10–1 Cell Growth

Limits to Cell Growth

The larger a cell becomes, the more demands the cell places on its DNA. In addition, the cell has more trouble moving enough nutrients and wastes across the cell membrane.

The rate at which food, oxygen, water, and wastes are moved in and out of the cell is dependent on the surface area of the cell.

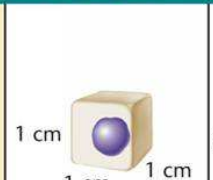
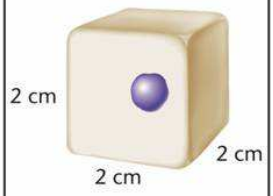
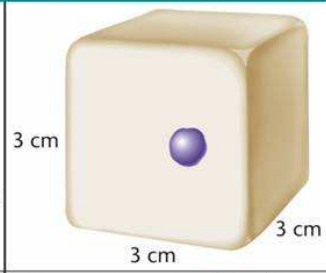
The rate at which food, oxygen and water are used and waste is produced depends on the cell's volume.

Ratio of Surface Area to Volume

As the length of a cell increases, its volume increases faster than the surface area.

The decrease in the cell's ratio of surface area to volume makes it more difficult for the cell to move needed materials in and waste products out quickly enough for the cell to survive.

Ratio of Surface Area to Volume in Cells

Cell Size			
Surface Area (length x width x 6)	1 cm x 1 cm x 6 = 6 cm^2	2 cm x 2 cm x 6 = 24 cm^2	3 cm x 3 cm x 6 = 54 cm^2
Volume (length x width x height)	1 cm x 1 cm x 1 cm = 1 cm^3	2 cm x 2 cm x 2 cm = 8 cm^3	3 cm x 3 cm x 3 cm = 27 cm^3
Ratio of Surface Area to Volume	6 / 1 = 6 : 1	24 / 8 = 3 : 1	54 / 27 = 2 : 1

Division of the Cell

Before it becomes too large, a growing cell divides forming two "daughter" cells.

The process by which a cell divides into two new daughter cells is called cell division.