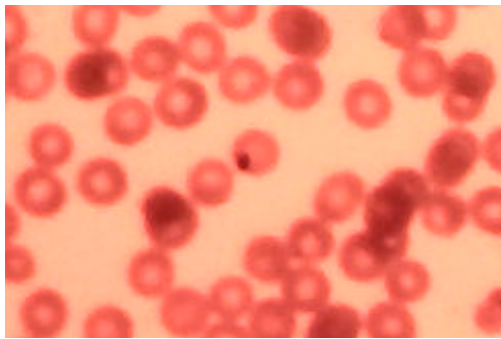


SGI Biology Cells Activity 5: Additional Teacher Support

This document provides additional information and images to help teachers support student understanding of what they will see on the Typical Human Blood, Patient A, and Patient B slides in the *Evidence of Disease* activity.

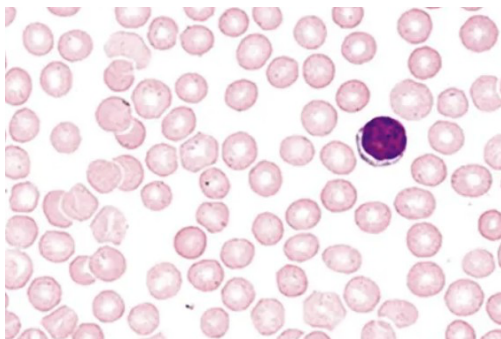
Before the activity, review the slides to become familiar with what students are likely to see. As there will be variability among the slides since they contain actual human blood samples, you may find it helpful to look at more than a single slide to be able to better support students. If a particular section of a slide contains too many cells to view individually, consider looking along the edge of the sample where there are fewer cells. You may find differences in staining. If the staining is light, it can help to increase contrast by reducing the amount of light coming through the slide (by adjusting the diaphragm below the microscope stage). At high levels of magnification, increasing the amount of light may improve visibility of the cells.

Typical Human Blood: Healthy human blood shows mostly rounded red blood cells (which can be stained pink or purple), a few white blood cells (larger cells that are darkly stained, and possibly platelets (much smaller, lighter stained shapes in the background).



Credit: Lab-Aids

A slide should show a blood sample from a healthy human with mostly red blood cells and possibly a few white blood cells (purple) and very few platelets (small dots in background).

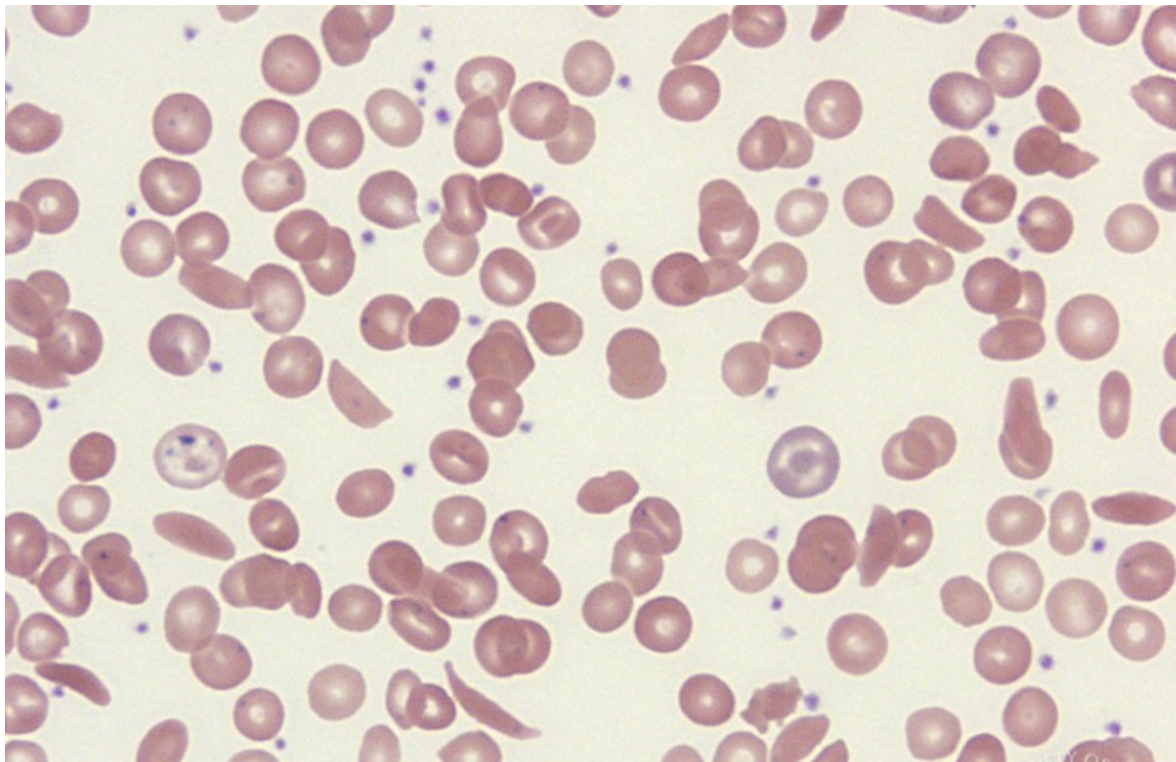


Credit: ©Carolina Biological Supply Co./PHOTOTAKE

The commonly-used Wright's stain gives red blood cells a pink color and white blood cells a purple nuclei. If there is light staining, it may be difficult to see the red blood cells. It can help to reduce the light (by using the diaphragm below the microscope stage) to increase contrast.

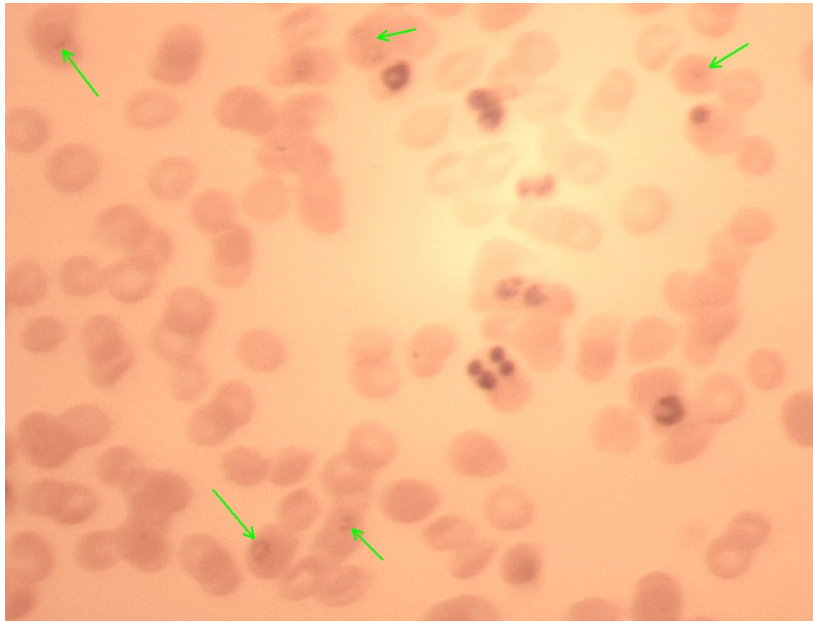
Patient A Blood: While students should not be provided this information in advance, this blood sample contains sickle cells (red blood cells shaped like crescent moons) among regularly-shaped red blood cells. Since the slide presents a 2-dimensional image of a 3-dimensional object, the shape of these cells will vary from a long, thin banana shape to a more rectangular boat shape. It should be clear that the shape of the sickle cells are distinct from the roundness of healthy red blood cells.

Ideally the blood sample shows multiple sickle cells, as shown in the image below. Students should be able to identify that Patient A has sickle cell disease because some of Patient A's red blood cells were the long, thin banana shape that is characteristic of this disease, and the patient's symptoms match those of sickle cell disease. It might help to remind students that slides are a 2-dimensional image of a 3-dimensional object, so sometimes that shape varies but is distinct from the roundness of a healthy red blood cell. Note that the small purple dots in the background are platelets. Depending on the typical blood slide, students may or may not have seen these in the healthy blood sample.

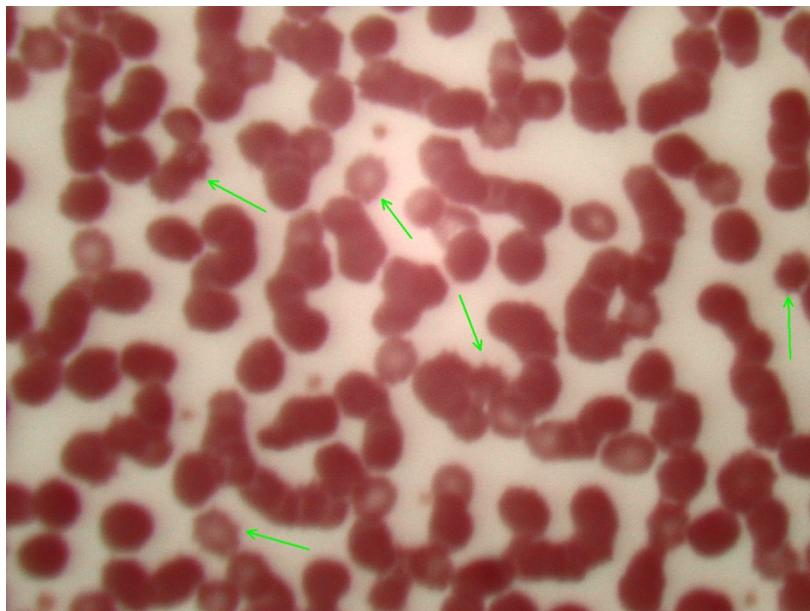


Credit: This image was originally published in ASH Image Bank. John Lazarchick. Sickle cell disease - RBC morphology. ASH Image Bank. 2009; #00003958. © the American Society of Hematology.

Patient B Blood: While students should not be provided this information in advance, this blood sample contains some red blood cells that contain malaria, which can appear as irregularly-shaped cells, some with dark dots inside. The images below show what the Patient B slides could look like. Depending on the slide, it can be challenging to differentiate from healthy human blood if there are only a couple of cells containing malaria, which can appear to be simply white blood cells. Students should be able to identify that Patient B has malaria because although her blood cells look normal, among them are irregularly shaped objects, some with dark dots inside, as shown in the first image (see arrows). These objects are the malaria parasites. Students may also find that some of the cells containing malaria are rough or bumpy on the edges as seen in the second image (see arrows). An additional reference image showing typical morphology of red blood cells infected with malaria can be found [here](#) (Takahashi, 2020, HHMI).



Credit: Lab-Aids



Credit: Lab-Aids