

Characteristics of Eukaryotic Cells

membrane-bound nucleus:
-nucleus enclosed by a nuclear envelope.
-DNA is linear chromosomes
-Contains nucleolus
membrane-bound organelles: ER, golgi, mitochondria, chloroplasts (plant), lysosomes
Mitochondria: cellular respiration and ATP production.
Membrane-bound Compartments: ER and Golgi (protein synthesis, modification, transport)
Complex cytoskeleton
mitosis and meiosis, sexual reproduction
endocytosis and exocytosis
larger size, defined compartments

Intermediate filament

-composed of various rope like proteins
-stable/permanent
-structural support to cell
-Resist tension (mechanical stress)

Extracellular matrix (animals)

-complex network of proteins, carbohydrates
-surrounds/supports cells in tissues
-fibers in a gel like medium
-Cell membrane proteins link the extracellular matrix and the cytoskeleton

Extracellular Matrix functions

-Holds cells together in tissues (structural support)
-physical organization of tissue (ex. Cartilage and bone)
-Filter materials that pass between tissues (prevent the spread of toxins)
-Align cell movements during development, cell growth, tissue repair (cell adhesion)
-Chemical signaling cell-to-cell
-maintain tissue hydration
-Limits volume

Surface area and volume

Cell grows = SA increases
ratio limits cell size
Cell grows = volume increases (faster than SA)
Cell grows = SA:Vol ratio halves (decreases)
More SA: more it will interact with environment
Better to be smaller cells than one larger cell

Microtubule

-Rigid internal skeleton/transport network
-Mechanical support, anchors organelles
-Framework motor proteins move along
-Change length
-Made of tubulin dimer
-Motor proteins: (kinesins and dyneins)
-Form interior of Cilia and flagella (hair-like structures)

Extracellular Matrix components

1. Collagen: fibrous protein
2. Proteoglycans: matrix of glycoproteins, consist mainly of sugars
3. Glycoproteins: proteins, have carbohydrate chains attached to them.

-role in cell adhesion/signaling
-link collagen and proteoglycans together

Cytoskeleton

network of fibrous protein filaments and tubules, can disassemble and reassemble
-Cell membrane proteins link extracellular matrix and cytoskeleton
-cell structure and movement
-Cell shape and support
-Holds organelles within cell
-Intracellular transport
-Anchor cells within tissues
-Cell division

COMPONENTS: microfilament, intermediate filament, microtubule

Microfilament

-thin, flexible filaments
-help cell move/change shape
-support and maintain cell shape
-Interact with other proteins
-Monomer: actin protein subunits

Tight junction

-prevent materials from moving through spaces between cells (animals)
-Fusion of adjacent cell membranes
-Seals intercellular space
-Prevent the passage of ions, water, molecules