Membrane Proteins [and Fats]- Bumpy Services

We spoke a little about the cell membrane and its structure. We also discussed the lipid bilayer. That lipid bilayer is not smooth around the entire cell. You will find thousands (millions?) of proteins throughout the cell membrane. Some are just on the inside of the cell and some on the outside. A special few cross the cell membrane. Each type of protein has a specific purpose. There are also embedded proteins in the other membranes for cell organelles.

A Tale of Two Types

There are two types of proteins in the cell membrane -- peripheral proteins and integral proteins. As you can guess from the name, integral membrane proteins are permanently connected to the cell membrane. They have large sections embedded in the hydrophobic (middle) layer of the membrane. Peripheral proteins are not bonded as strongly to the membrane. They may just sit on the surface of the membrane, anchored with a few hydrogen (H) bonds.

Integral proteins are the hard workers of the cell membrane. Some integral proteins cross the membrane and act as pathways for ions and molecules. Some of the ion movement may not require work (passive transport), but other processes require a lot of energy and pumping action (active transport). When you look at the whole membrane, there are very few integral proteins when compared to the number of peripheral ones.

Discovering Structures

This structure of the membrane with embedded proteins and a lipid bilayer was discovered in the early 1970's. Two scientists, Singer and Nicolson, first developed the theory of the "Fluid Mosaic Model." They used several different methods, such as the freeze-fracture technique and electron micrographs, to look closely at the cell membrane and its structure. They identified the proteins that sat on the surface, were sunk into the membrane, and the others that crossed the membrane.