Microbial Cell Structure and Function

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1. Cell Wall:

- Provides structural support and protection to the cell.
- Composed of peptidoglycan in bacteria and chitin in fungi.
- Determines the shape of the cell.

2. Cell Membrane:

- Regulates the passage of substances in and out of the cell.
- Contains proteins for transport and cellular recognition.
- Site of energy production in microbial cells.

3. Cytoplasm:

- Gel-like substance inside the cell where cellular processes occur.
- Contains ribosomes for protein synthesis and nucleoid region (DNA).
- Involved in metabolism and nutrient storage.

4. Flagella:

- Long, whip-like structures for cell motility.
- Allow microbes to move towards nutrients or away from harmful substances.
- Composed of protein flagellin.

5. Capsule:

- Protective layer outside the cell wall.
- Helps microbes evade immune system detection.
- Contributes to the pathogenicity of some microbes.

6. Plasmids:

- Small, circular DNA molecules separate from the chromosomal DNA.
- Carry genes that can confer advantages such as antibiotic resistance.
- Can be transferred between microbial cells through horizontal gene transfer.

7. Ribosomes:

- Sites of protein synthesis in the cell.
- Composed of RNA and protein molecules.
- Different in size and structure between prokaryotic and eukaryotic cells.

8. Nucleus (in eukaryotic microbes):

- Contains the genetic material (DNA) of the cell.
- Surrounded by a nuclear membrane.
- Site of transcription and replication of DNA.

Understanding the structure and function of microbial cells is essential in studying their biology, interactions with hosts, and developing strategies for disease control and biotechnological applications.