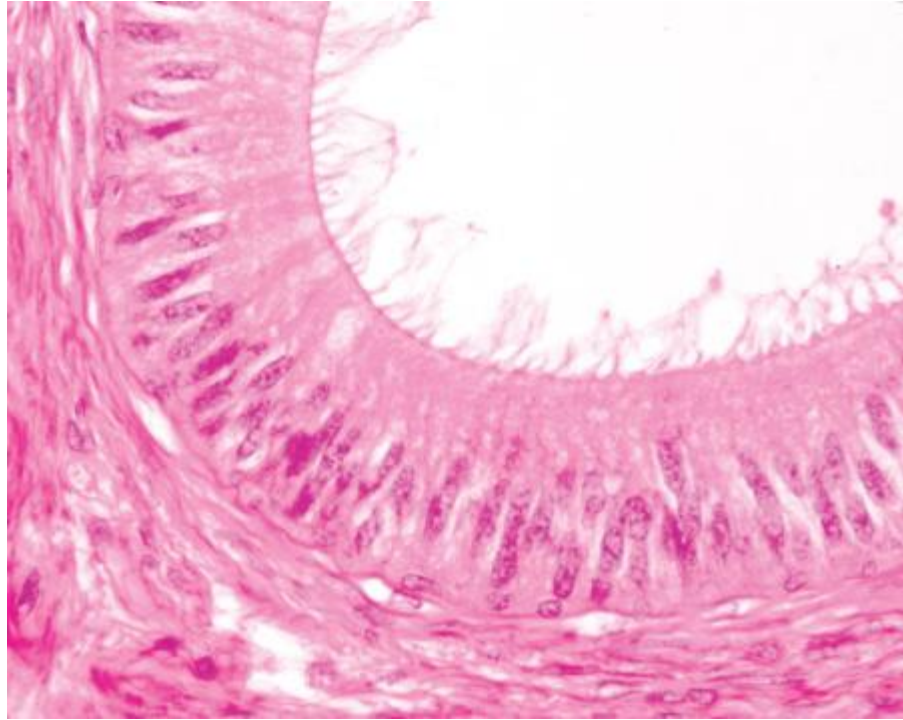




STREOCILLIA

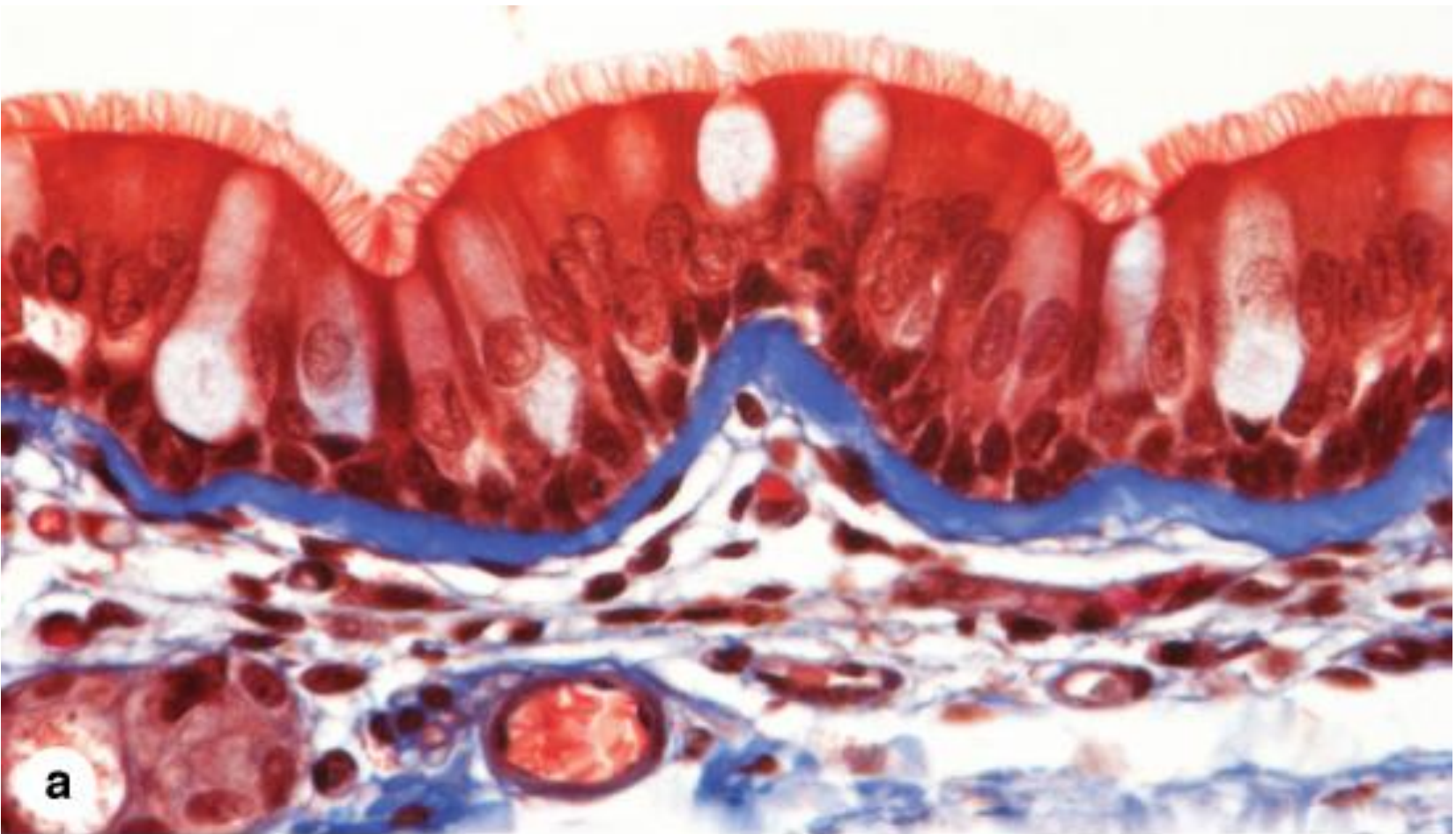


# Stereocilia



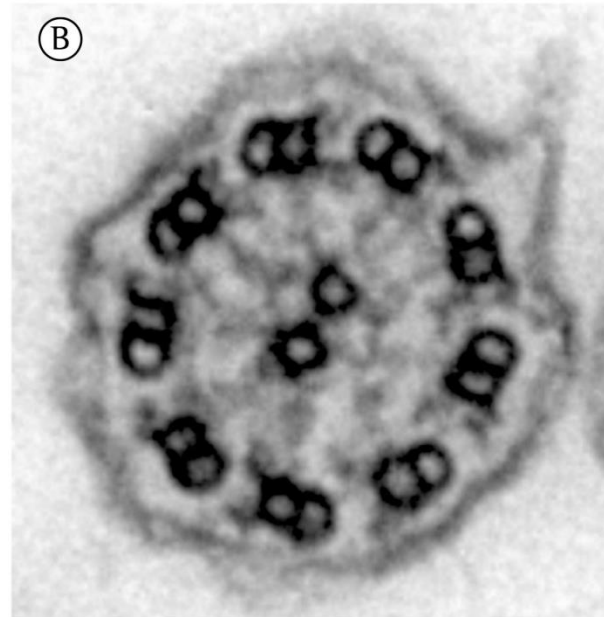
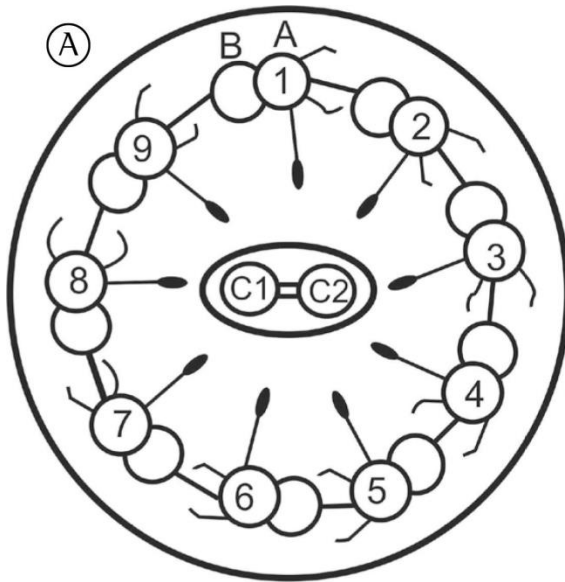
# Cilia

- 5–10  $\mu\text{m}$  long and 0.2  $\mu\text{m}$  in diameter



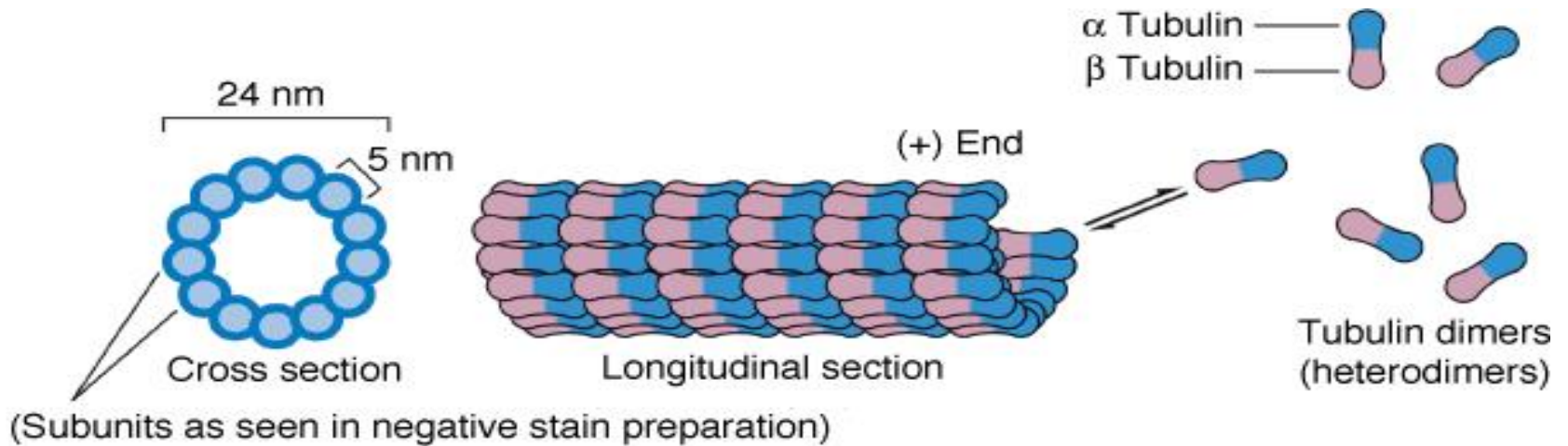
## Core Knowledge

# Cilia And Basal Body

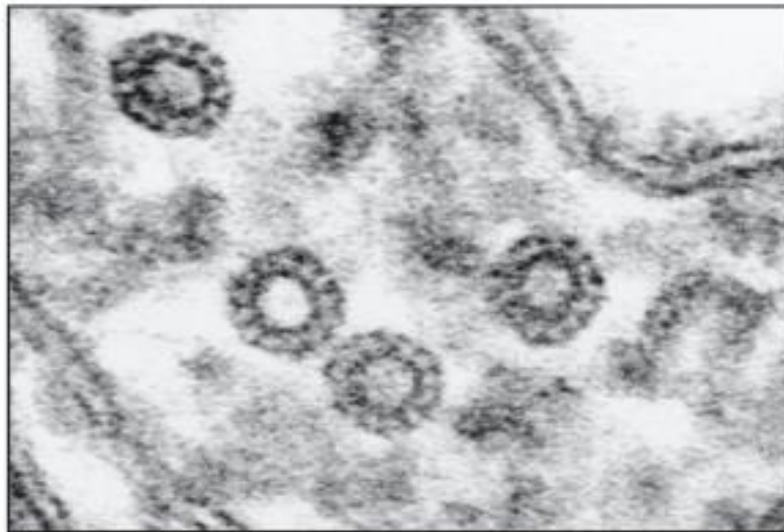




# Microtubule structure



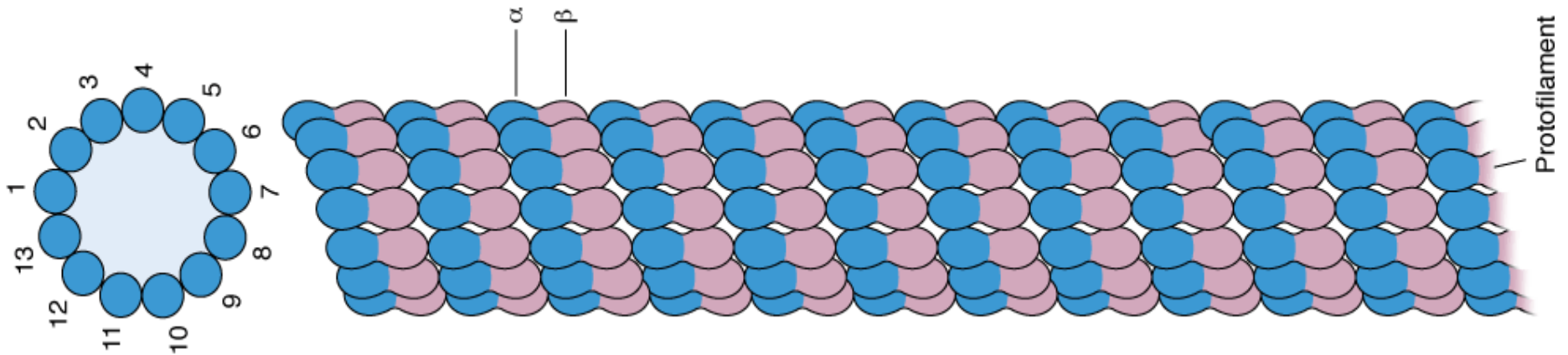
Electron micrograph of microtubules showing above structural features

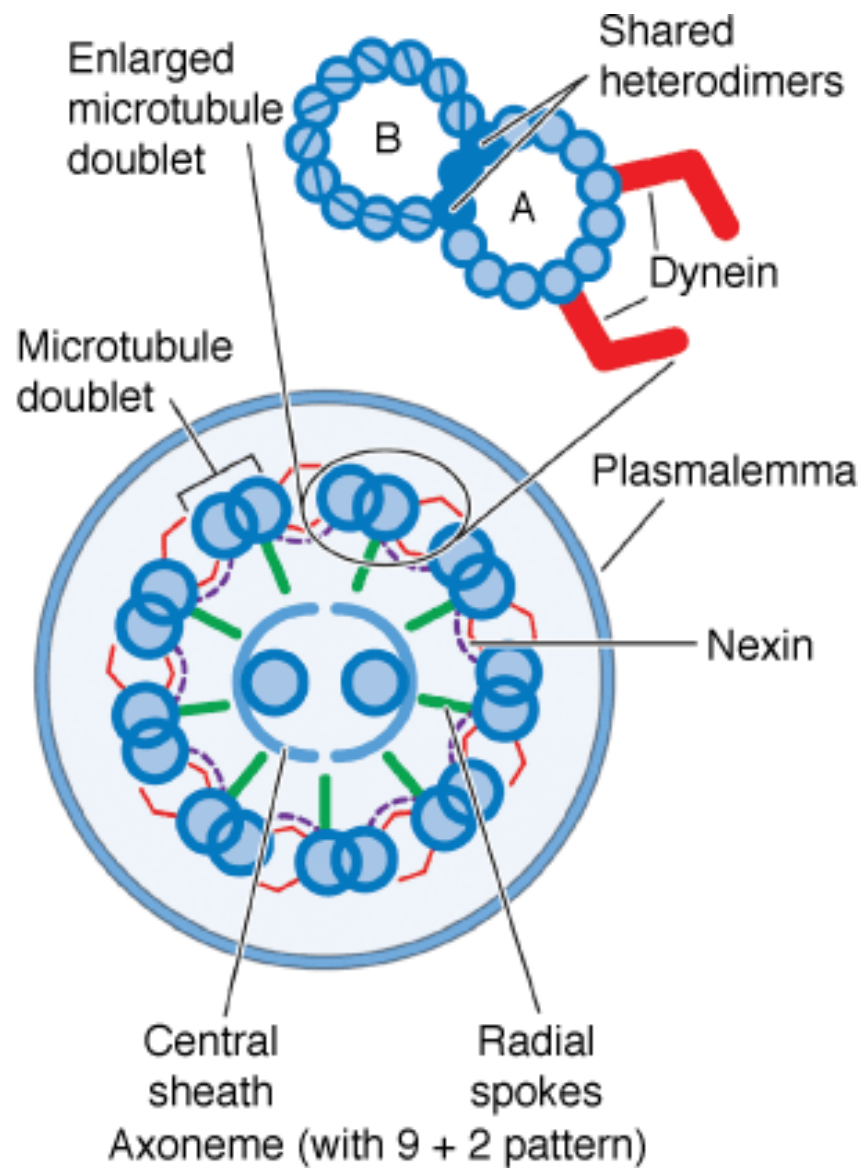


**a** Microtubule

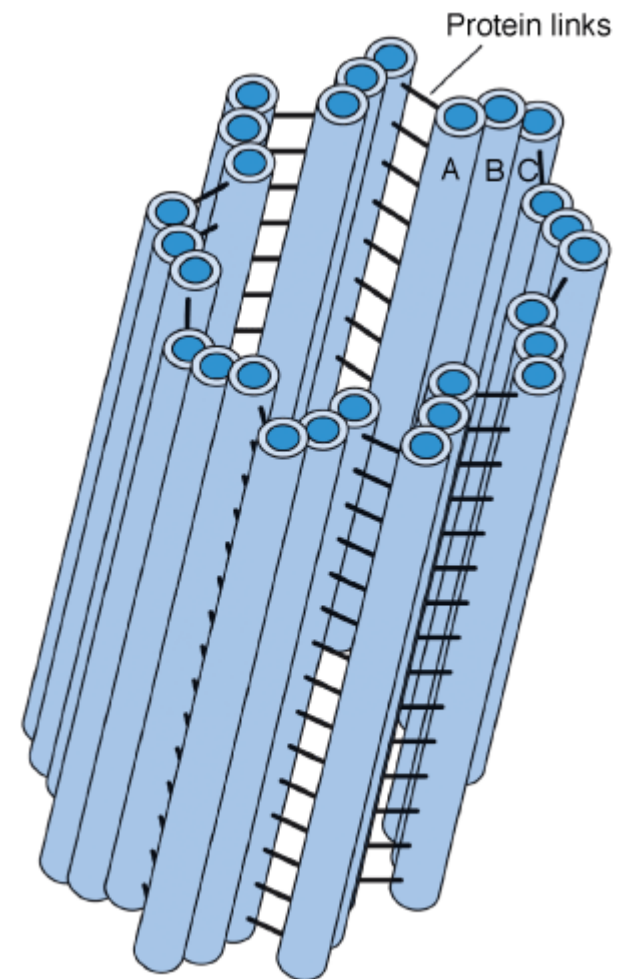
## Core Knowledge

# Microtubule structure



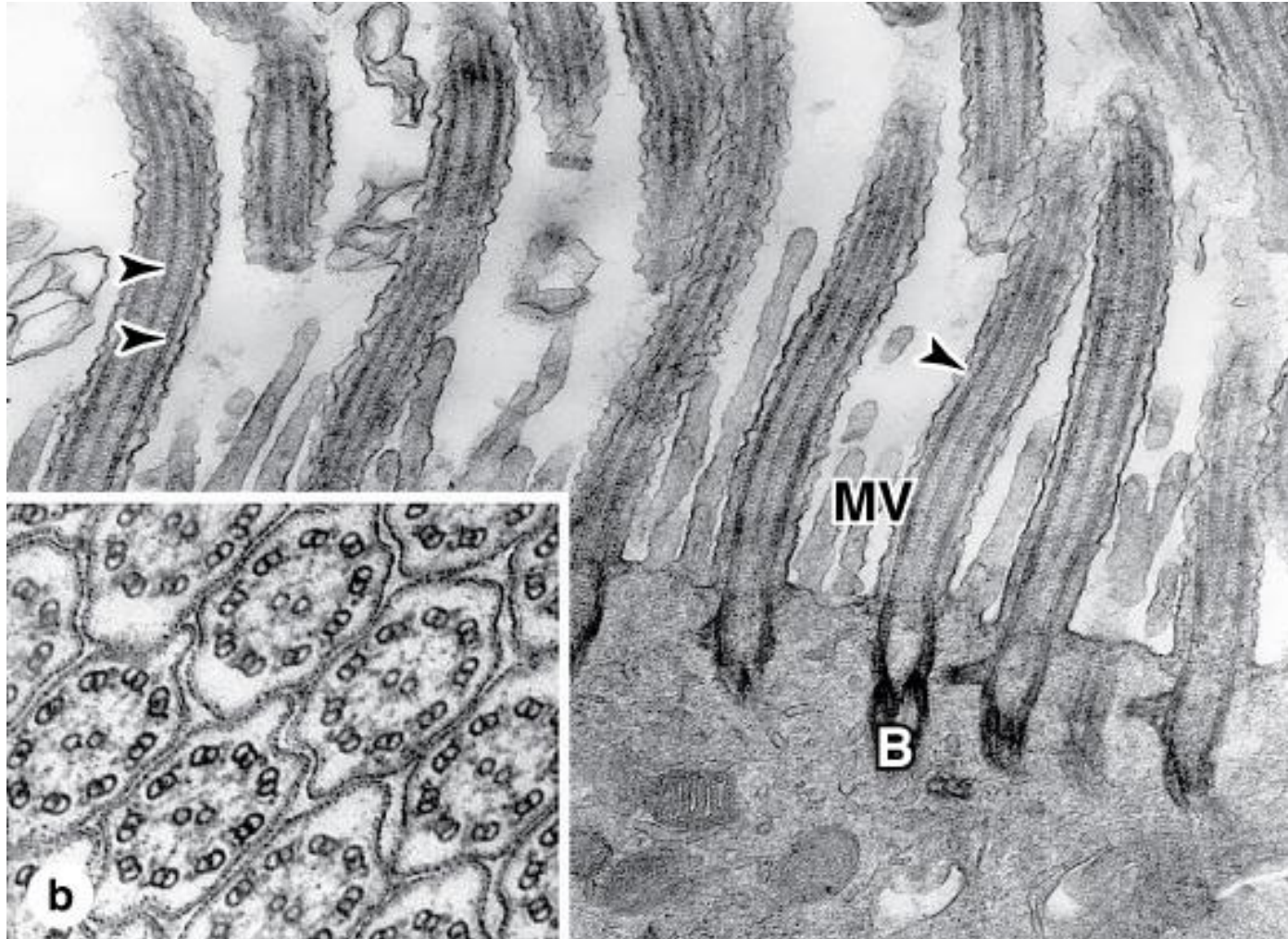


**b** Cilium



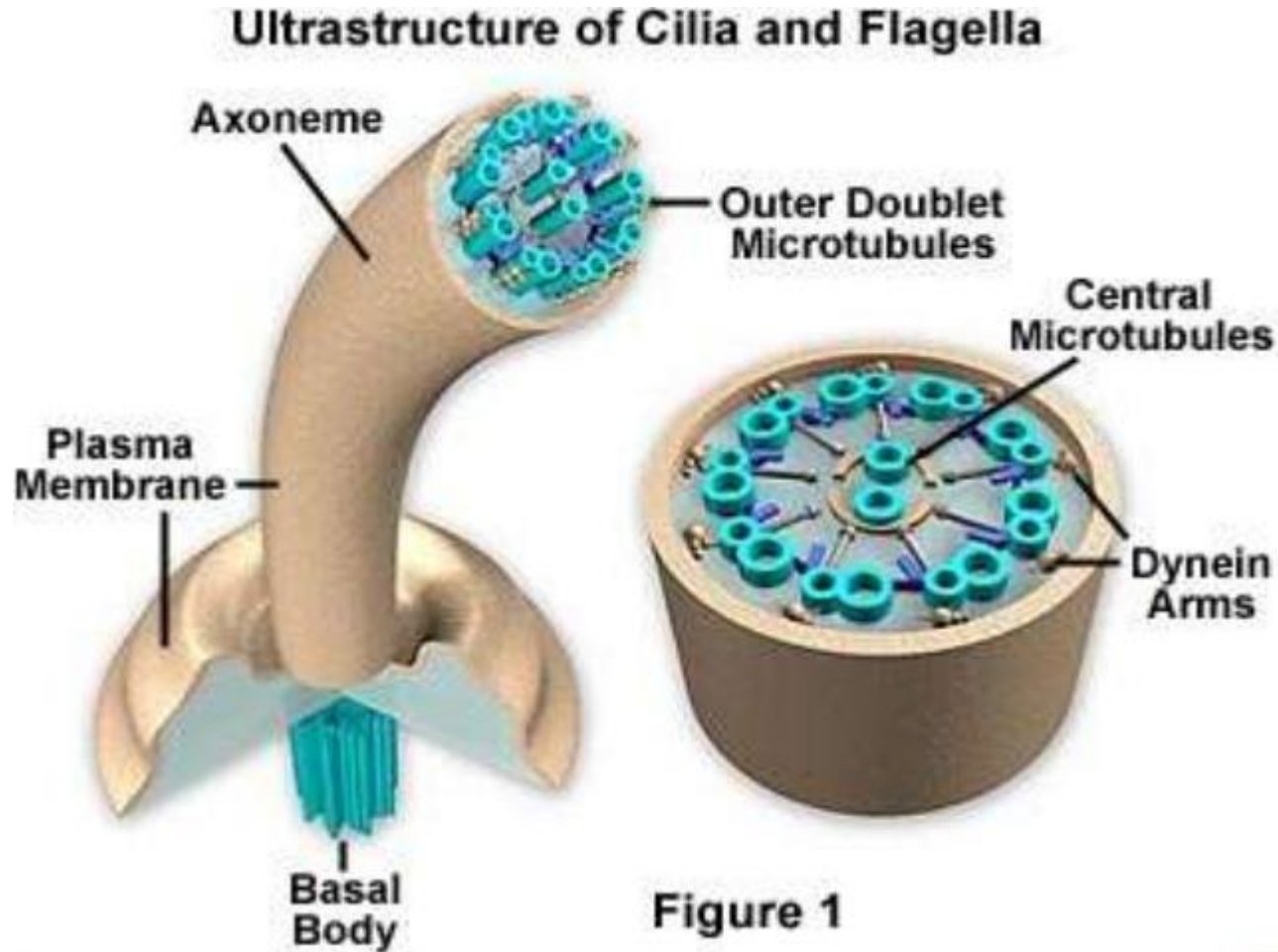
**c** Centriole

# Cilia

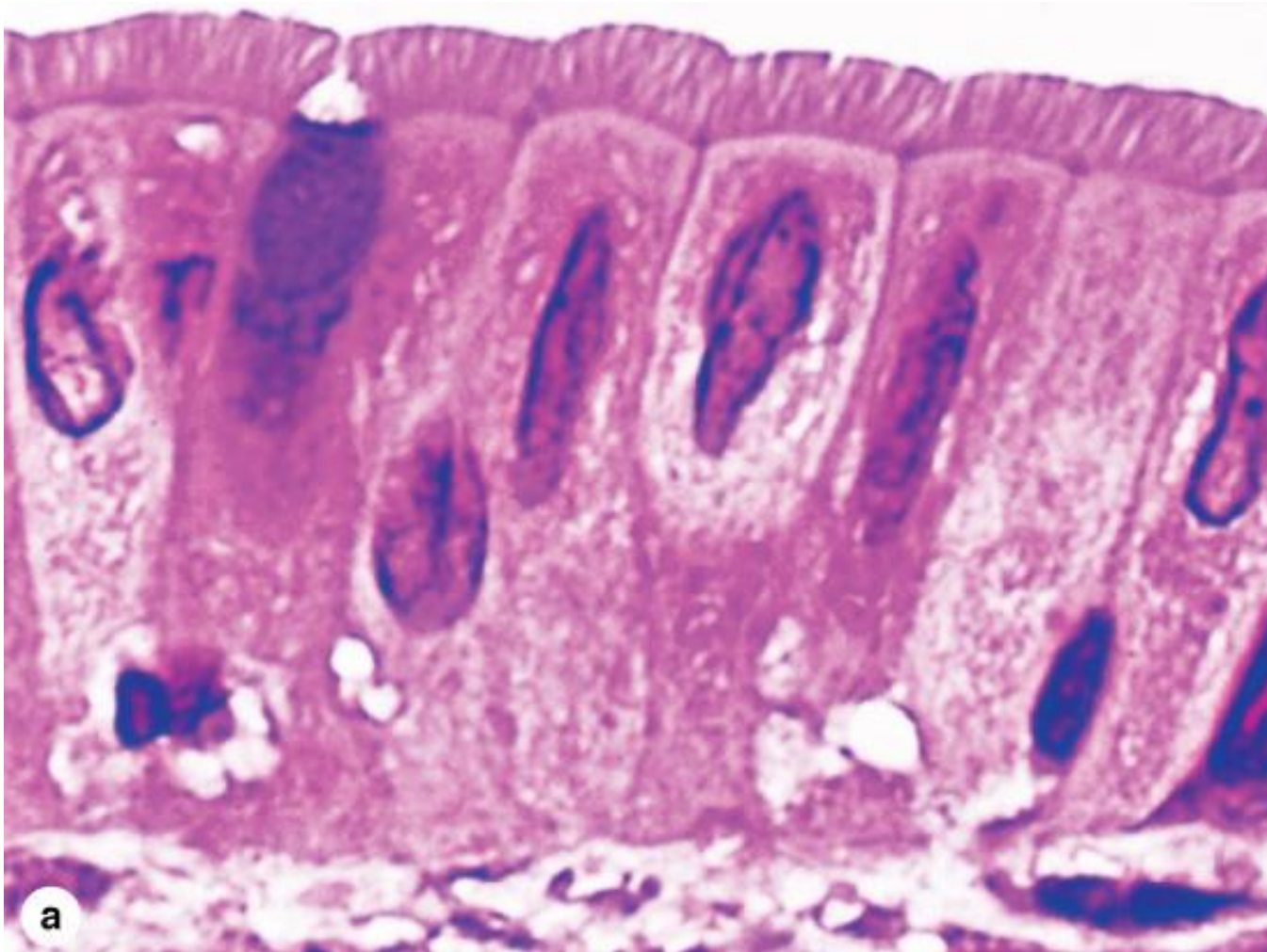




## CILIA



# CILIA

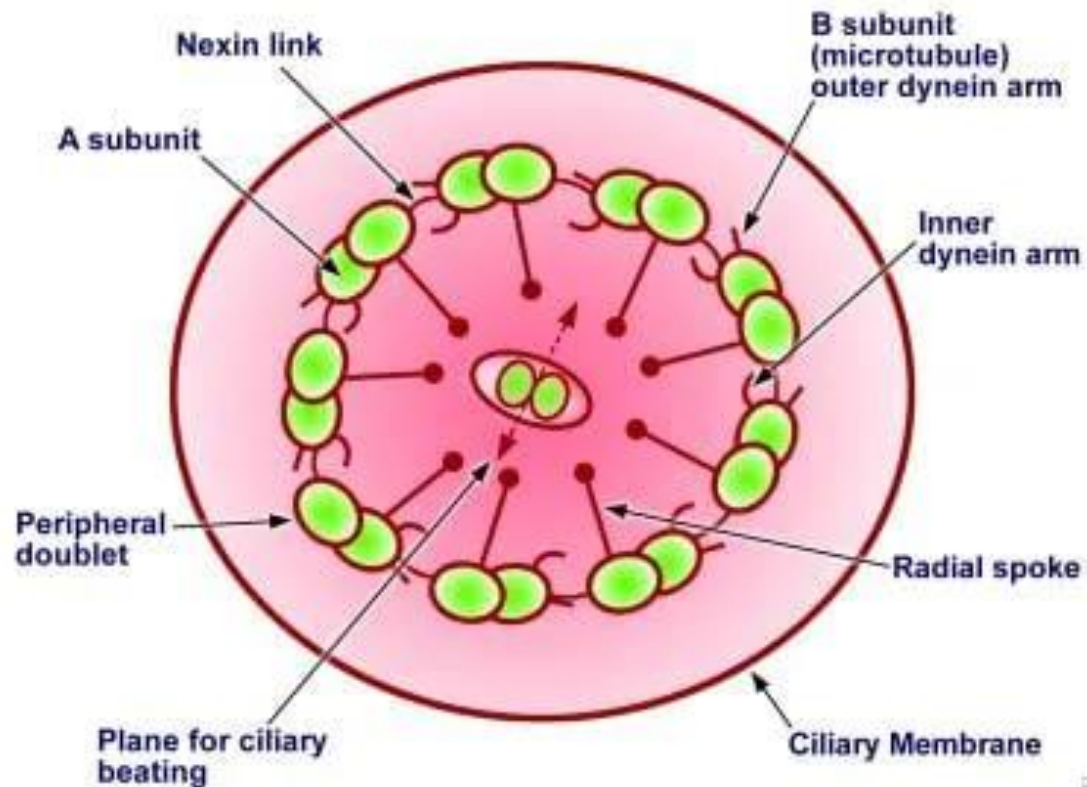


# Core Knowledge

Cilia	Microvilli
Narrow, long, hair like structure	Finger like membrane protrusions
Cylindrical with tapering ends	Cylindrical with blunt ends
Longer than microvilli	Shorter than cilia
Thinner	Thicker than cilia
Not covered with glycocalyx	Covered with glycocalyx
Motile	Non motile
9+2 axonem	absent
Non absorptive	absorptive
Do not increase surface area	Increase surface area

# Primary ciliary Dyskinesia

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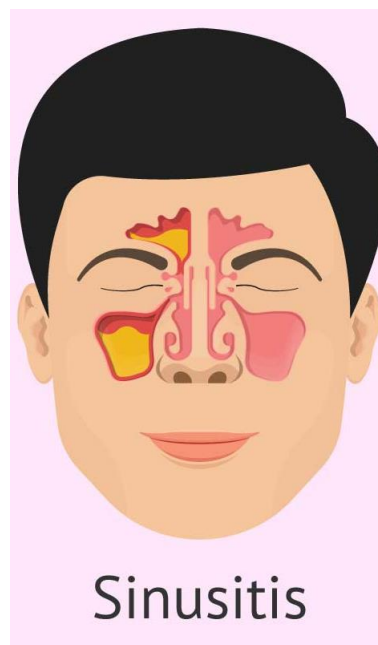
# Clinical Correlation

- Several mutations have been described in the proteins of the cilia and flagella. They are responsible for the immotile cilia syndrome, the symptoms of which are immotile spermatozoa, male infertility, and chronic respiratory infections caused by the lack of the cleansing action of cilia in the respiratory tract

# kartagener Syndrome

## Specific Kartagener syndrome treatment includes:

- Regular sinus washes.
- Regular ear canal washes.
- Steroids.
- Mucus thinners, called mucolytics.
- Antibiotics.
- Bronchodilators to relax lung muscles for easier breathing.
- Ear tubes.
- Speech therapy



# Kartagener syndrome (primary ciliary dyskinesia)

- Ethical considerations surrounding genetic testing for PCD are important. Patients and their families may need counselling.
- Individuals with PCD may face challenges related to infertility. Ethical questions may arise concerning assisted reproductive technologies, such as in vitro fertilization (IVF)
- **Privacy and Genetic Information:**
- **Patient Autonomy**
- **Stigmatization and Discrimination**
- 



# Research Article

- **The immotile cilia syndrome: radiological manifestations**
- [H R Nadel](#), [D A Stringer](#), [H Levison](#), [J A Turner](#), [J M Sturgess](#)
- <https://pubs.rsna.org/author/Nadel%2C+H+R>

# How To Access Digital Library

- Go to the website of HEC National Digital Library.
- On Home Page, click on the INSTITUTES.
- A page will appear showing the universities from Public and Private Sector and other Institutes which have access to HEC National Digital Library HNDL.
- Select your desired Institute.
- 5. A page will appear showing the resources of the institution
- 6. Journals and Researches will appear
- 7. You can find a Journal by clicking on JOURNALS AND DATABASE and enter a keyword to search for     your desired journal.

# Learning Resources

- Junqueira's Basic Histology 12<sup>th</sup> Edition, Chapter 4
- Histology , A text and Atlas by Michael H.Ross 7<sup>th</sup> Edition, Chapter 5
- DiFiore's Atlas of Histology with Functional Correlations 11<sup>th</sup> Edition, Chapter 2
- Google scholar