### Части цитоскелета, их структура и функции

таблица из учебника биологии Campbell Biology, 9th Edition, 2012, JB Reece, LA Urry, ML Cain & 3 more

Property	Microtubules (Tubulin Polymers)	Microfilaments (Actin Filaments)	Intermediate Filaments
Structure	Hollow tubes; wall consists of 13 columns of tubulin molecules	Two intertwined strands of actin, each a polymer of actin subunits	Fibrous proteins supercoiled into thicker cables
Diameter	25 nm with 15-nm lumen	7 nm	8–12 nm
Protein subunits	Tubulin, a dimer consisting of $\alpha$ -tubulin and $\beta$ -tubulin	Actin	One of several different proteins (such as keratins), depending on cell type
Main functions	Maintenance of cell shape (compression-resisting "girders")	Maintenance of cell shape (tension- bearing elements)	Maintenance of cell shape (tension- bearing elements)
	Cell motility (as in cilia or flagella)	Changes in cell shape	Anchorage of nucleus and certain other
	Chromosome movements in cell division  Organelle movements	Muscle contraction	organelles Formation of nuclear lamina
		Cytoplasmic streaming	
		Cell motility (as in pseudopodia)	
		Cell division (cleavage furrow formation)	
-	10 μn	n 10 μr	m5 μm
Fluorescence micro- graphs of fibroblasts, a favorite cell type for cell biology studies. In each, the structure of interest has been tagged with fluores- cent molecules. In the first and third micro- graphs, the DNA in the nucleus has also been tagged (blue or orange).	Column of tubulin dimers		
	α β Tubulin dimer	Actin subunit	Fibrous subunit (keratins coiled together)

### Цикл центросомы

рисунок из википедии

Daughter centriole



Daughter centriole

1 Centriole disengagement
The tight link between mother and daughter centrioles is severed. The centrioles are still connected by a loose fibrous structure.

2 Centrosome duplication
The mother and daughter centrioles duplicate themselves—new centrioles form near their proximal ends. This takes place during S-phase, at the same time as when the cell duplicates its DNA. Mother centriole

### Centrosome

Distal ends

Loose fibrous structures

3 Centriole engagement The newly formed centrioles reach full length. Meanwhile, the original daughter centriole becomes a mother centriole, and the link between the two is severed.

### Mother centriole

Tight link Microtubules Proximal ends

#### Procentrioles

Mother centriole

Distal appendages -Subdistal appendages

Daughter centriole (Now a mother centriole)

### **Engaged** pair

(Now daughter centrioles)

Tight link Newly formed centrioles

**Engaged pair** 

## 7 Cell division

The cell divides, and each daughter cell receives one centrosome with a pair of centrioles.

# the centrosome cyc

# 4 Centrosome maturation

The two centriole pairs, now centrosomes, collect additional pericentriolar material.

### Chromosome

Mitotic spindle-

### Mother centrioles

Centrosome

Daughter centrioles

Centrosome

Pericentriolar material (PCM)

# 6 Bipolar spindle formation By metaphase of mitosis, the centrosomes

have moved to opposite sides of the cell.

5 Centrosome separation
During prophase of mitosis, the centrosomes generate spindle fibers between them and move away from each other.