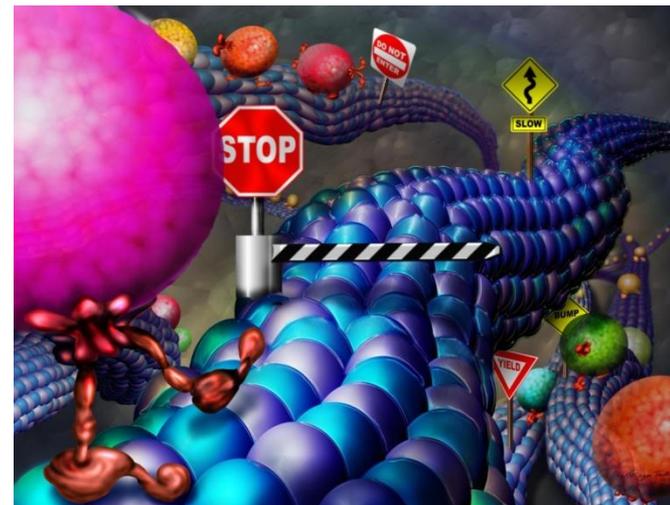
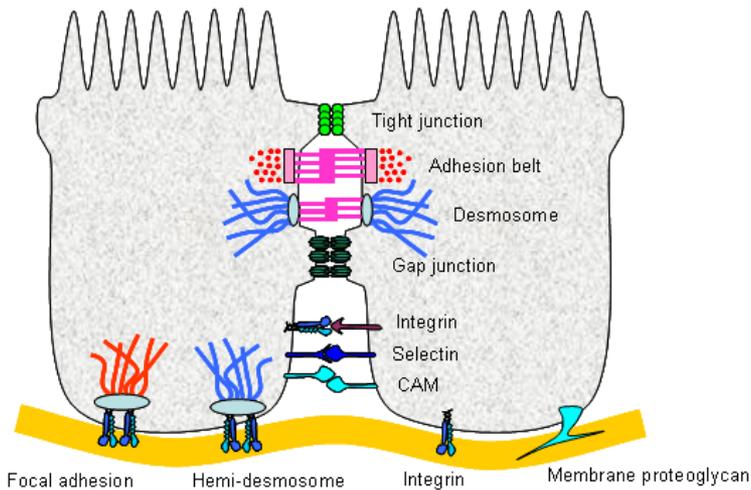
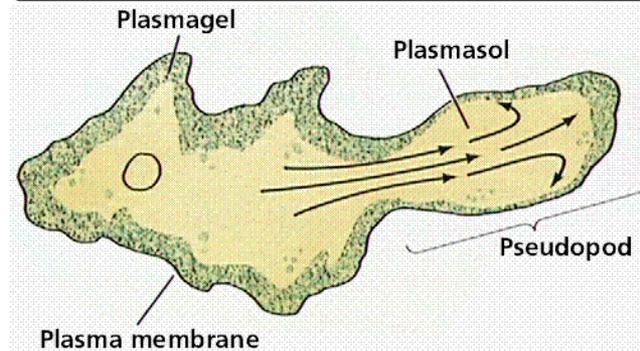
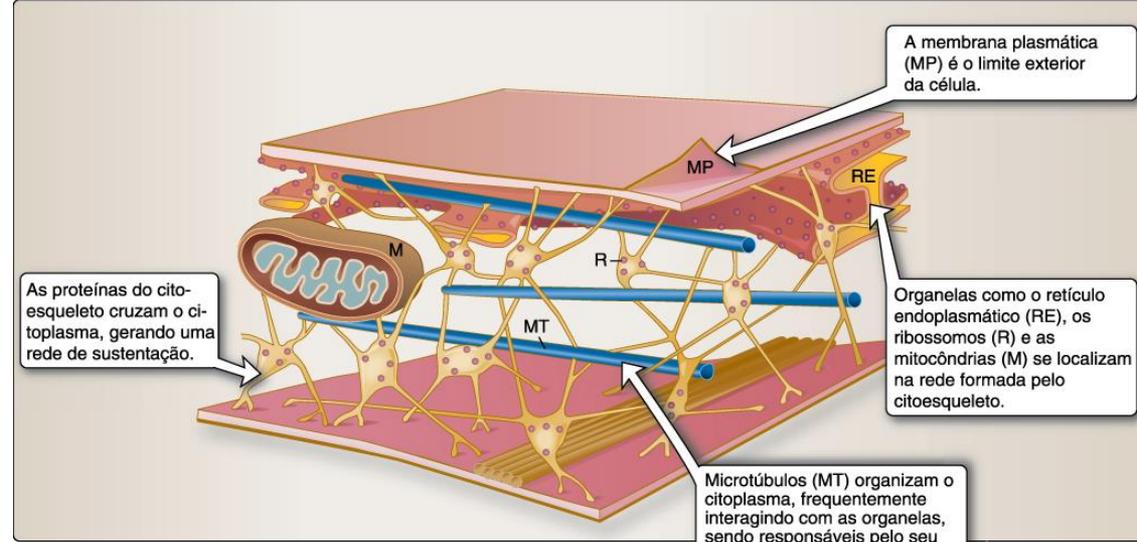
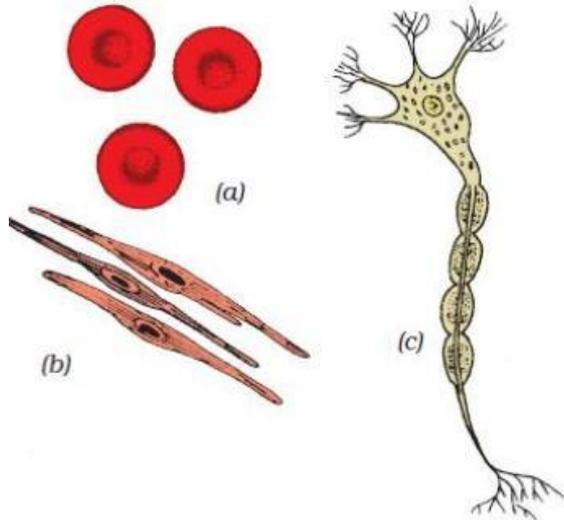


# Citoesqueleto e Transporte Intracelular

- **OBJETIVOS da aula** – os estudantes deverão ser capazes de...
  - **Descrever** os componentes do citoesqueleto (microtúbulos, microfilamentos e filamentos intermediários), suas funções e como são formados
  - **Descrever** as estruturas celulares formadas pelos componentes do citoesqueleto (cílios/flagelos, centríolos/corpusculos basais e microvilos), sua localização e suas funções
  - **Explicar** a atuação dos componentes do citoesqueleto e proteínas associadas (dineína e miosina 2) nos diferentes tipos de movimento celular (com e sem alteração da forma celular)
  - **Descrever** as proteínas motoras (cinesina, dineína e miosina 1) e **explicar** sua interação com o citoesqueleto para o transporte intracelular de vesículas/organelas

# Citoesqueleto

## • Funções gerais

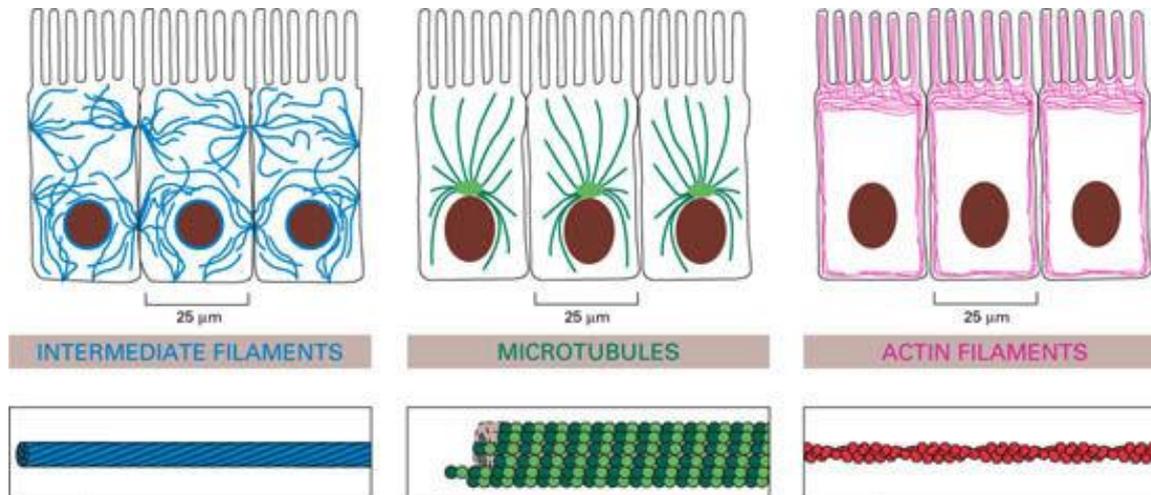


# Citoesqueleto

- **Constituintes**

- **filamentos proteicos**: estáveis ou dinâmicos

- **proteínas associadas**



# Filamentos intermediários

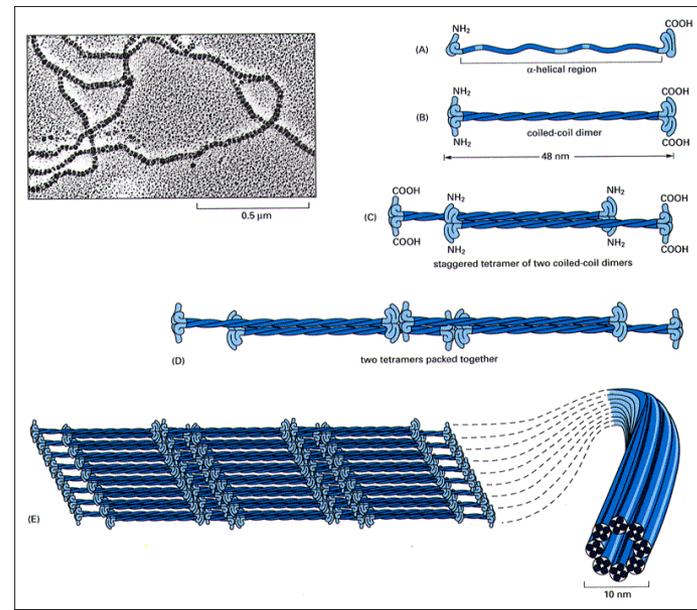
## • Características

- $\emptyset$  intermediário
- $\approx$  cordas
- citoplasma / núcleo / membrana
- tração
  - epiderme
  - células musculares
  - axônios

- **estáveis**
  - **função estrutural**

## – constituição

- monômeros
- proteínas alongadas
- **polimerização espontânea**



# Filamentos intermediários

## • Características

### – pontes proteicas

citoesqueleto

- **microtúbulos**
  - plectina
- **microfilamentos**
  - anquirina

membranas

- **envelope nuclear**
  - receptor B da lamina
- **membrana plasmática**
  - desmoplaquina
    - » **desmosomos**

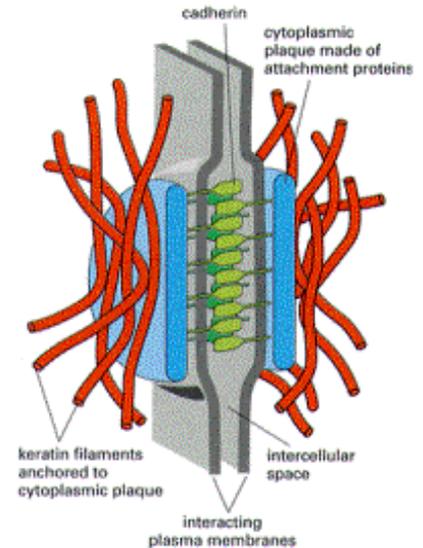
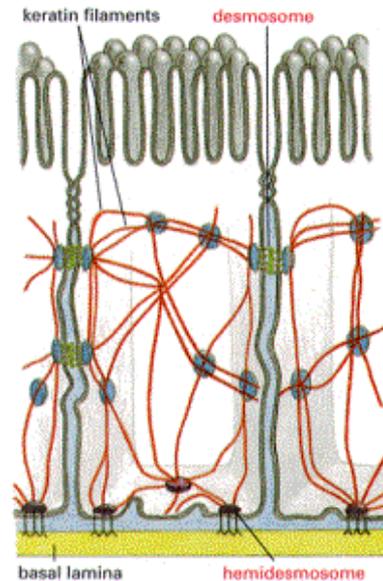
organelas

- **mitocôndrias**
- **ribossomos**

## • Tipos

### – queratinas

- epiteliais
- > 20
  - » citoplasma
  - » **desmosomos / hemidesmosomos**

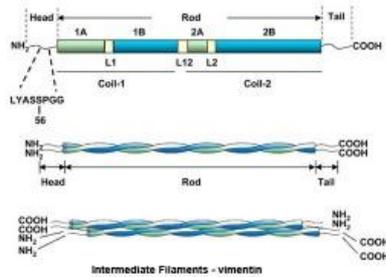


# Filamentos intermediários

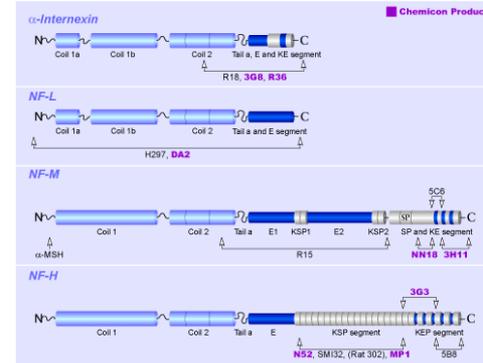
- Tipos

- vimentina

- fibroblastos
    - macrófagos
    - m. liso de vasos sanguíneos

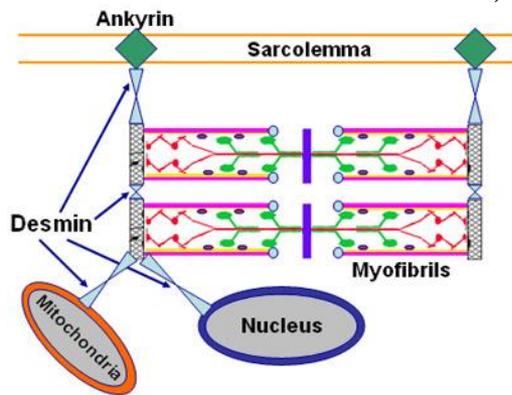


- neurofilamentos

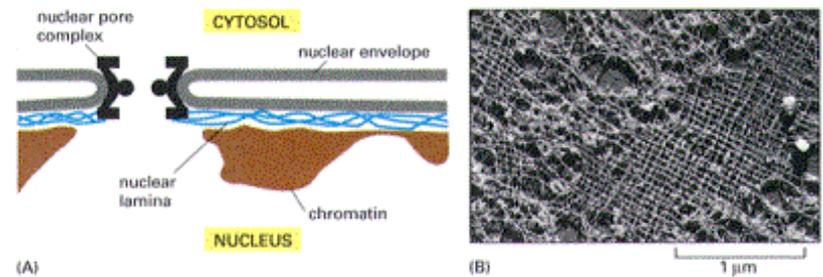


- desmina

- m. estriado; liso



- laminas nucleares (A, B e C)



# Microtúbulos

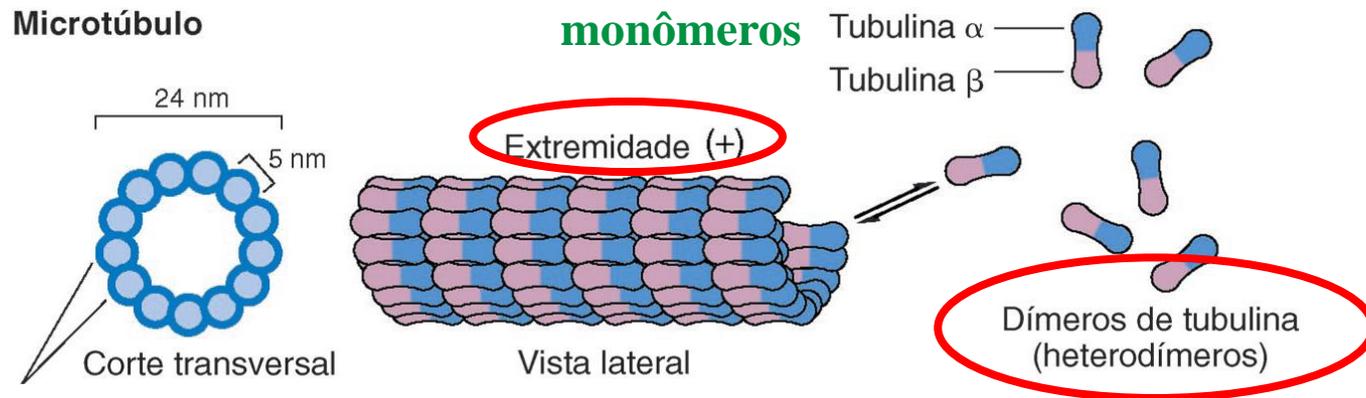
- **Características**

- os mais espessos
- tubos ocos
- citoplasma

- **estabilidade variável**

- citoplasma - **dinâmicos**
- fuso mitótico / meiótico - **temporários**
- **cílios e flagelos** - **estáveis**

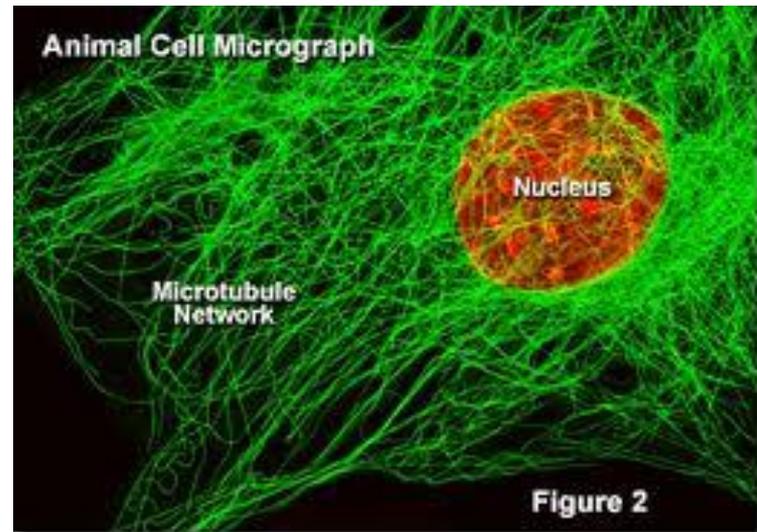
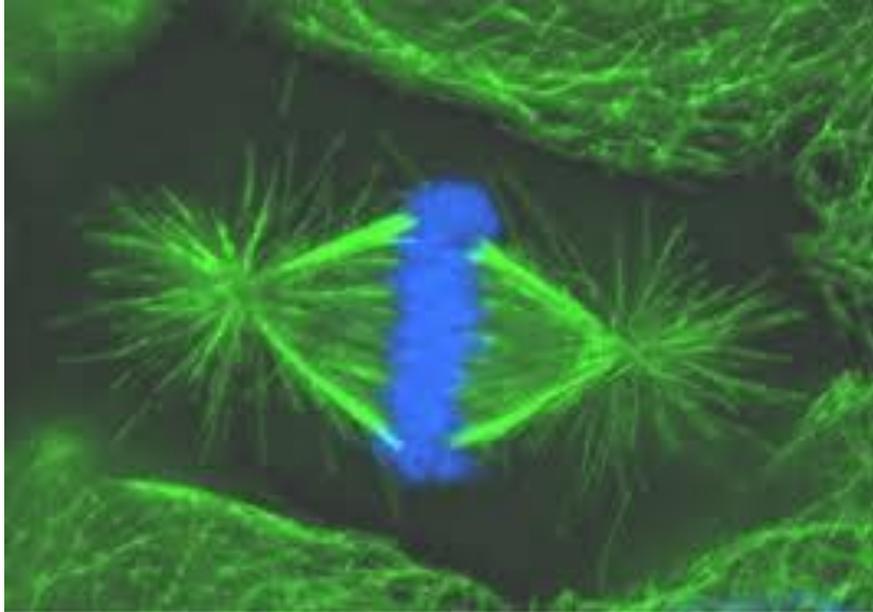
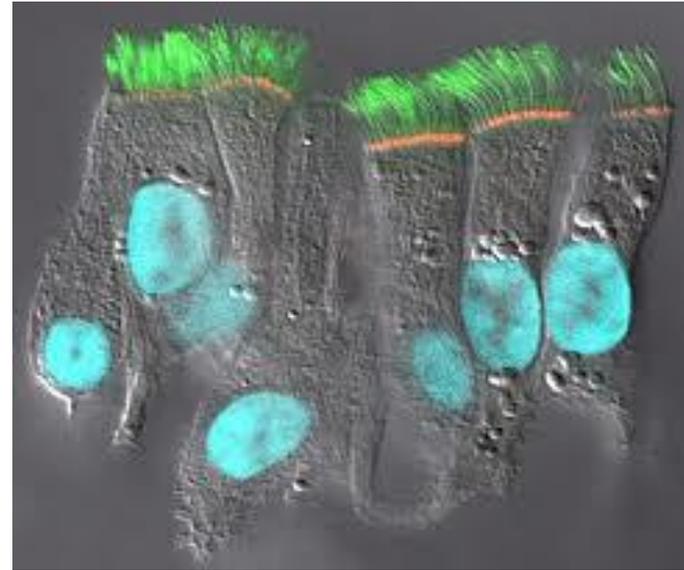
- **constituição**



# Microtúbulos

- **Funções**

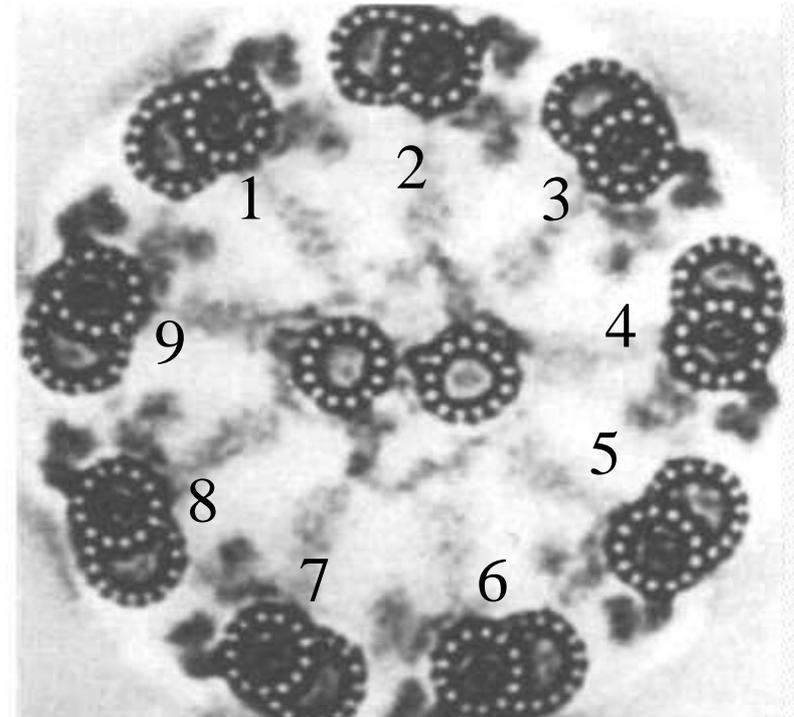
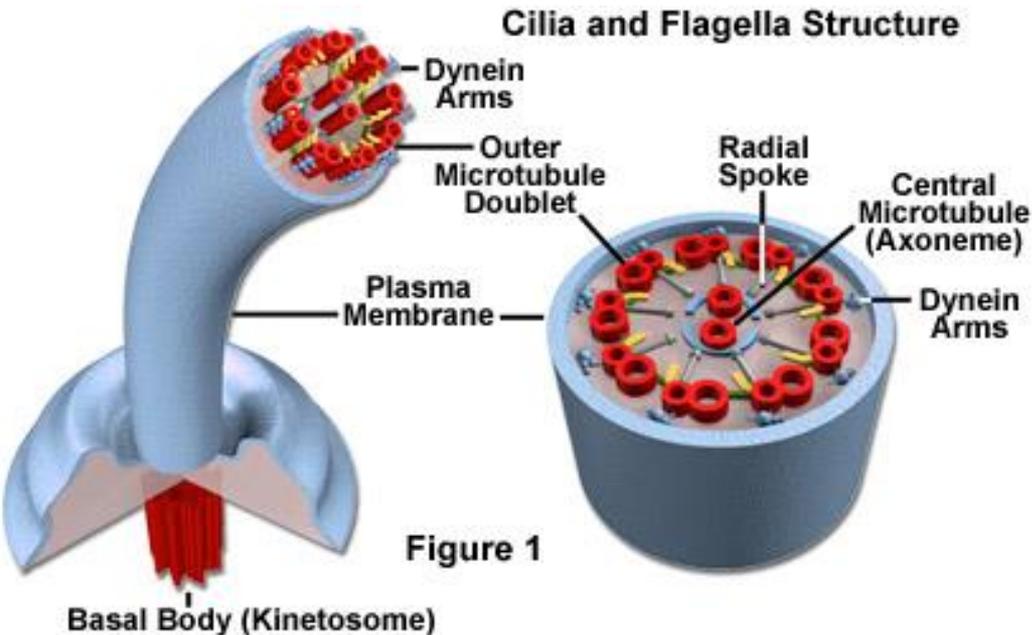
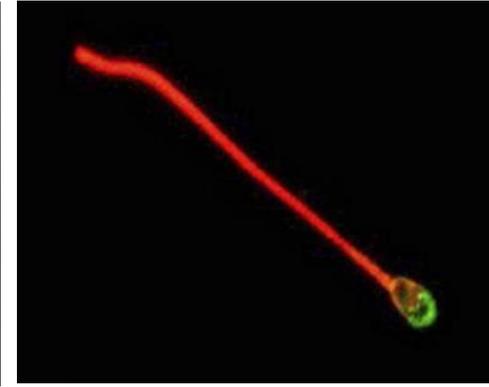
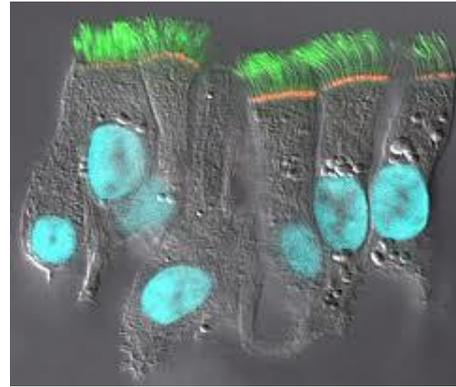
- movimento de cílios e flagelos (**estáveis**)
- transporte intracelular (**dinâmicos**)
- separação cromossomos (**temporários**)
- morfologia



# Estruturas formadas por microtúbulos

- **Cílios e flagelos**

9 pares em círculo + **dineínas**  
1 par central



# Estruturas formadas de microtúbulos

- **Centríolos**



- núcleo e Golgi – 1 par
  - centrossomo

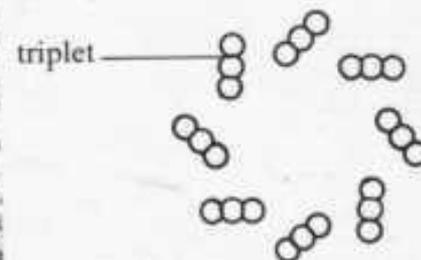
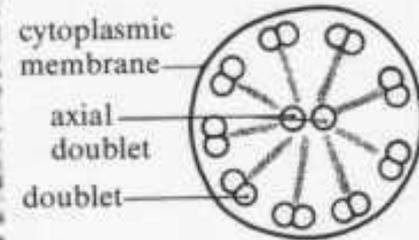
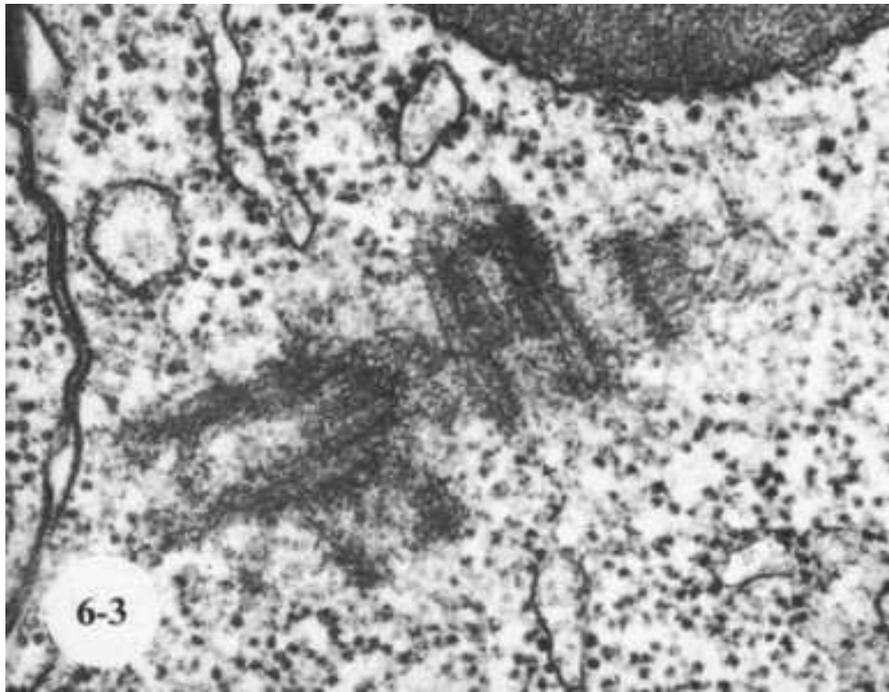
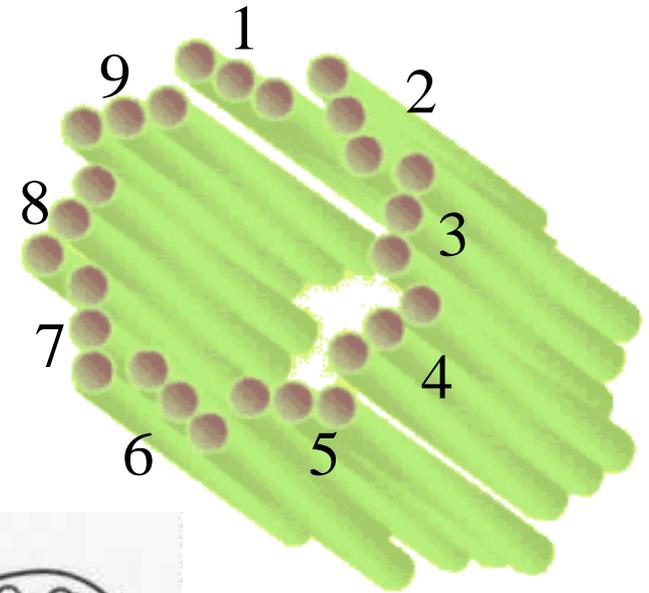
fuso mitótico

nucleação

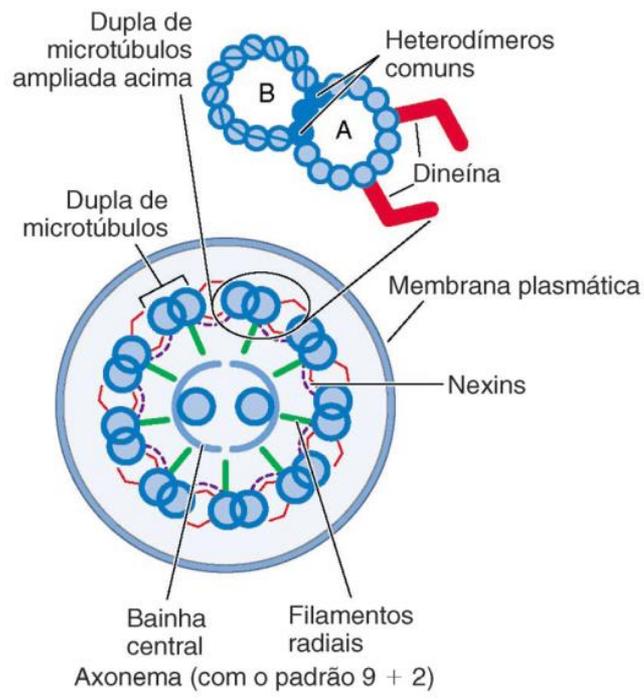
cílios/flagelos

- **Corpúsculos basais**

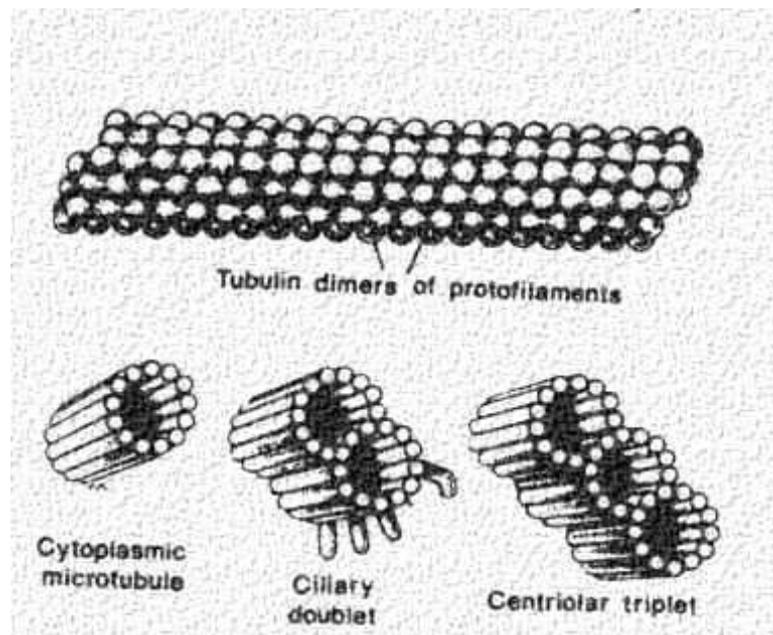
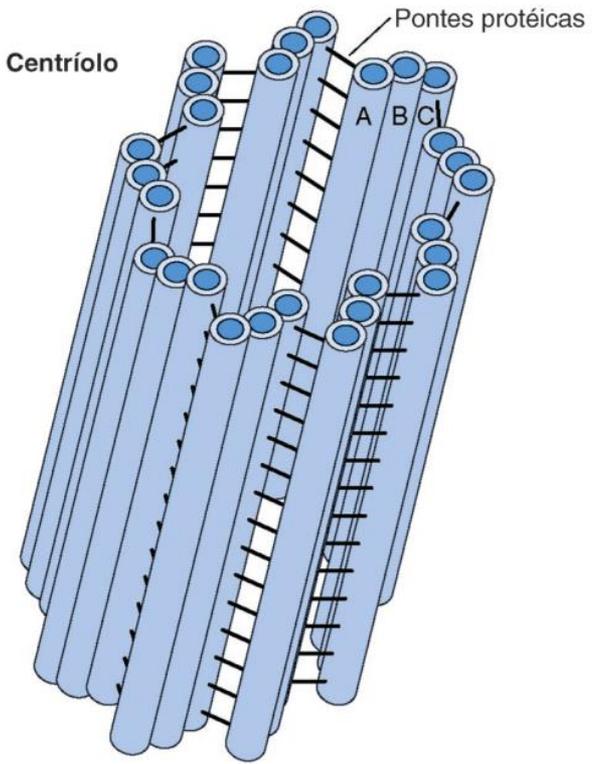
- base cílios/flagelos



**B Cílio**



**C Centríolo**



# Microfilamentos

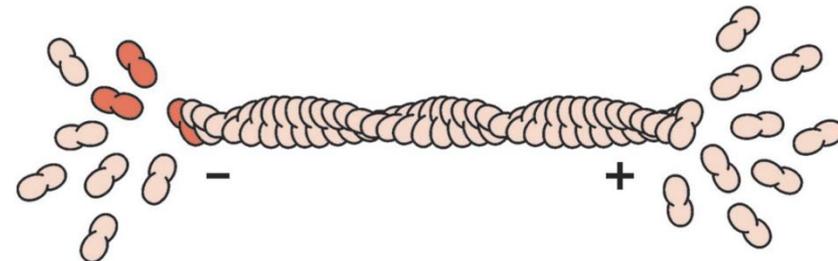
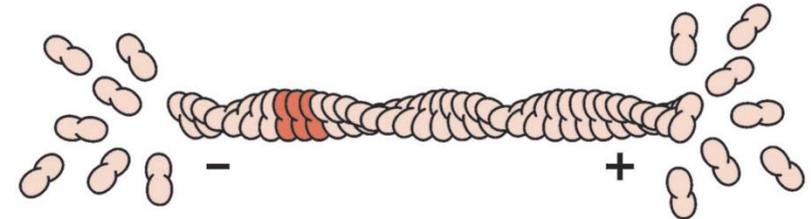
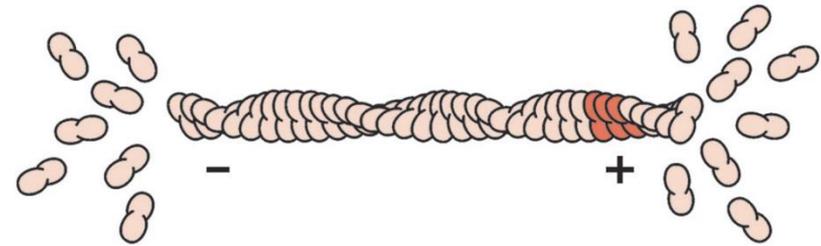
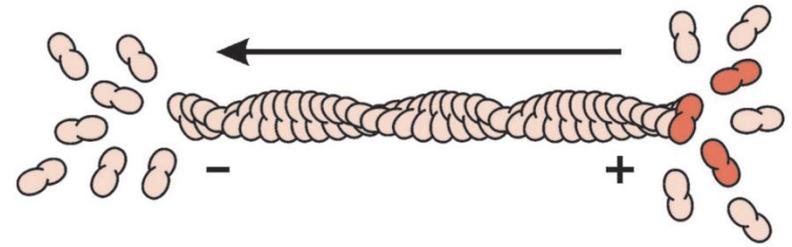
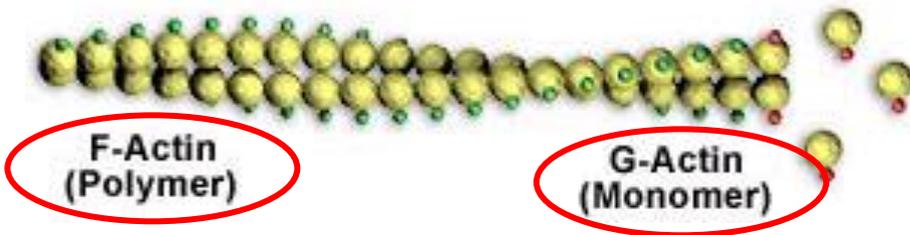
## • Características

- filamentos proteicos + **finos**
- $\approx$  cordão de contas torcido
- citoplasma
- ++++ membrana plasmática

- **córtex celular**

- **estabilidade variável**

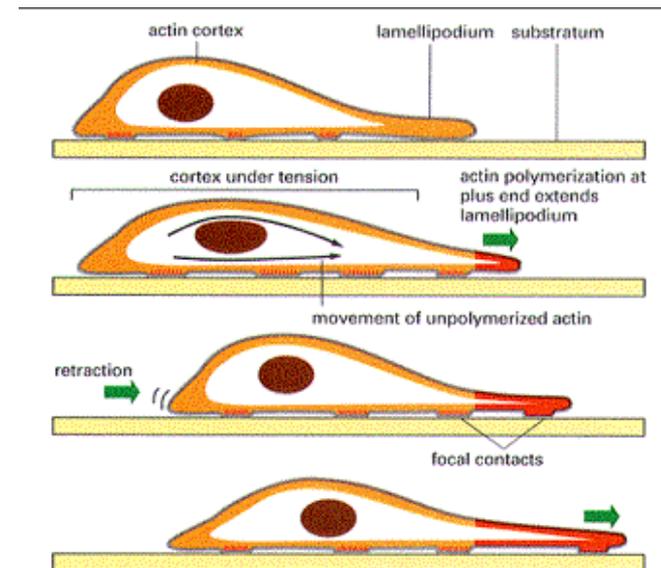
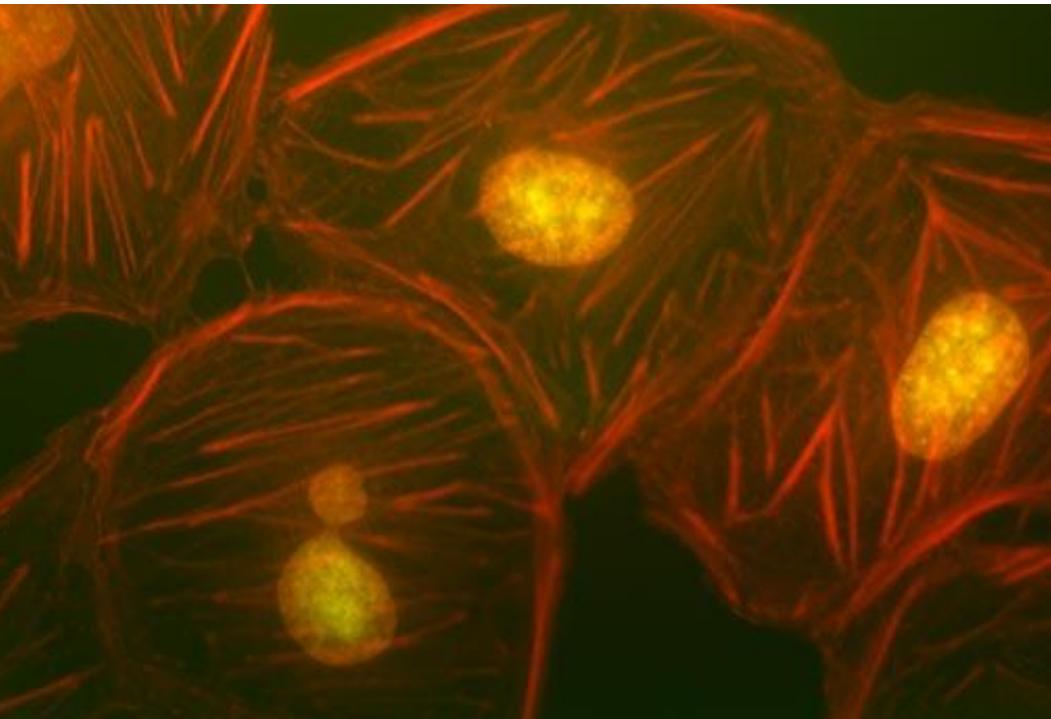
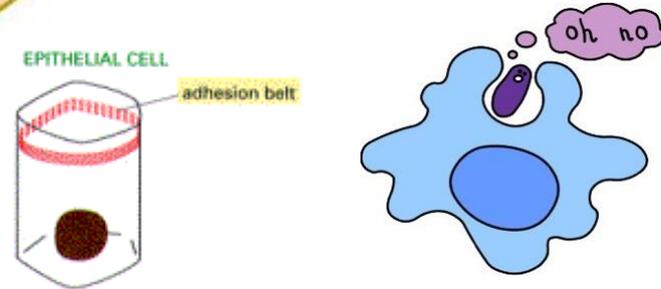
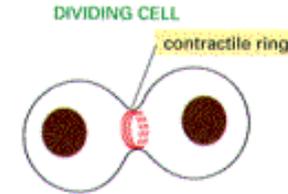
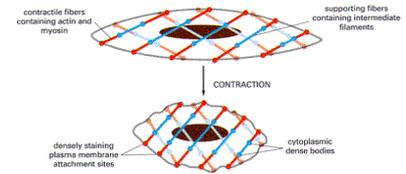
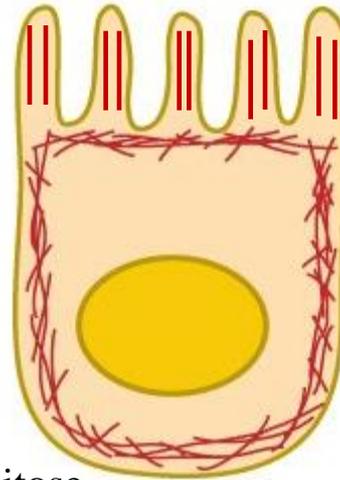
## • constituição



# Microfilamentos

## • Funções

- suporte / sustentação
  - membrana plasmática / **microvilos**
- **movimentos celulares**
  - contração / citocinese / diapedese / fagocitose
- **junções de adesão e oclusão**



# Proteína associada à actina

- **Miosina**

- **Características**

- **Funções**

- **movimento**

- deslocamento intracelular

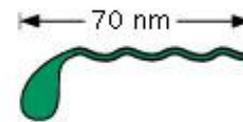
- fagocitose / pseudópodes

- » miosina 1

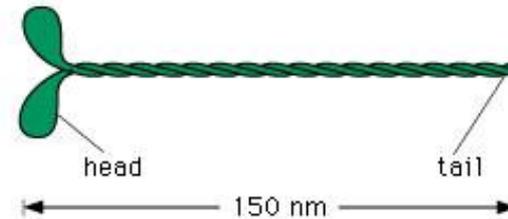
- contração / citocinese

- » miosina 2

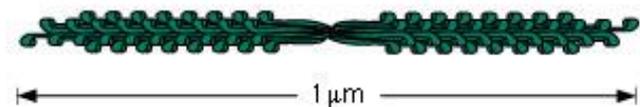
(A) myosin-I **minimiosina**



(B) myosin-II molecule



(C) myosin-II filament



©1998 GARLAND PUBLISHING

**filamento de miosina**

# Movimentos celulares

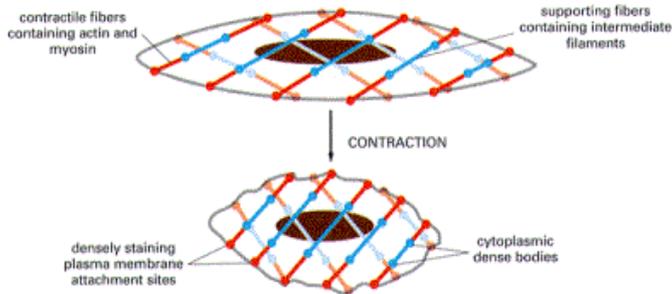
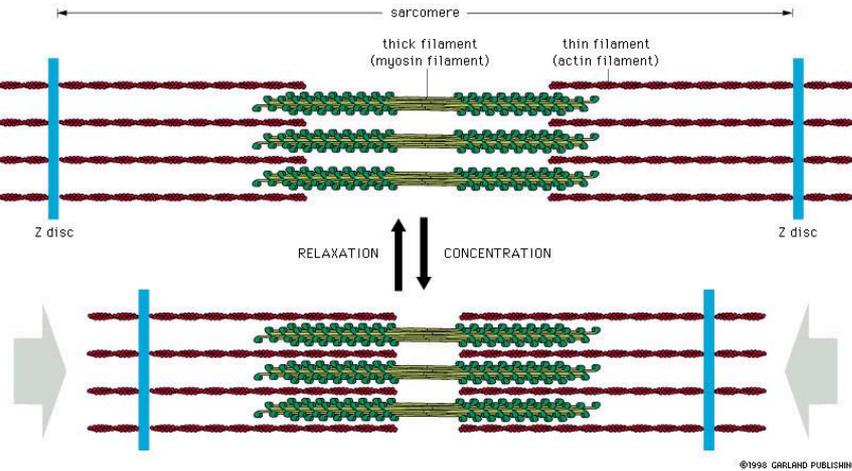
- Tipos de movimentos

- modificam a forma celular

- actina + miosina 2

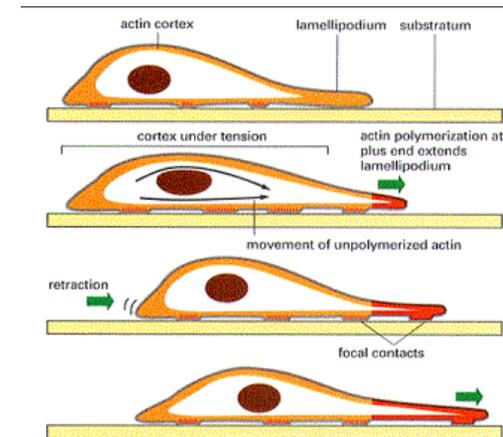
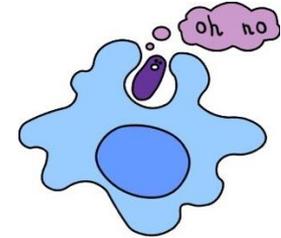
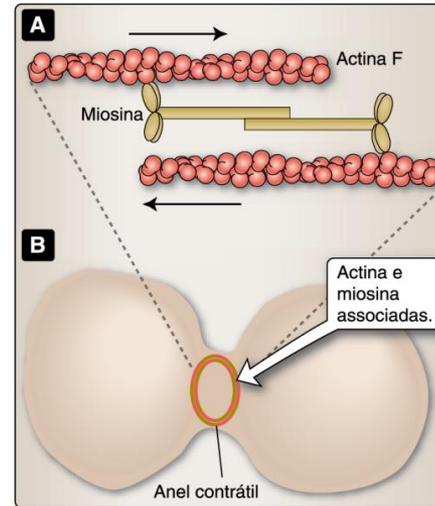
- actina + miosina 1

- musculares
- contração



- não musculares

- citocinese



<https://www.youtube.com/watch?v=vAyofFNUibg>

[https://www.youtube.com/watch?v=I\\_xh-bkiy\\_c](https://www.youtube.com/watch?v=I_xh-bkiy_c)

<https://www.youtube.com/watch?v=CepeYFvqmk4>

<https://www.youtube.com/watch?v=oHDRIwRZRVI>

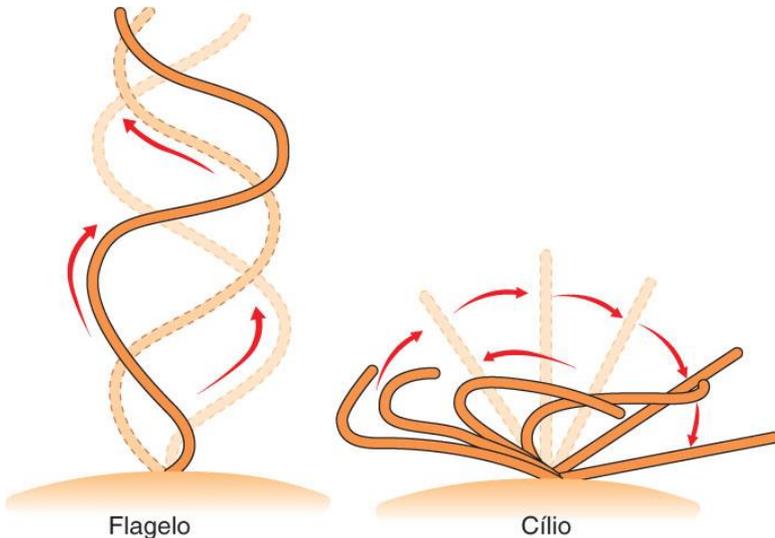
# Movimentos celulares

- Tipos de movimentos

– não modificam a forma

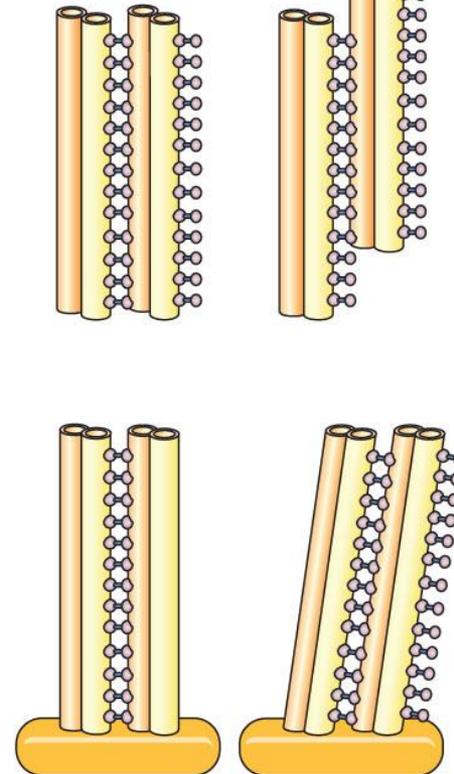
- tubulina + dineína

– cílios e flagelos



Remoção do material que une os pares de microtúbulos

A movimentação resulta em deslizamento



# Movimentos celulares

- Tipos de movimentos

- não modificam a forma

- transporte **intra**celular de vesículas / organelas



- actina (microfilamentos)

- miosina 1

- tubulina (microtúbulos)

- dineína

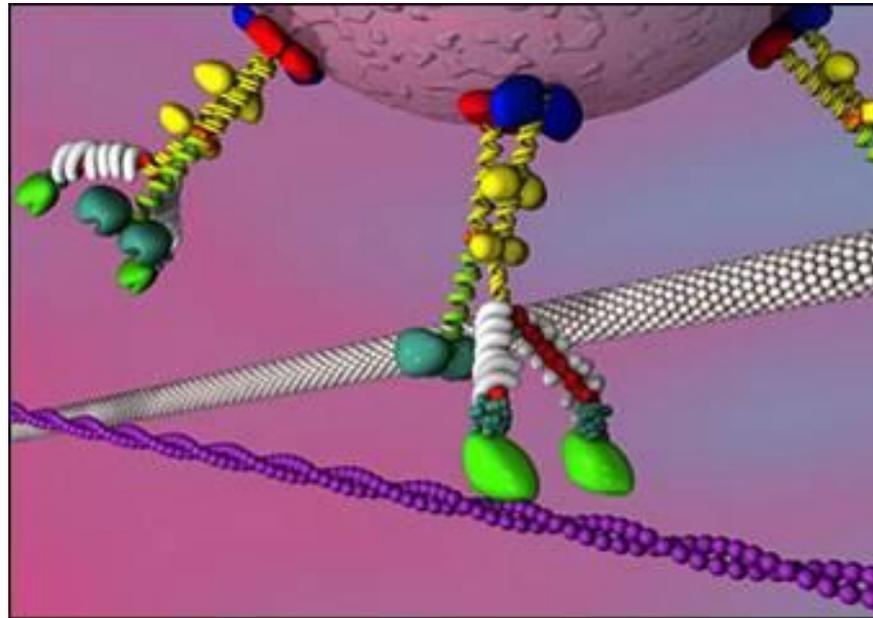
- cinesina

**PROTEÍNAS MOTORAS**

# Transporte intracelular

- **Proteínas motoras**

- microfilamentos de **actina** → **–miosina 1**



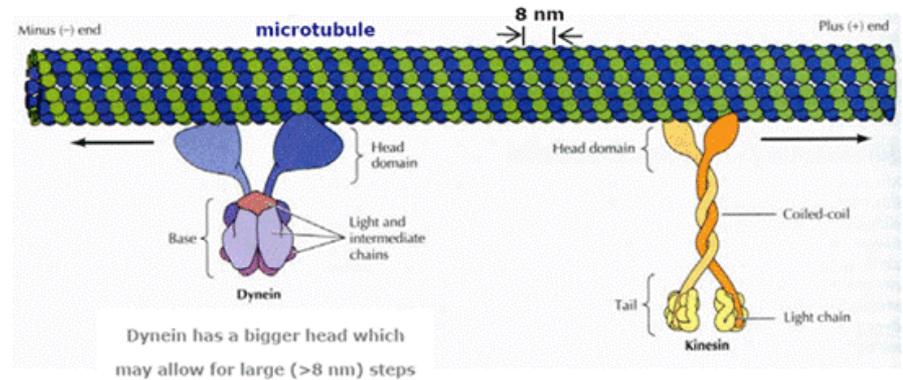
# Transporte intracelular

- **Proteínas motoras**

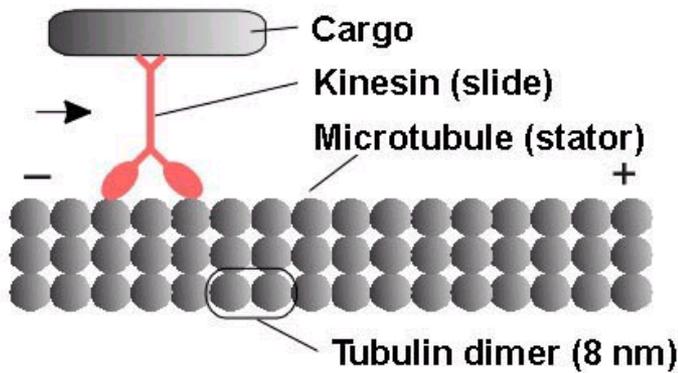
- **microtúbulos**

**cinesina**

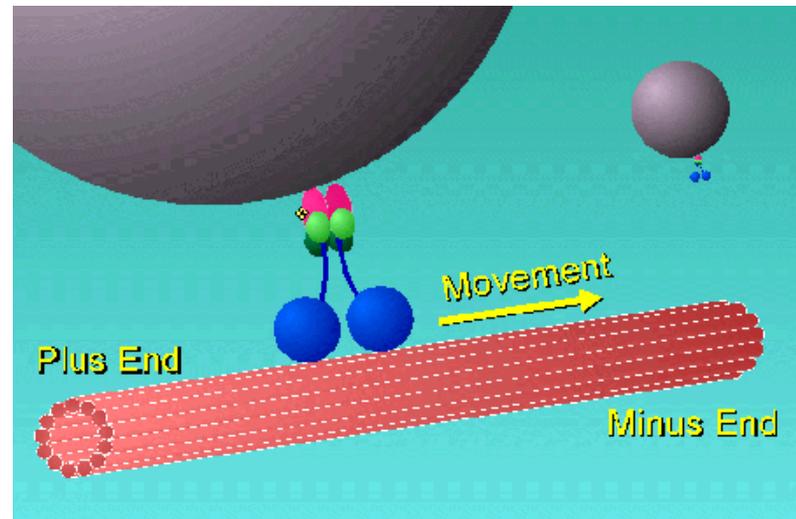
**dineína**



## **cinesina**



## **dineína**



<http://www.youtube.com/watch?v=7sRZy9PgPvg>

<https://www.youtube.com/watch?v=YAva4g3Pk6k>

# Movimentos celulares

## Tipos de movimentos

– **modificam** a forma

– **NÃO modificam** a forma

actina + miosina 2

tubulina + dineína

actina + miosina 1  
 } – cílios e flagelos

**contração de células musculares**

- transporte **intracelular**

actina + miosina 1

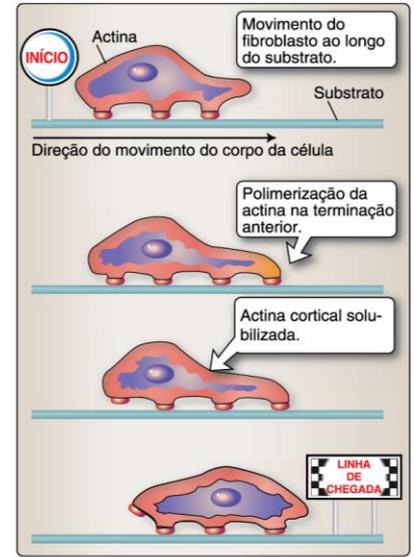
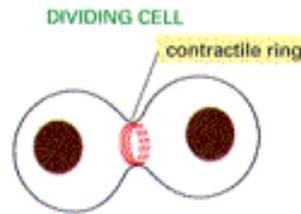
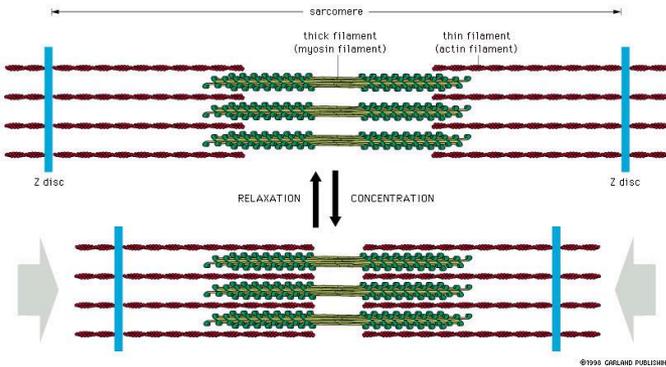
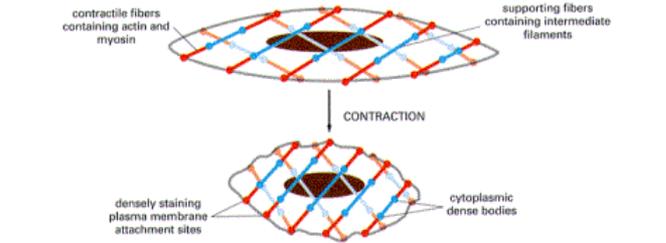
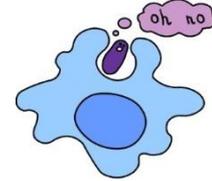
tubulina + dineína

tubulina + cinesina

**proteínas motoras**

**contração de céls não musculares**  
**citocinese (divisão celular)**

**fagocitose**  
**diapedese (pseudópodos)**



# Tarefa para aula de **17/04**

- Leitura referente ao tema Matriz extracelular de acordo com os objetivos no Moodle
- Fazer o teste online