GET TO KNOW YOUR KIDNEYS

PROMISE

SANFORD RESEARCH

STOP AND THINK!

How does your body make urine?

Where does it come from?

Why is it yellow?

How come sometimes you have a lot and sometimes you have a little?

Name: _____

PROMISE SANFORD RESEARCH

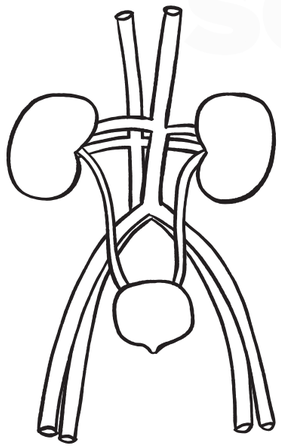
GET TO KNOW YOUR KIDNEYS

Answer the questions below as you progress through the Get to Know Your Kidneys lesson and slideshow.

1. How does your body make urine?

2. List all the waste products your body makes.

3. Draw arrows from the words to the corresponding areas on the diagram.



BLOOD VESSELS

KIDNEYS

URETERS

BLADDER

What are all the waste products your body makes?

Consider all these questions and record your thoughts in your lab notebook!

THREE WASTE SYSTEMS

RESPIRATORY

Your lungs breathe out carbon dioxide, which is a waste product from breaking down sugar.

DIGESTIVE

Your stomach and intestines take the food you eat and take all the nutrients out. The rest exits the body as feces.

EXCRETORY

Your kidneys take all of the waste out of your blood and sends it out of the body as urine.

Name: _____

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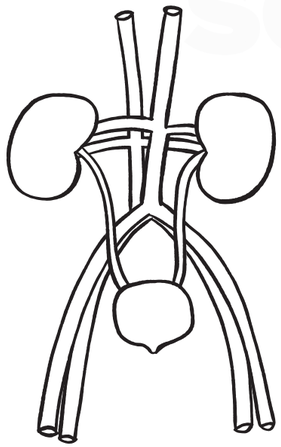


BLOOD VESSELS

KIDNEYS

URETERS

BLADDER

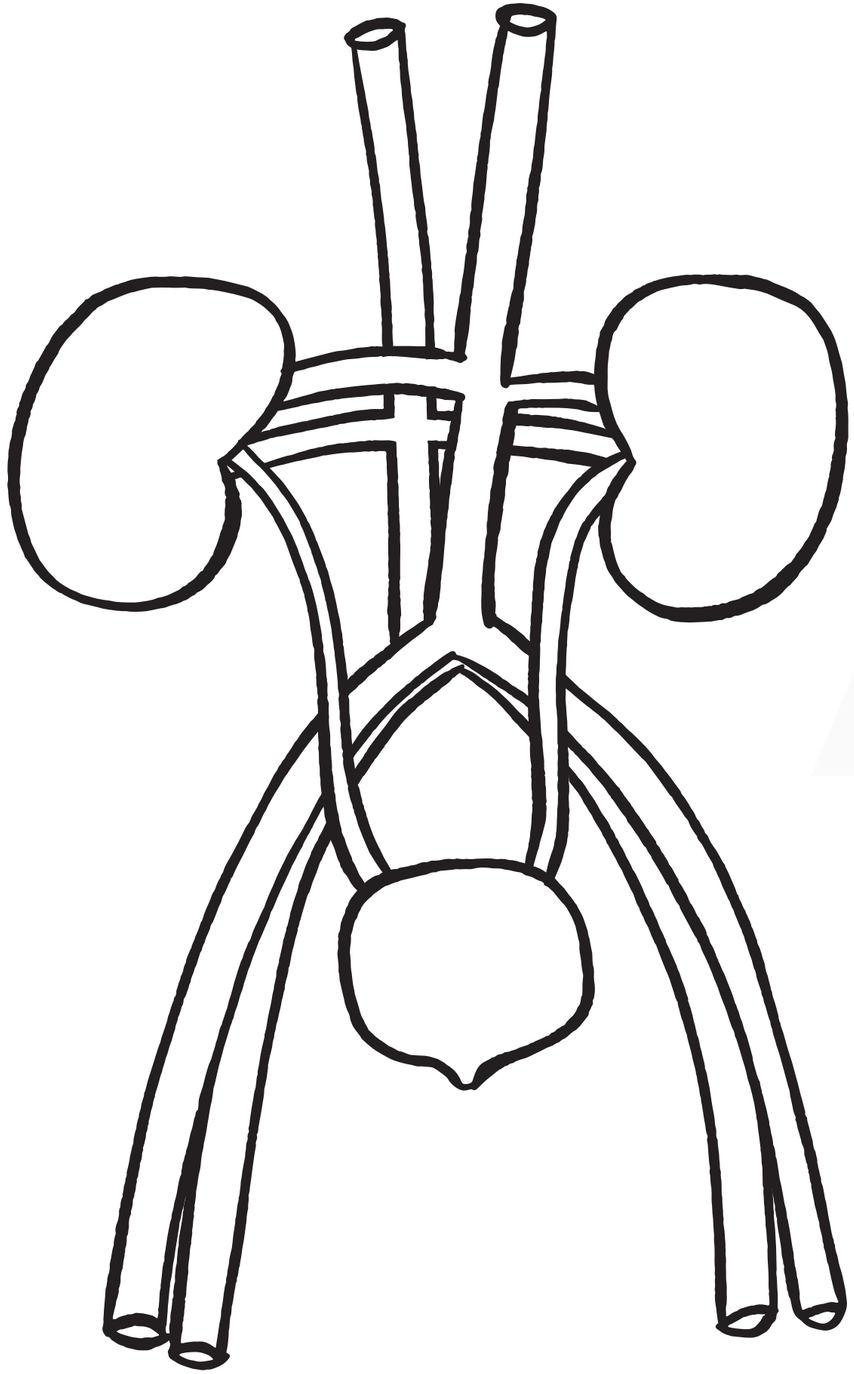
Look back at your waste list.

- Underline the waste products from the **respiratory** system.
- Put a box around the waste products from the **digestive** system.
- Put a circle around the waste products from the **excretory** system.

THE EXCRETORY SYSTEM

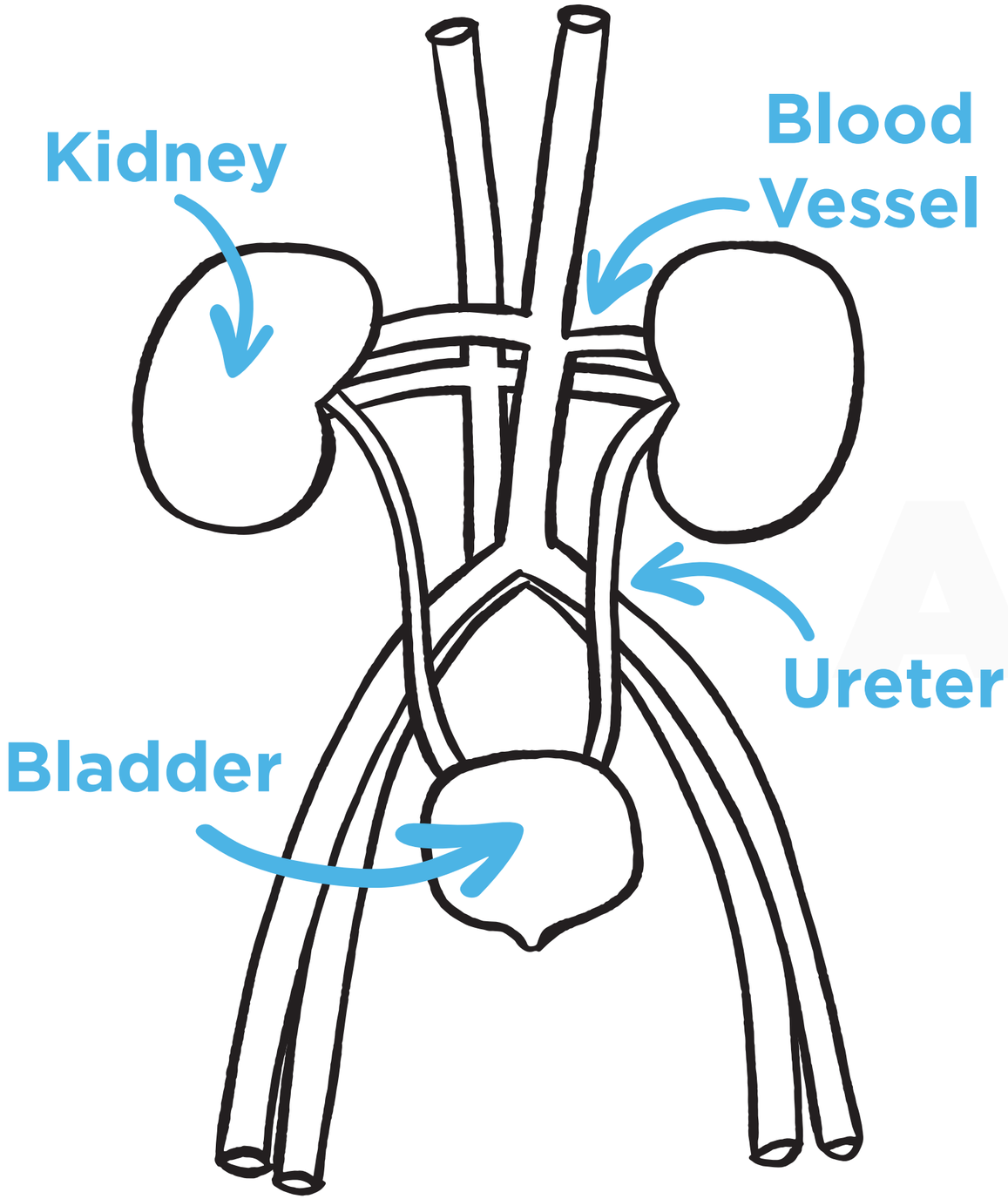
The excretory system consists of 4 major parts.

- **Blood Vessels** - These veins and arteries circulate blood around your body. They connect to the kidney.
- **Kidney** - You have 2 of them. Each one can filter 37 gallons of blood each day!
- **Ureters** - Each kidney makes urine and sends it down the ureter, which is a small tube connected to the bladder.
- **Bladder** - This holds the urine until it's ready to leave. The urine leaves through the urethra.



CAN YOU LABEL THE DIAGRAM?

- Blood Vessels
- Kidneys
- Ureters
- Bladder



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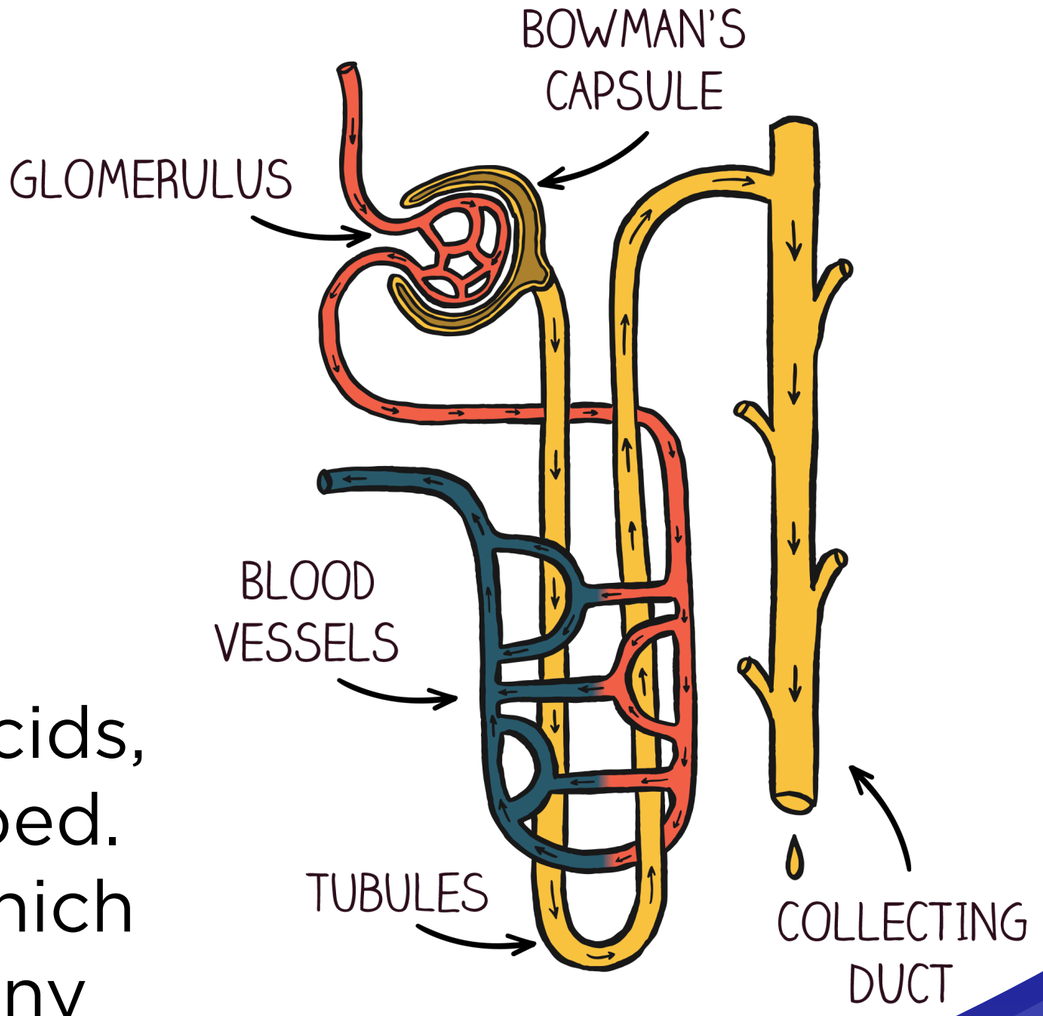
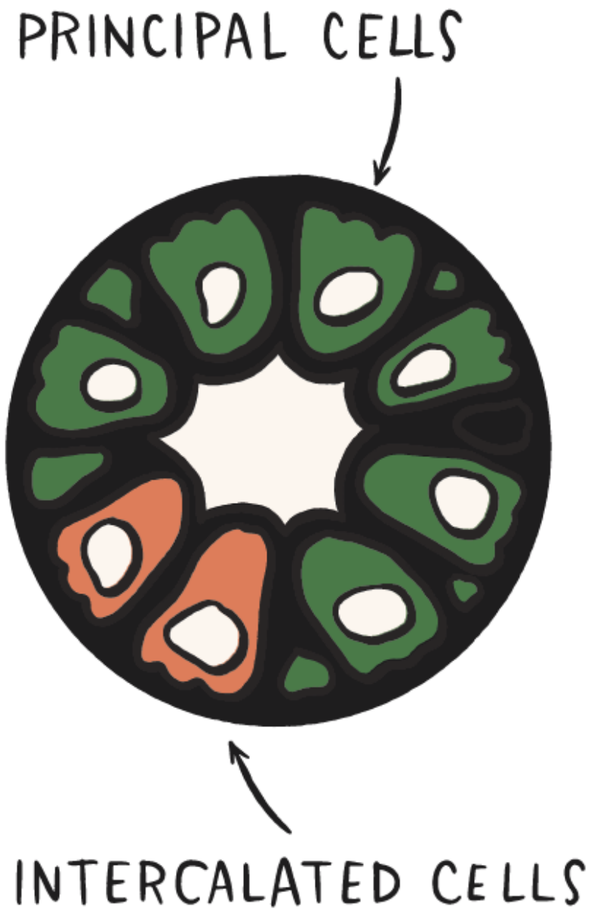
KIDNEY FILTRATION: NEPHRONS

- Each kidney has one million nephrons.
- Blood enters at the glomerulus.
- Small particles and water are removed but most of the blood continues on.
- The liquid moves through the tubules. Good stuff like water, acids, bases, and minerals are reabsorbed.
- The remaining liquid is urine, which is made of urea and water plus any excess hormones and chemicals.



LOOKING AT THE CELLS

- There are many kinds of cells that line the tubules of the nephron.
- In the collecting duct, there are two that are especially interesting.
    - **Principal:** reabsorbs water by opening aquaporin channels
    - **Intercalated:** reabsorbs or releases acids and bases depending on pH of the blood



WATCH THE VIDEO!

EXPERIMENT TIME

Create a model to solve the the problem and meet the objectives below.

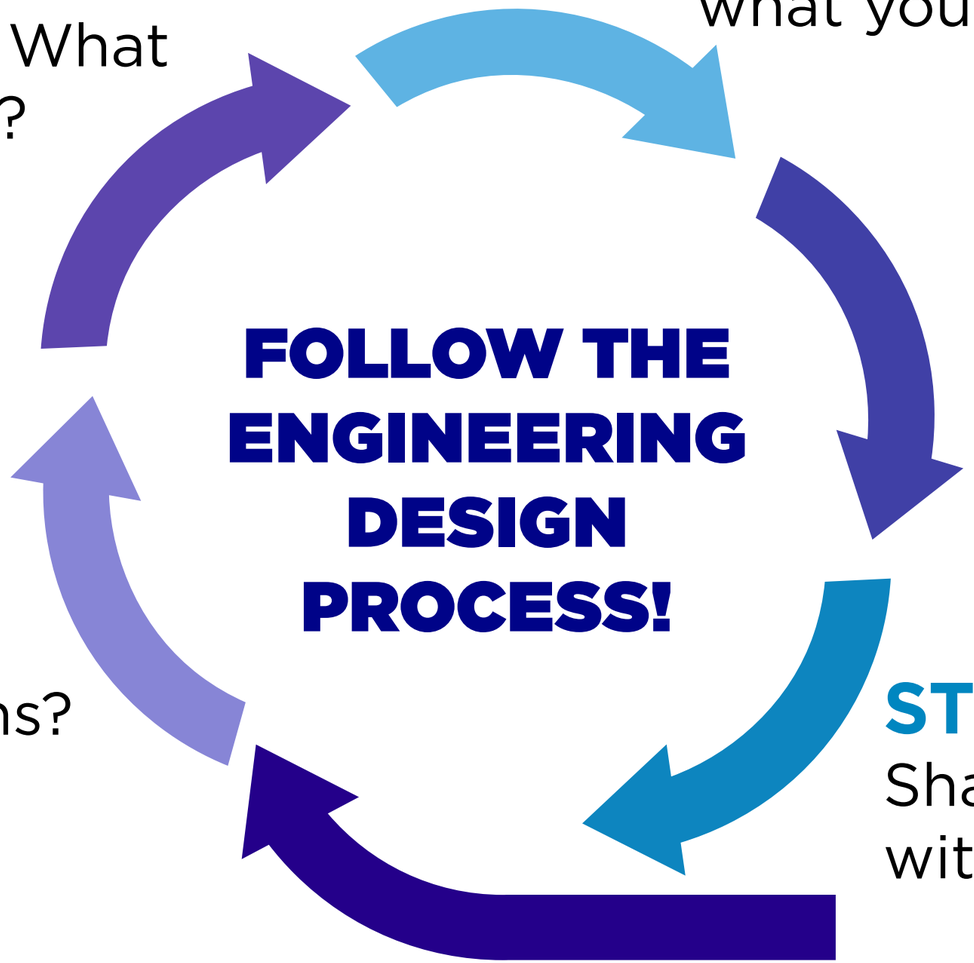
- **Problem:** You have blood that contains a lot of waste particles. It needs to cleaned without removing the red blood cells.
- **Objective 1:** Create a filter that removes all the “waste” (dirt, glitter, and other residue out).
- **Objective 2:** The beads and water should stay in your cup. At the end, present your “clean blood” to your teacher.

STEP 4: CREATE

Follow your plan and build what you have designed.

STEP 3: PLAN

What is your process? What materials do you need?



STEP 5: TEST

Did your design work? How can it improve?

STEP 2: IMAGINE

What are some solutions?

STEP 6: SHARE

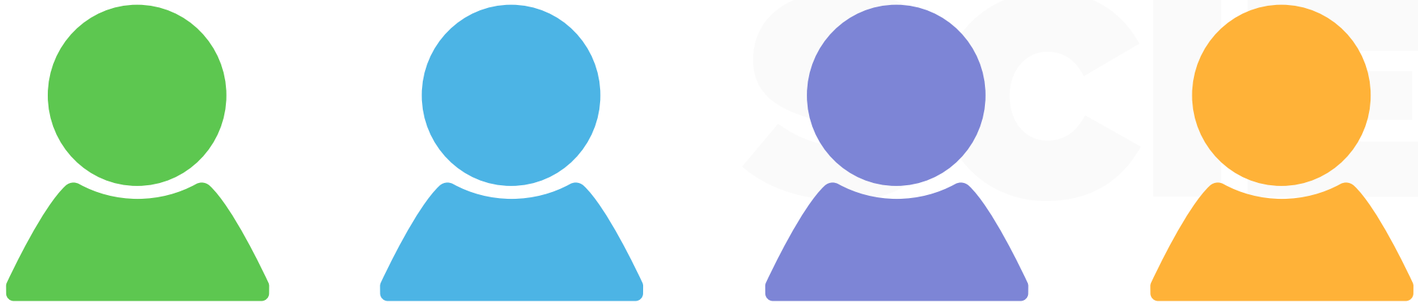
Share your findings with the whole group.

STEP 1: ASK

What is the problem?

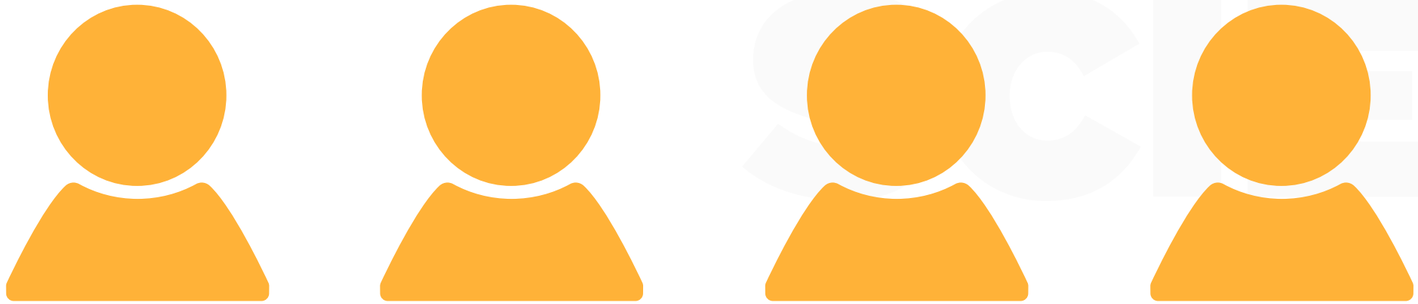
KIDNEY DISEASE DISCUSSION

- Grab your Kidney Disease Jigsaw.
- You will be assigned a color.
- Read the disease study of your assigned color.
- Fill out the **READ** section of your lab notebook.



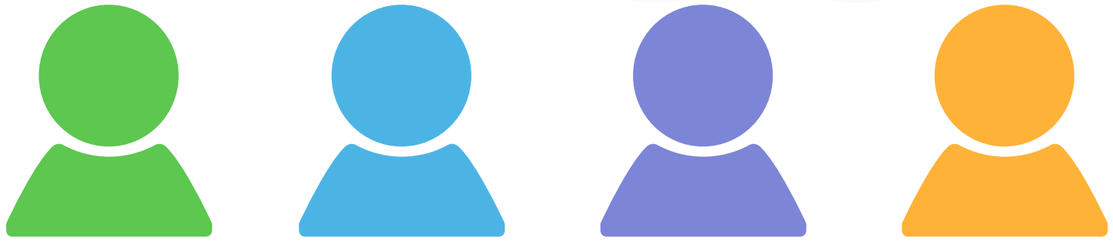
KIDNEY DISEASE DISCUSSION

- Read the Group Work Norms section of your lab notebook, and meet with the other students assigned the same disease study to discuss.
- Fill out the **MEET** section of your lab notebook.



KIDNEY DISEASE DISCUSSION

- Return to your original seat and discuss your disease study with those around you.
- Pay attention! You are responsible for their information as well as your own.
- Fill out the **SHARE** section of your lab notebook.



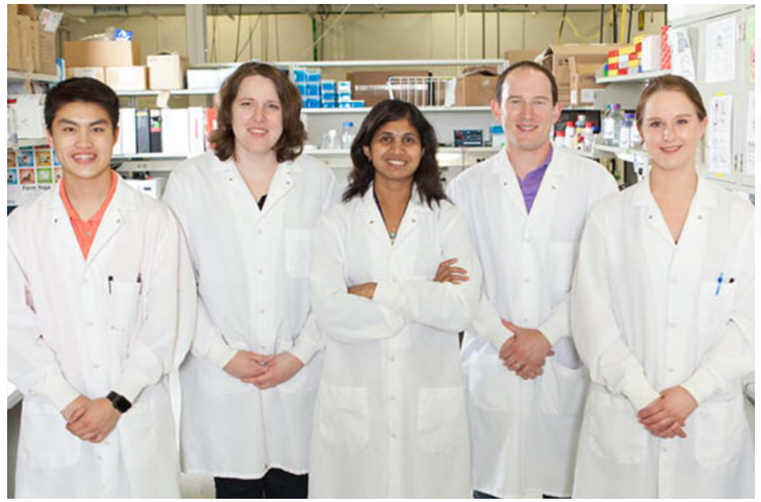
FUN FACT!

- When proteins are broken down (metabolized) it results in a molecule called urochrome.
- **Urochrome** is a yellow pigment-which gives urine its color.
- Other pigments from foods can be removed through urine, so it is not always yellow.
- The color of urine is used to diagnose many blood related issues.
- Urine should never be pink or red; this means blood is in the urine and you need to see a doctor.

SANFORD RESEARCH

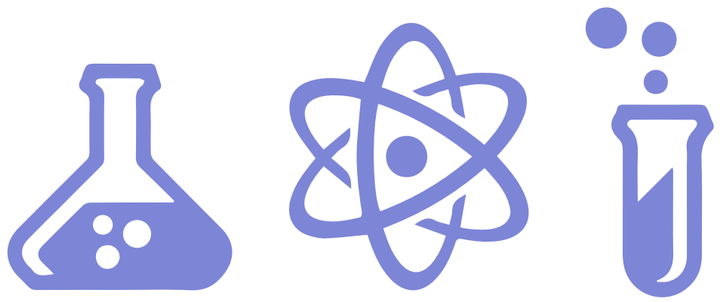
- At Sanford Research, scientists are learning more about specific cells in the kidney.
- With this understanding, they hope to be able to provide more effective treatments.

The Surendran Lab studies kidney development and disease by determining the molecular basis by which diverse cell types of the kidney develop and are maintained.



The Chandrasekar Lab focuses on understanding the role of actin cytoskeleton and associated molecular motor proteins in cellular transport pathways and transport related kidney disease.

ANSWER THE REMAINING QUESTIONS IN YOUR LAB NOTEBOOK!



15. Respond to the claim below by using evidence gathered during the lesson.

Claim: The kidney has an essential function in the human body.

Here's what I did today!

Today I visited the virtual PROMISE Lab at Sanford Research. I learned about the excretory system and the role of the kidneys.