**NGSS MS-LS1-2** (Students who can demonstrate an understanding of this concept can develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function).

**More than just the sum of its parts: An investigation into cell structure and function**

**Background**

Cells are the tiny workhorses that hold all of the biological machinery necessary for life. There are numerous types of cells, each of which perform very different functions. Have you ever thought about what is inside of a cell? Or what cells really do? Today we’ll be taking a much closer look at these questions while learning about the structure and function of cells.

There are two main groups of cells – prokaryotic cells and eukaryotic cells. Let’s take a look at these two cell groups.

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| **Characteristic** | **Prokaryotes** | **Eukaryotes** |
| Example of Cell | Macintosh HD:Users:christinemitchell:Downloads:sci_203_2_review_visual2.jpg | Macintosh HD:Users:christinemitchell:Downloads:0.jpg |
| Organisms | Bacteria | Protists, Fungi, Plants, Animals |
| Nucleus | No membrane bound nucleus | Membrane bound nucleus |
| Cell Wall | Made of peptidoglycan | If present, made of cellulose or chitin |
| Organelles | No membrane bound organelles | Membrane bound organelles |
| DNA | Single circular chromosome | Multiple linear chromosomes |
| Number of Cells | Always unicellular | Can be unicellular or multicellular |

Think of the human body for a moment. We have one body with many organs inside, each performing a different function. Eukaryotic cells have a similar structure; each cell has many organelles inside that all perform unique tasks. Let’s take a moment to learn about these organelles.

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| Organelle | Example | Function |
| Cell Membrane | Macintosh HD:Users:christinemitchell:Downloads:cell-membrane-1-728.jpg | Controls what comes into and out of a cell; found in plant and animal cells |
| Cell Wall | Macintosh HD:Users:christinemitchell:Downloads:cellwall.gif | Ridged outer layer of a plant cell |
| Cytoplasm | images.jpeg | Gel-like fluid where the organelles are found  |
| Mitochondria | organelles-and-their-basic-functions.png | Produces the energy a cell needs to carry out its functions |
| Lysosome | organelles-and-their-basic-functions.png | Uses chemicals to break down food and worn out cell parts |
| Vacuole | organelles-and-their-basic-functions.png | Stores food, water, wastes, and other materials |
| Golgi complex | organelles-and-their-basic-functions.png | Receives proteins & materials from the ER, packages them, & distributes them |
| Chloroplast | organelles-and-their-basic-functions.png | Captures energy from the sunlight and uses it to produce food in a plant cells |
| Endoplasmic Reticulum (ER) | organelles-and-their-basic-functions.png | Has passageways that carry proteins and other materials from one part of the cell to another |
| Ribosome | organelles-and-their-basic-functions.png | Assembles amino acids to create proteins |
| Nucleus | organelles-and-their-basic-functions.png | Contains DNA, which controls the functions of the cell and production of proteins |
| Nucleolus | organelles-and-their-basic-functions.png | Found inside the nucleus and produces ribosomes |

**Activity**

Take some time to familiarize yourself with the organelles of eukaryotic cells. Today you will be creating a diagram of a cell that will help you remember the organelles and their functions.

You can have your students draw the cell diagram or use construction paper to create the diagram.

*Make a diagram of a plant or animal cell and be sure to include all of the appropriate organelles. Next to each organelle add a picture that symbolizes the function of that organelle (e.g. next to the nucleus you may choose to draw a brain because the nucleus is the control center of a cell).*

A great follow up to this activity is to discuss what your students chose to symbolize the functions of each of the organelles. Have your students talk to the class about what they chose and why.