



# ***Human biology***

# **Cytoskeleton**

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***Dr. Rawaa Salim Hameed***



# Reference

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- Text book of human biology by John Kenneth Inglis 3<sup>rd</sup> Ed (1985)

# Cytoskeleton

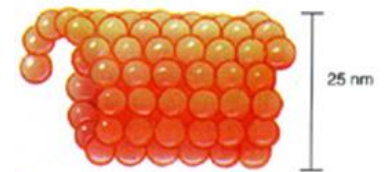
- ✓ A network of protein fibres
- ✓ Help maintain the shape of the cell
- ✓ Secure some organelles in specific positions
- ❖ There are three types of fibres within the cytoskeleton:
  - 1- Microfilaments
  - 2- Intermediate filaments
  - 3- Microtubules



**Actin filaments** (microfilaments) are composed of actin subunits and are about 8 nm in diameter.



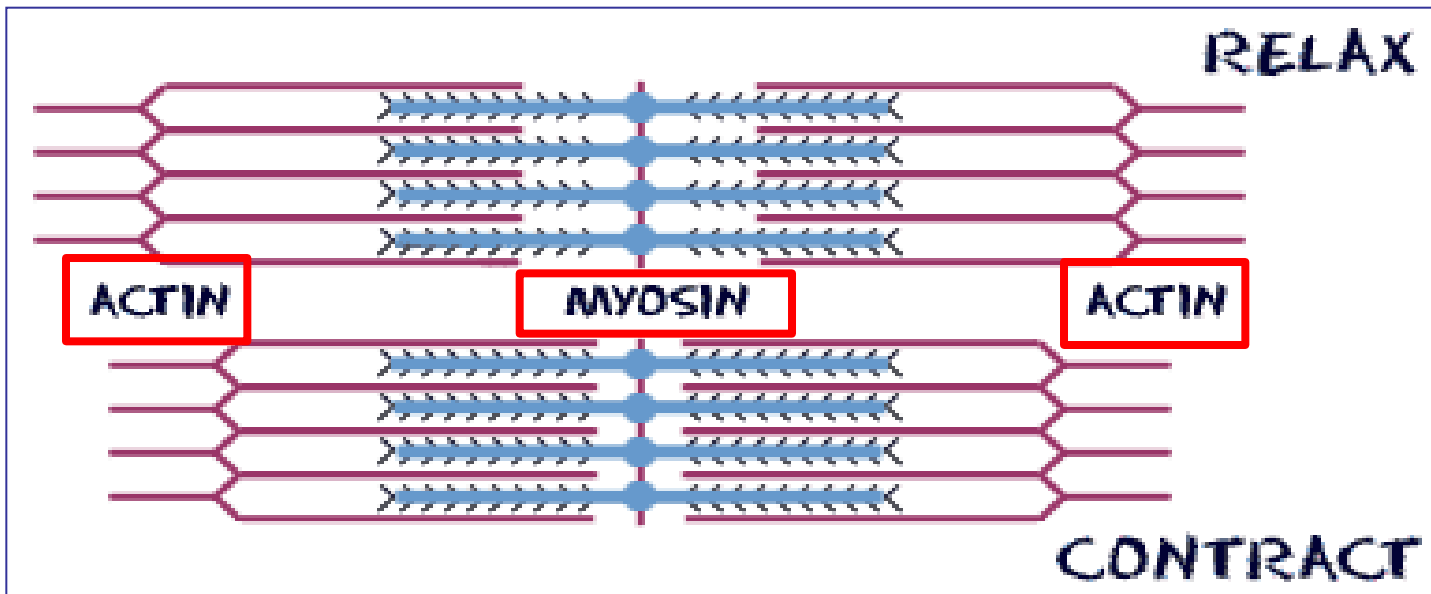
**Intermediate filaments** are protein fibers 10 nm in diameter.



**Microtubules** are composed of tubulin protein subunits. Microtubules are 25 nm diameter tubes with 5 nm thick walls.

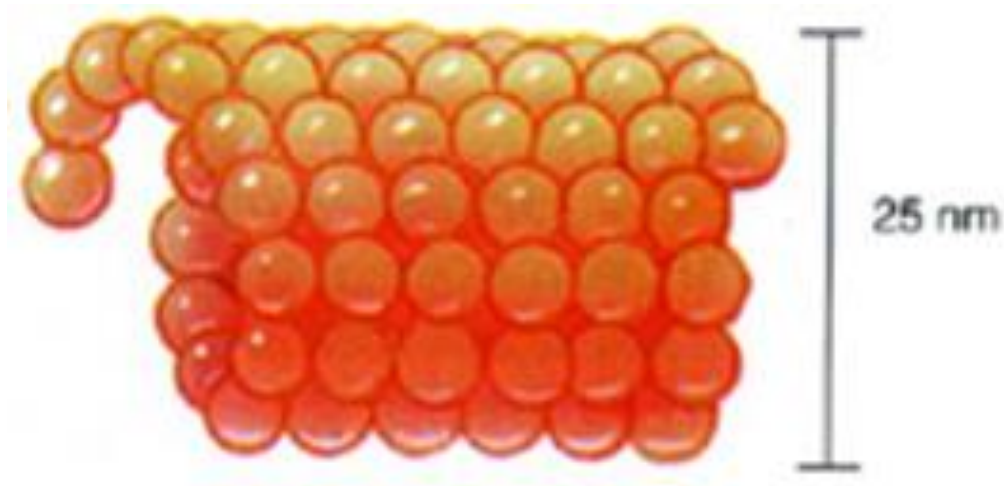
# Microfilaments

- The thinnest part of the cytoskeleton
- They made of the proteins actin and myosin
- Actin works with myosin to produce muscle movements and cell division.



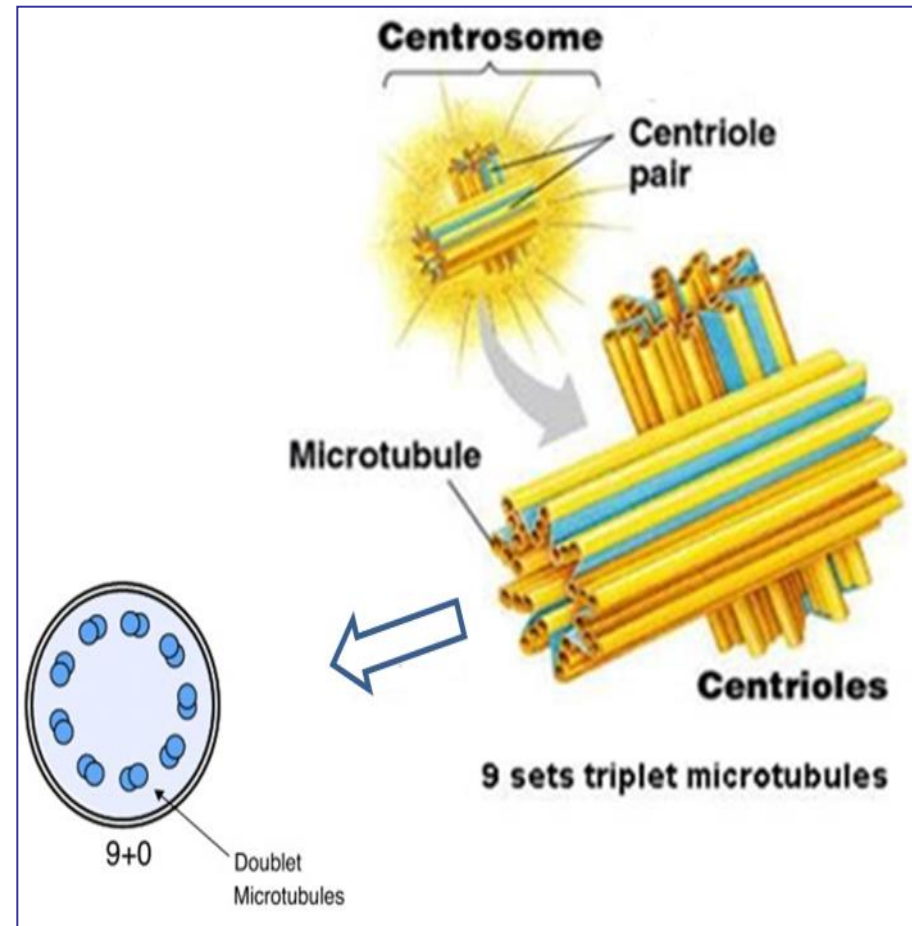
# Microtubules

- Microtubules are the largest element of the cytoskeleton.
- Small hollow tubes made of proteins called **tubulin**
- They are the structural elements of centrioles, cilia, and flagella

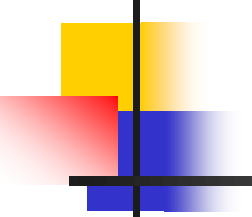


# Centrioles

- They are extremely small tubules (**microtubules**) located in pairs near the nucleus.
- In the cross section, centrioles have a bundles of microtubules arranged in threes in a circle nine pairs (**9+0 pattern**).

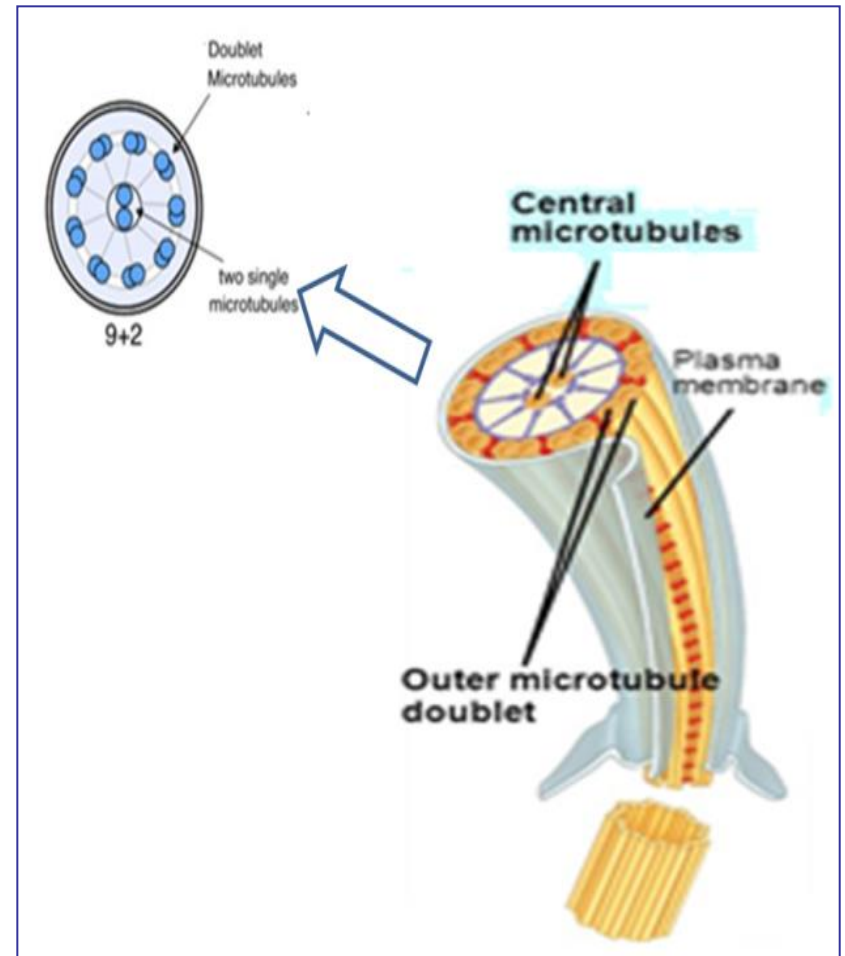


# Cilia and Flagella

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- **Cilia** are short, hair-like projections from cell membranes
  - They are lining the cells of the **respiratory tract** that trap particulate matter and prevents them getting into our lungs
  - **Flagella** are similar to cilia but they are longer

# Cilia and Flagella

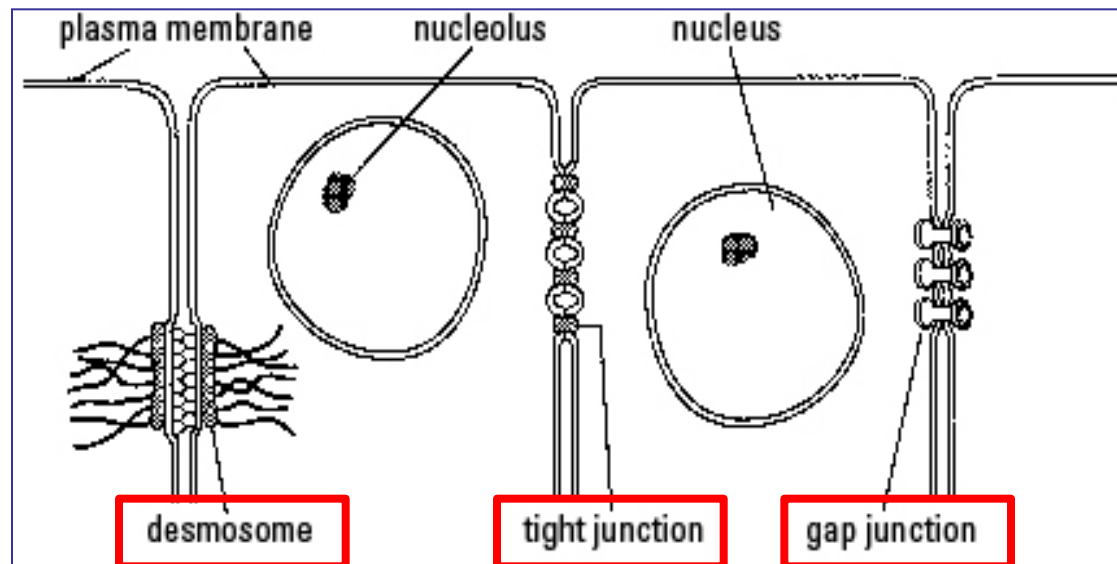
Both cilia and flagella have a bundles of microtubules arranged in nine pairs and an extra central pair of tubules (9+2 pattern).

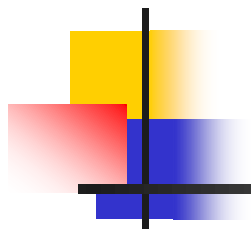




# Different types of cell junctions

1. **Tight junctions:** Proteins from each membrane fuse and thereby seal in the cell contents.
2. **Desmosomes:** Cell to cell links by means of thin filaments.
3. **Gap junction:** the cells are joined by means of protein channels between the membranes across which substances such as salts, sugars, amino acids, vitamins and water may be transported.





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**Thank you**