This week, I would like to take a break from human anatomy and move on to something different: plant cell anatomy. I know botany is not everyone’s cup of tea; I am included in that category. It may not be the most exciting stuff, but you never know when you may need it. Plus, it is never a bad thing to expand one’s knowledge.

**BASIC PLANT CELL ANATOMY**

In many ways, plant cells are a lot like ours. Both are eukaryotes and have a lot of the same organelles. There are a few differences, starting with the presence of a cell wall.
The most characteristic feature of plant cells is their rigid cell wall. Human cells only have a cell membrane. The cell wall is primarily made of cellulose, which is composed of glucose monomers. As the outermost layer of the cell, it has many important functions. It prevents the plasma membrane from bursting as a result of water uptake and it determines the overall cell shape and texture.

Furthermore, the cell wall also prevents dangerous pathogens from entering the cell. The cell is able to process information from the surface of the pathogen. This causes the cell to produce antibiotics called phytoalexins, which are deadly to the pathogens that wish to break in.

There are two types of cell walls: primary and secondary. Primary cell walls are found in cells that divide and in metabolizing cells. Secondary cell walls are found in cells that need added strength, which includes cells that have anything to do with water or structural support. Small strands called plasmodesmata are also found going through the cell wall.

Plasmodesmata connect the cells and allow transport of nutrients. Cell walls also have a region called the middle lamella, which holds adjacent cells together.

Underneath the cell wall is the protoplast, which is the term for the rest of the stuff in the cell, such as the cytoplasm and organelles. The cytoplasm is made of two parts: the cytosol and plasma membrane.

Cytosol is the portion that contains the organelles and the plasma membrane is the outer portion. The plasma membrane regulates what goes in and out of the cell, modulates cell growth and assembles the cell wall. Inside the cytosol are various components. The largest are the vacuoles, which are sacs filled with fluid. They are responsible for the breakdown of macromolecules and storage of metabolites. Another organelle unique to plant cells is chloroplasts, which are the sites for photosynthesis. They also store starches and contain chlorophyll, which gives plants their green color. Plants also have chromoplasts, which make and store food. The remaining organelles are the same as those found in our cells. Of course, there is the nucleus.

The nucleus contains the DNA of the cell and controls actions of the cell. The endoplasmic reticulum, or ER for short, has two sections: rough ER and smooth ER. The rough ER is covered with ribosomes, which synthesize proteins. The smooth ER has no ribosomes and handles synthesizing lipids.

Up next are the mitochondria. The mitochondria have their own DNA and are the site for cellular respiration, which ultimately produces ATP. Then there is the Golgi apparatus, which is usually referred to as just the Golgi. The Golgi is made of sacs and packages proteins before they are secreted and sent to be used in other areas of the cell.

Small organelles called peroxisomes break down fats using oxidative enzymes. Hydrogen peroxide is produced as a byproduct. Finally, there are the non-membranous organelles: cytoskeleton, microtubules and microfilaments. The cytoskeleton consists of microtubules, protein filaments and microfilaments. The cytoskeleton aids in cell movement and division.
Microtubules are shaped like cylinders and have a few different functions. They direct chromosome movement, removal of cellulose and directing the movement of the Golgi vesicles.

Finally, there are the microfilaments. Microfilaments are made from actin, which is a type of protein. Microfilaments move the organelles around and also participate in cytoplasmic streaming (movement of cytosol). Now that the basic cell anatomy is out of the way, let's talk about the three types of plant cells.

**TYPES OF PLANT CELLS**

There are only three types of plant cells versus the many, many kinds in humans. The types of plant cells are parenchyma, collenchyma and sclerenchyma. They are classified based on their cell walls.

**Parenchyma** and **collenchyma** makes up ground tissue. Parenchyma cells are found in the cortex and pith of stems, roots and the mesophyll of leaves. They are considered living at maturity, so they are capable of cell division (meristemic). Some have secondary cell walls, but the majority only has primary cell walls. Parenchyma cells with primary cell walls have roles in wound healing, nutrient storage, photosynthesis and food/water transport. They appear as vertical strands. The term parenchyma is also used in reference to humans. In humans, parenchyma is the name for the functioning part of an organ.

Like parenchyma cells, collenchyma cells are also living at maturity, so they are also meristemic. They are elongated cells that are used for structural support. Collenchyma cells are found in the shoots and leaves of the plant.

The final type of plant cell is called **sclerenchyma**. Sclerenchyma cells are used for structural support and they are very rigid. Unlike the previous two types of cells, sclerenchyma is not living at maturity. There are two types of sclerenchyma cells: sclereid and fibres. If you have ever bitten into a pear, you are already familiar with sclereid cells. Sclereid cells, or stone cells, give pears their texture. They are also found in apple cores and cherries. They are very thick due to lignin. Fibres, however, are much thinner. They are found in the xylem and phloem of plants. Xylem is used for water transport and phloem transports sugar throughout the plant.

And there you have it, the essentials of the anatomy of a plant cell and the types of plant cells.