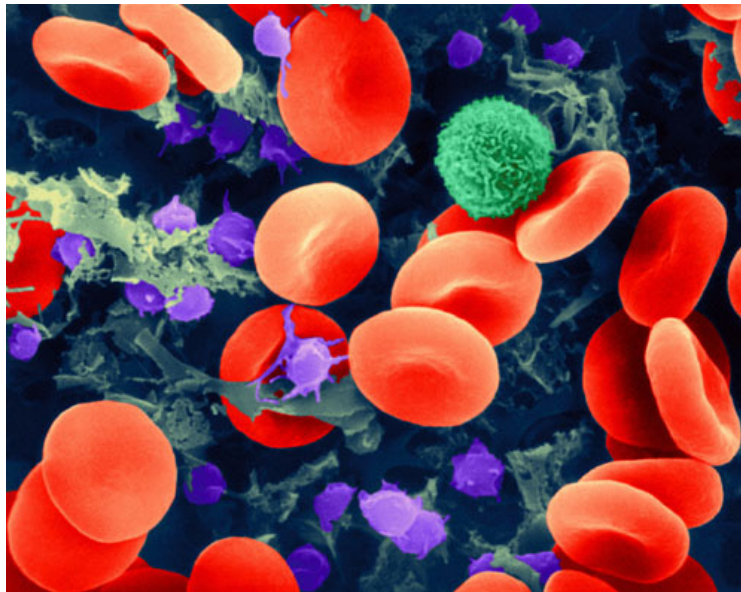


Unit 2: Disease Prevention

Instructional Activities for Ages 9-12



PKIDs' Infectious Disease Workshop

Made possible by grants from the Northwest Health Foundation,
the Children's Vaccine Program at PATH and PKIDs.

PKIDs' Infectious Disease Workshop

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Acknowledgements

Producing this workshop has been a dream of ours since PKIDs' inception in 1996. It has been more than two years since we began work on this project, and many people helped us reach our goal. It's not done, because it is by nature a living document that will evolve as science makes strides in the research of infectious diseases, but it's a great beginning.

There are people who've helped us whose names are not on this printed list. That omission is not deliberate, but rather from our own clumsiness in losing important pieces of paper, and we apologize.

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The authors specifically disclaim any responsibility for any liability, loss, or risk, personal or otherwise, which is incurred as a consequence, directly or indirectly, of the use and application of any of the contents of this workshop.

Introduction

PKIDs (Parents of Kids with Infectious Diseases) is a national nonprofit agency whose mission is to educate the public about infectious diseases, the methods of prevention and transmission, and the latest advances in medicine; to eliminate the social stigma borne by the infected; and to assist the families of the children living with hepatitis, HIV/AIDS, or other chronic, viral infectious diseases with emotional, financial and informational support.

Remaining true to our mission, we have designed the *Infectious Disease Workshop (IDW)*, an educational tool for people of all ages and with all levels of understanding about infectious diseases. In this workshop, you will learn about bacteria and viruses, how to prevent infections, and how to eliminate the social stigma that too often accompanies diseases such as HIV or hepatitis C.

We hope that both instructors and participants come away from this workshop feeling comfortable with their new level of education on infectious diseases.

The IDW is designed to “train-the-trainer,” providing instructors not only with background materials but also with age-appropriate activities for the participants. Instructors do not need to be professional educators to use these materials. They were designed with both educators and laypersons in mind.

The IDW is comprised of a master Instructor’s Background Text, which is divided into six units: Introduction to Infectious Diseases, Disease Prevention, Sports and Infectious Disease, Stigma and Infectious Disease, Civil Rights and Infectious Disease, and Bioterrorism and Infectious Disease.

For each unit, instructors will find fun and helpful activities for participants in five age groups: 2 to 6 years of age, 6 to 9 years of age, 9 to 12 years of age, 13 to 18 years of age and adults.

We welcome any questions, comments, or feedback you may have about the IDW or any other issue relating to infectious diseases in children.

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Dear Parents,

Our class will soon be studying infectious diseases. We will learn about what germs are and ways we can keep from spreading germs. We will also learn that people who have infectious diseases don't have to be treated differently or singled out just because they have a disease.

The workshop we will use has been created by PKIDs (Parents of Kids with Infectious Diseases), a national nonprofit organization dedicated to supporting families touched by infectious diseases.

Your child may have questions about germs or may come home with new ideas about preventing the spread of germs. Here are a few ways you can stay informed:

View PKIDs' website. PKIDs' website can be found at www.pkids.org. You may also request information by calling PKIDs at 1-877-55-PKIDS.

View the instructor's background text for the Infectious Disease Workshop (IDW). The primary purpose of this text is to provide teachers with background information on infectious diseases. It is a good text for anyone seeking general information on infectious diseases. The text provides information about specific diseases, methods of disease prevention, and civil rights for those affected by infectious disease. Visit www.pkids.org for a link to the IDW background texts in PDF format.

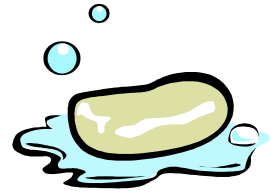
View descriptions of the activities we will be doing in class. Visit www.pkids.org for a link to the activities and handouts in PDF format.

The world becomes smaller every day and germs from near and far continue to threaten our health. It is extremely important to educate our young people, equipping them with prevention methods to protect their health and stop the spread of disease.

As always, please feel free to contact me with any questions!

Sincerely,

HANDWASHING EXPERIMENT



LEVEL

Ages 9-12

OBJECTIVE

- Students will predict which handwashing techniques will be more effective.
- Students will discriminate between effective and ineffective handwashing techniques.

MATERIALS

- Cooking oil.
- Cinnamon or nutmeg.
- Soap, sink with cold and warm water, towels—preferably at a location where there are a few sinks together.
- Stopwatch (with seconds).
- Handwashing Experiment handout (1 per student).

PREP

Locate sink area to be used for experiment.

INSTRUCTIONAL COMPONENTS

1. Students will need to work in pairs so that if their partner is volunteering, they can make observations for both of them.
2. Distribute handout.
3. Read the top of the handout together. For every blank box in the table, you will need one person with “dirty” hands to wash their hands for that specific amount of time using that particular method. How many volunteers you have at a time will depend on how many sinks are available and/or the space available around each sink.

Procedures

1. The first group of volunteers “dirties” their hands by covering them with oil and then rubbing in cinnamon/nutmeg. Decide who will wash for how long and with what method.
2. Volunteers get ready to wash by wetting their hands (and squeezing soap onto them, if applicable), but NO scrubbing.
3. The stopwatch operator indicates when to start and volunteers begin rubbing/scrubbing hands. Stopwatch operator should indicate the 5 second intervals, at which point that hand-washer should stop washing, rinse off, and wait until the last person is done.
4. The class observes and notes the cleanliness factor of each volunteer’s hands using the handout provided.
5. Volunteers may dry off and make their own observations, or use their partner’s answers.
6. Repeat process until all methods and lengths of time have been demonstrated.

ASSESSMENT

- Students should observe their data and reach conclusions about which methods/lengths of time for handwashing are the most effective. Have them share their conclusions with the class.
- Students can compare their findings with established health standards for handwashing and discuss differences or similarities.

HANDWASHING EXPERIMENT

Name: _____

Have you ever gone to the bathroom and forgotten to wash your hands? Or were you just in a hurry? Or did you not realize the importance of washing your hands in order to prevent the spread of disease? This experiment will help you discover what’s important when washing your hands.

Before starting this experiment, make a hypothesis. (*A hypothesis* is an educated guess at what the result of an experiment will be.) Which method(s) will be the most effective? The least effective? Why? Write your hypothesis below.

LENGTH OF TIME TO WASH

Scale of effectiveness: 1 = Nasty! 3 = Halfway clean 5 = Spotless!

Handwashing Method	5 Seconds	10 Seconds	15 Seconds	20 Seconds	25 Seconds	30 Seconds
Cold water no soap						
Cold water soap						
Warm water no soap						
Warm water soap						

Now check your results against your hypothesis. Were you correct? Why or why not? Do your class results reflect standards established by the CDC? Why or why not? What can you conclude about the importance of handwashing?



HEALTHY HABITS POSTERS

Five Common Disease Transmission Scenarios

LEVEL

Ages 9-12

OBJECTIVE

Students will portray correct (and incorrect, where appropriate) methods for preventing disease transmission in common, everyday activities.

MATERIALS

- Butcher paper or posterboard.
- Markers, paints, etc.
- Handout on Disease-Causing Scenarios included with lesson (optional).

PREP

None

INSTRUCTIONAL COMPONENTS

1. According to the Centers for Disease Control and Prevention, there are five common ways in which diseases are transmitted in everyday activities. Pass out the included handout and/or review these scenarios with students.
2. Students can then make posters for the scenarios, individually or in groups.
3. Each student/group should determine who their “audience” will be. Possibilities include:
 - The student’s family
 - Fellow students (e.g., the poster could be displayed in the bathroom)
 - A near-by daycare facility
 - Younger students in the elementary schools.
4. Students/groups can make 1 poster portraying all five concepts, or they can make a poster for each concept.
5. Students may want to consider portraying/describing poor disease prevention actions as well. The posters should be age-appropriate for the intended audience.

ASSESSMENT

- Does the poster clearly portray and emphasize appropriate methods for preventing transmission of diseases?
- Is the poster age-appropriate?

Five Common Disease Transmission Scenarios

In all of these scenarios, disease transmission can be prevented by proper handwashing (scrubbing with warm water and soap for at least 15 seconds).

1. **HANDS to FOOD:** Microscopic amounts of body waste may stick to our hands and get on the food we prepare, if we don't wash after using the toilet.
2. **INFANT to HANDS to OTHER CHILDREN:** Traces of body waste can adhere to hands after changing a baby's diaper. That waste can then be transferred to others we touch, if we don't wash our hands.
3. **FOOD to HANDS to FOOD:** Raw, uncooked foods like chicken and eggs may contain harmful germs. When handling these foods, it is important to wash our hands before handling any other foods. While cooking the chicken or eggs will kill any germs present on them, the other raw foods we touch, e.g., salad, will retain the harmful germs.
4. **NOSE/MOUTH/EYES to OTHERS:** Germs can be found in saliva, mucous and nasal discharge. Sneezing, coughing, or rubbing the eyes or nose and then touching people prior to washing hands can transmit germs.
5. **FOOD to HANDS to INFANTS:** In the same way germs can be transmitted from certain uncooked food to other foods, they can also be transmitted to an infant if the caregiver neglects to wash his/her hands between food preparation and tending the infant.

STANDARD PRECAUTIONS

Practice/Demonstration Stations

LEVEL

Ages 9-12

OBJECTIVE

- Students will practice and/or observe proper practice of standard precautions.
- Students will create displays/demonstrations relating to a particular set of standard precautions.
- Students may teach other participants appropriate observation of standard precautions.

MATERIALS

Note: Students may be able to “create” some of these materials themselves (e.g., a simulated refrigerator from a cardboard box).

1. *Handwashing and Gloves Station:* Must effectively demonstrate proper methods for washing hands, when to use gloves, and explain why these precautions are important.
 - Soap.
 - Sink (can be a prop sink).
 - Non-permeable gloves.
 - Plastic bag for “garbage.”
 - Plastic sandwich bags (demo as substitute if no gloves are available).
2. *Masks and Eye Protection Station:* Must effectively demonstrate use of eye/face protection equipment and explain why these precautions are important.
 - Goggles.
 - Surgical-type mask.
 - Bandanna.
 - Face shield.
 - Glasses/sunglasses/person wearing glasses (demo as substitute if no goggles are available).
3. *Contaminated Clothing Station:* Must effectively demonstrate procedures for isolating and cleansing soiled clothing and explain why these precautions are important.
 - Various articles of clothing.
 - Fake blood (ketchup for clothing that can be ruined, construction paper for good clothing).
 - Plastic bag w/ twist-tie (for storage of clothes until cleaned or disposed of).
 - Bottle of bleach (preferably empty) – to add to laundry wash cycle.
4. *Dinnerware and Other Inanimate Objects:* Must effectively demonstrate procedures for cleansing and disposal of various items and explain why these procedures are important.
 - Dish, cup, spoon — 1 of each: washable and disposable.
 - Sharps container (optional?) — show single use disposal of sharp objects.
 - Garbage bag in garbage can with lid (or some other means of showing how to keep

- items in the garbage out of reach of children) — show disposal of single use non-sharp objects.
- Plastic toys — show disinfection of multiple use objects.
 - Countertop — show disinfection of multiple use objects.
5. *Resuscitation—optional*: Must effectively demonstrate use of barriers during resuscitation and explain why these precautions are important.
 - Doll or mannequin.
 - Mouthpieces, resuscitation bags, plastic wrap with hole in it—show means of providing a barrier between individuals. However, resuscitation should only be performed by a trained individual—do not practice on people, only dolls or mannequins.
 6. *Diaper-Changing Station*: Must effectively demonstrate procedures for cleansing/disinfecting hands and surfaces before and after diaper changes and explain why these precautions are important.
 - Doll.
 - Diaper.
 - Non-permeable gloves.
 - Bleach solution in spray bottle—to clean counter with afterwards.
 - Bleach solution recipe for display.
 - Soap and sink, or other appropriate means of showing handwashing.
 - Plastic-lined garbage can with lid (or other means of keeping out children) for diaper disposal.
 7. *Kitchen Station*: Must effectively demonstrate procedures for cleansing/disinfecting hands and surfaces before and after food preparation and explain why these precautions are important.
 - Small refrigerator, box, or picture of refrigerator.
 - Examples of food that should be kept refrigerated.
 - Bleach solution in spray bottle—for cleaning countertops.
 - Example of raw meat.
 - Sink (or simulation of)—to wash hands in after preparing raw meat.
 - Scrubbing brushes or pads—to demonstrate washing them in the dishwasher after use.
 - Simulation of dishwasher.

PREP

Decide how the stations will be used. Ideas include:

- At a school-wide “health fair” students can be “station supervisors,” helping people visiting their display to correctly manipulate objects and perform standard precaution activities.
- For the instructor to demonstrate to students.
- For students to explore individually.
- For students to demonstrate to other classes/groups.

INSTRUCTIONAL COMPONENTS

1. Introduce the assignment to students.

2. Explain that standard precautions are various types of actions we can take to prevent infectious disease transmission between ourselves.
3. Note that although standard precautions were issued for health care workers caring for patients in hospitals and other medical settings where the risk of disease transmission is greater, they make sense for everyone in general, and PKIDs has adapted them to everyday situations.
4. For instructor and student reference, a more detailed explanation of standard precaution concepts for everyday life can be found in the PKIDs' IDW *Unit 2: Disease Prevention Instructor's Background Text*.
5. Assign students to the various stations. A sign-up sheet may work well.
6. Make sure each group understands the concepts they must address.
7. You may wish to do a demonstration of each activity/station for the entire class so that students have a better idea of the nature of standard precautions.
8. Allow class time for group collaboration and work. Encourage students to make their stations as "hands on" and visually oriented as possible, including posterboards, etc., summarizing the standard precaution concepts covered at their particular station (i.e., what to do and when to do it).

ASSESSMENT

Each student should be able to use the equipment at each station appropriately and should be able to explain why correct use of equipment and procedures is important.



WHAT WOULD YOU DO?

LEVEL

Ages 9-12

OBJECTIVE

- Students will recall appropriate actions that should be taken in the event of a body fluid spill.
- Students will apply this knowledge to body fluid spill scenarios.

MATERIALS

None

PREP

None

INSTRUCTIONAL COMPONENTS

1. Ask students for scenarios in which they've seen someone else's blood. Talk about those scenarios.

What could cause another person to touch someone's blood? (trying to help, curiosity)

Why should we not touch another person's blood? (germs)

Can blood and germs be in other body fluids, like saliva, even if we can't see them? (yes)

2. Talk about things we can do to help someone without touching their blood or other body fluids.

Get an adult!

Offer tissues to a bleeding person or person with a runny nose.

If you get blood on your clothes, tell an adult and he/she will help you. (The adult should put the clothes in a plastic bag for the parents to deal with—wash, or throw away.)

3. Briefly quiz the students on these things.

ASSESSMENT

“What would you do if...” Offer students scenarios and have them explain what they would do. They should apply what they have learned.

1. Your little sister is all excited because she has a loose tooth, and she wants you to pull it. Should you do it? (No—hands carry germs, and there may be blood from the loose tooth.)
2. Jane suddenly develops a nosebleed, and it's getting on her shirt. What should you do? (Get an adult; don't touch the blood; offer towels in a way that you don't come into contact with her blood.)
3. You are eating lunch with your friend. He takes a bite of a candy bar that you really like, and he offers you a bite. Should you take a bite? (No, because germs and/or blood can be present in saliva.)
4. You're at a sleepover, and you discover you've forgotten your toothbrush. Should you use your friend's toothbrush? (No, for the same reason you don't take a bite of someone else's food.)

5. You're playing soccer and suddenly you collide with someone. He or she bleeds on your shirt. What should you do? (Immediately get an adult; don't touch the blood on your shirt; take your shirt off as soon as possible and put it in a plastic bag. Your parents will wash it, throw it away or take care of it in some way.)
6. Your parents leave out their nail clippers or razor. Should you use them? (No; everyone should have their own grooming tools, because blood can still get on them, even if we can't see it.)
7. You have to sneeze, and you can't get a tissue in time. What should you do? (Cover your mouth and wash your hands afterward.)

THE IMMUNE SYSTEM IN ACTION

LEVEL

Ages 9-12

OBJECTIVE

Students will act out and comprehend basic functions of the immune system.

MATERIALS

Script and handouts—included

PREP

Print handouts included with this lesson plan:

1. Script—1 copy for the instructor
2. Antigens—5 copies
3. B cells—3 copies of sheet A; 2 copies of sheet B; 1 copy each of sheets C, D, and E
4. Antibodies—about 3 sheets (total of 15 shapes)
5. Lymph—2 copies
6. Phagocyte—5 copies
7. T cells—5 copies of sheet A; 1 copy each of sheets C, D, and E

INSTRUCTIONAL COMPONENTS

- Introduce the lesson, “The **Immune System** in Action,” to students. Tell students our immune system helps keep us healthy and that they will act out how it works inside our bodies to defend us against some diseases. They will act out 2 different types of immune system responses; often, these responses occur simultaneously.
- Students may need to know what a **cell** is; if they don’t, you can explain to them that cells are the tiny building blocks that combine to make up all the parts of our body (skin, brain, muscles, hair, etc.). There are a lot of different kinds of cells, and the immune system uses certain kinds of cells to attack harmful germs in our body.

For Scenario 1:

1. Select 5 students to be the “bad guys” (invading antigens). Give each of them one of the antigen shapes. Read the description of “Antigens” to the class.
2. Select 4 students to be B cells. Give each of them a different B cell shape. (Give all copies of B cell sheets A and B to one student). Read the description of B cells and plasma cells.
3. Have 2 other students hang the “Lymph” signs up in different parts of the room. Read the description of Lymph Nodes.
4. Read the script for Scenario 1, taking students through it step by step. (Things noted in parentheses are to aid the instructor and don’t necessarily need to be read out loud.)
5. At the end, reseal everyone in order to begin Scenario 2.

For Scenario 2:

1. Select 5 students to be the “bad guys” (invading antigens). Give each of them one of the antigen shapes. Ask the class to recall what “antigens” are.
2. Select 5 students to be Phagocytes. Give each of them a phagocyte shape. Read the description of phagocytes to the class.
3. Select 4 students to be T cells. Give each of them a different T cell shape. (Give all copies of T cell sheet A to one student.)
4. Read the script for Scenario 2, taking students through it step by step.
5. At the end, have students return to their seats for review questions.

ASSESSMENT

Questions:

1. What is one thing that B cells do (or produce) that T cells do *not*? (*antibodies*)
2. What happens to T cells after they are done attacking antigens? (*they die or are stored in a lymph organ in case they are needed again*)
3. What is the first thing that B or T cells do when they match up to an antigen or phagocyte with antigen pieces? (*multiply*)
4. Correctly order these immune system events. (A printout for overhead use is included with this lesson, or you can read each one and write it down as the students tell you whether or not it follows or precedes activities already written down. Use the visual aid sheets to help jog students’ memories.)
 - Matching B cells multiply.
 - B cells match up with antigens.
 - Antigens invade body.
 - Phagocytes digest antigens.
 - Remaining B or T cells are stored in lymph nodes.
 - Matching T cells multiply.
 - T cells call other cells to destroy antigens.
 - Plasma B cells release antibodies.
 - T cells match up with phagocytes and antigen pieces.

THE IMMUNE SYSTEM IN ACTION

The Script

THE PLAYERS

- **Antigens:** Bad guys! Antigens are foreign substances that invade the body and cause our immune system to respond.
- **B cells:** Good guys! B cells seek out specific antigens and then attempt to destroy them. These B cells then produce plasma cells. **Plasma cells** produce the antibodies that attack specific antigens.
- **Lymph nodes:** Good guys! Bean-shaped areas in the body where *lymphocytes*, like B cells and T cells, hang out. Lymph nodes filter out harmful stuff like bacteria.
- **Phagocytes:** Good guys! Phagocytes surround bad stuff (like antigens) and break them up or ingest them. Some phagocytes take these broken-up pieces and show them to other cells called T cells.
- **T cells:** Good guys! When a special phagocyte shows a T cell pieces of an antigen, it might tell the body to start fighting back against that antigen.

SCENARIO 1: (Humoral Immune Response, aka, Antibody Immune Response; humoral refers to the body fluids that, in this case, carry the antibodies)

1. The antigens invade the body. (Antigen students enter the room.) When antigens get inside our body, they usually want to 1) multiply so there are more of them and 2) attack/invade our body's cells.
2. One of the B cells detects an antigen—invader! But wait! There are many different kinds of antigens, and each B cell responds to just one kind of antigen. (B cell students figure out which one matches the antigen.)
3. The correct B cell attaches to the antigen. The enemy is engaged!
4. This B cell multiplies. (Correct B cell student hands out copies of his/her shape to other students.)
5. Some of these new cells become *plasma* cells. (Some of the shapes will say “plasma” on them.)
6. The plasma cells produce antibodies that fight the antigens. (Give some “antibodies” to the plasma students.)
7. The plasma cells hang out in the lymph nodes until they are needed again, and next time, they will be able to respond more quickly. (All “cells” without antibodies go to the Lymph area of the room.)
8. The antibodies go to work! (Plasma students give antibodies to antigen students.)
9. They can fight in several different ways:
 - By coating the antigens to make them more digestible by phagocytes (plasma student gives antibody to an antigen student; phagocyte student gets up and takes the antigen student).
 - By neutralizing toxins (poisons) produced by bacteria.
 - By activating special proteins (complement) that help phagocytes eat up the antigens or attract other fighting lymphocytes to the area of infection.

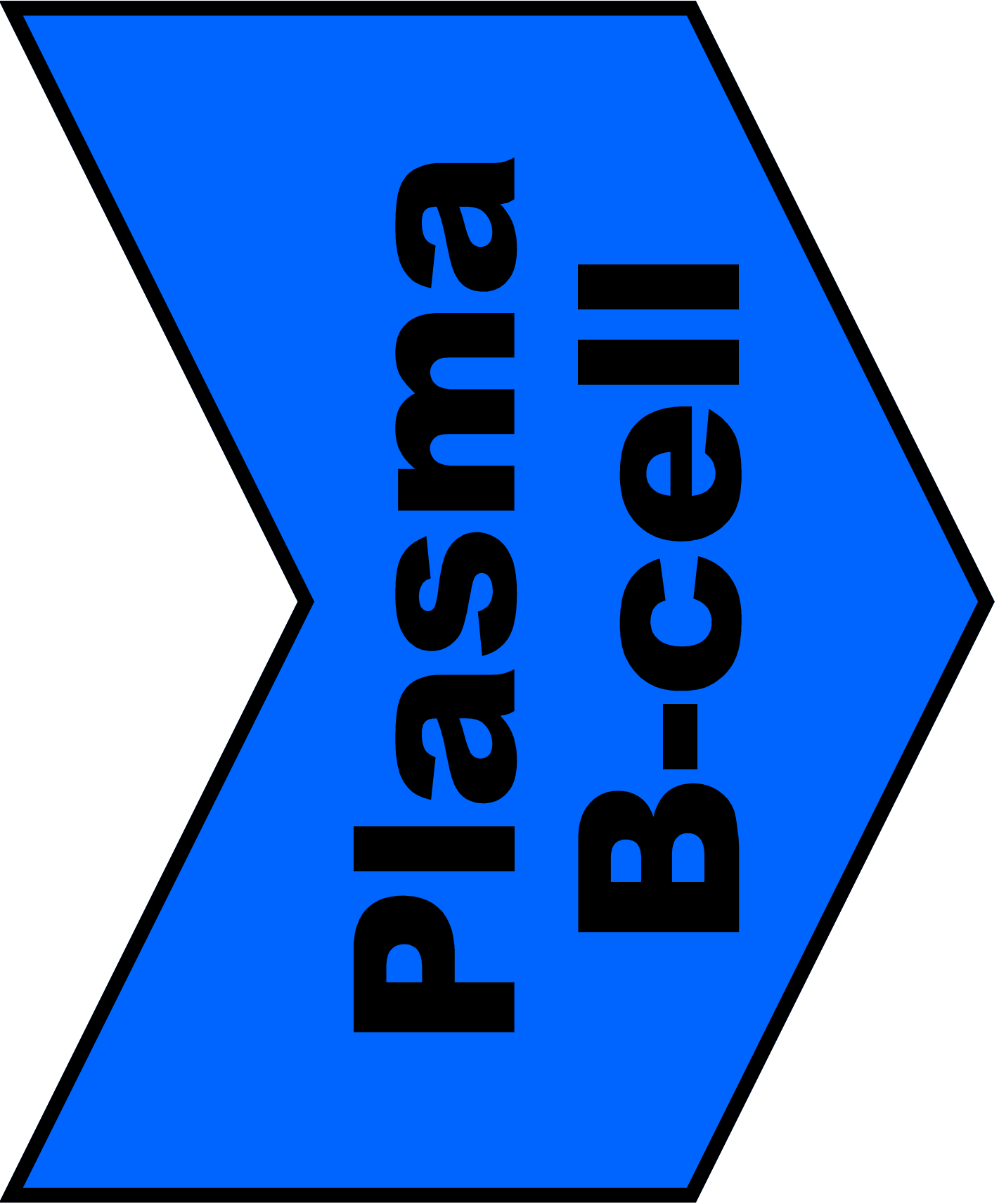
SCRIPT 2: (Cell-Mediated Immune Response)

1. Antigens enter the body. (Antigen students enter room.)
2. Certain phagocytes digest the antigen. (Phagocyte people take away the antigen people's shapes.)
3. Special proteins on the phagocyte combine with the antigen pieces. The phagocyte displays them on the outside of itself. (Phagocyte people hold up both their shape and the antigen shape.)
4. T cells that are nearby look at these antigen pieces to see if they match up. (T cell people with matching shapes stand next to phagocyte people with matching antigen shapes.)
5. If a match is made, then the T cell gets ready to fight. The first thing it does is multiply rapidly so it can start circulating through the body and fight infection. (Matching T cell student hands out copies of his/her shape to other students.)
6. T cells kill the antigens in different ways, depending on the type of antigen. Generally speaking, T cells call other types of cells to come kill the antigens.
7. After the battle is over, the T cells produce different chemicals that tell the body to stop responding. Some of the newly produced T cells die (some T cell students can fake death — they'll have fun with that!), but others hang out in the lymph glands in case they are ever needed again. (The remaining T cell students go to the Lymph area of the room.)

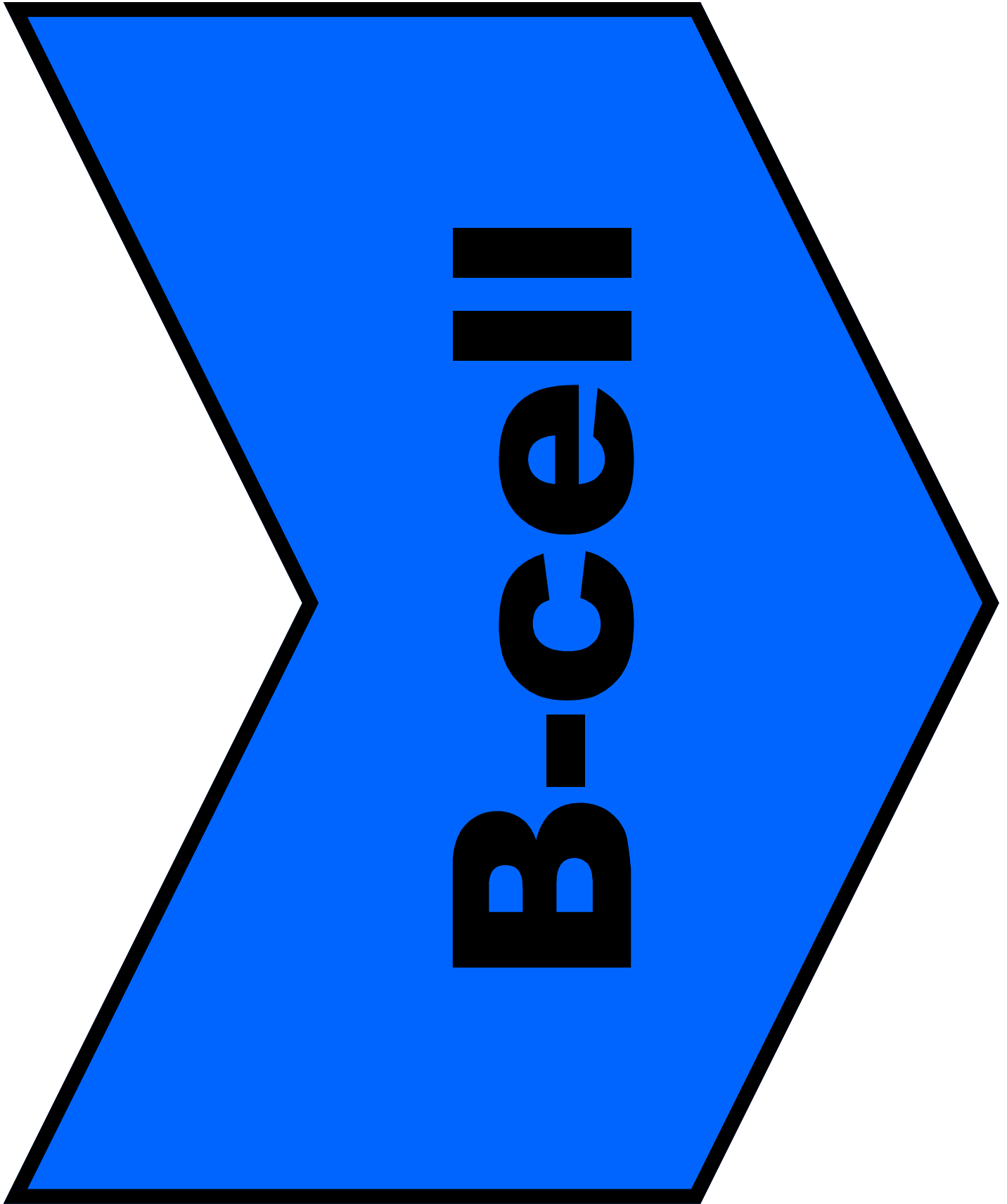
**Put these immune system actions in the correct order.
(Hint: some things may happen at the same time!)**

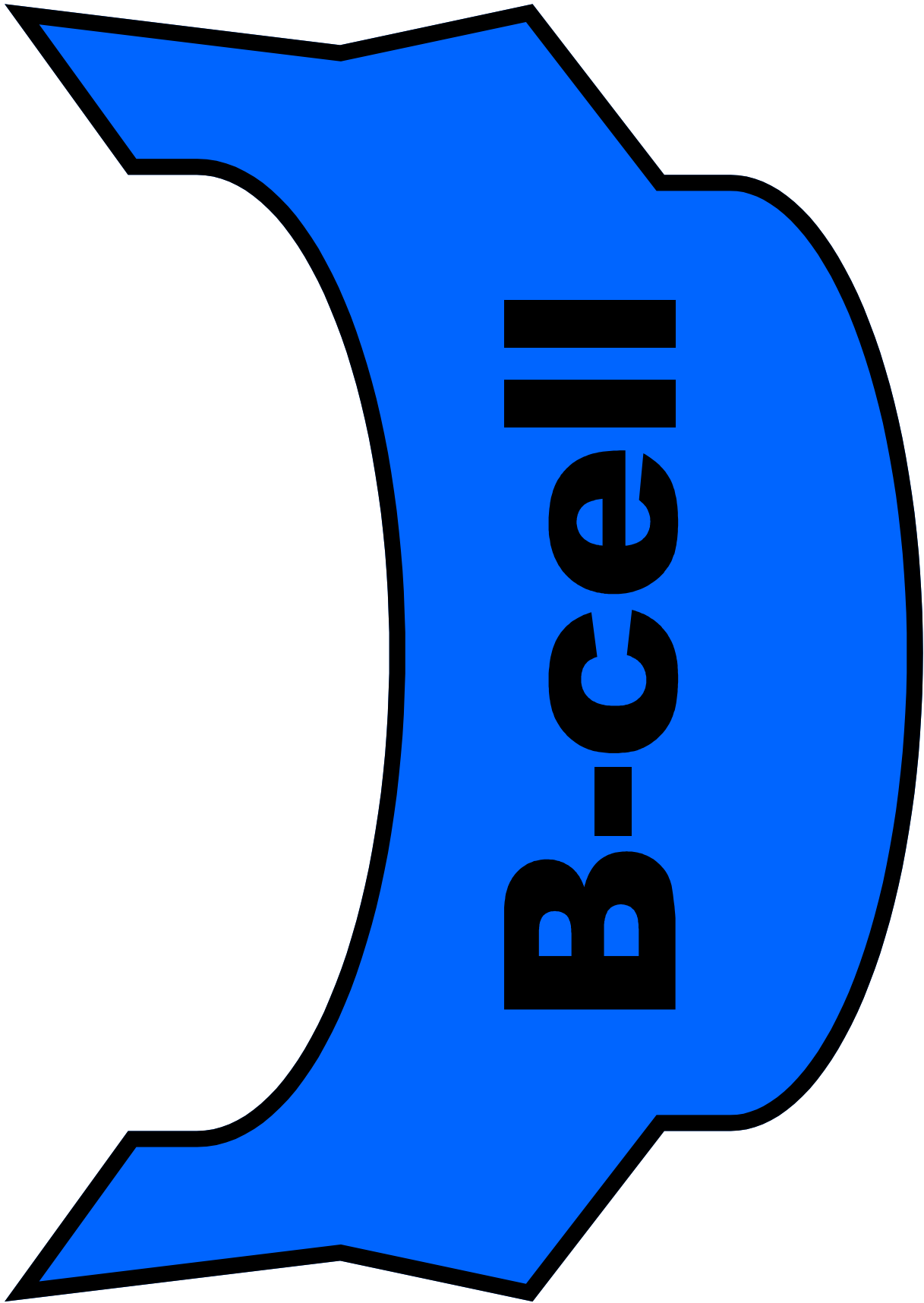
- 1. Matching B cells multiply**
- 2. B cells match up with antigens**
- 3. Antigens invade body**
- 4. Phagocytes digest antigens**
- 5. Remaining B or T cells are stored in lymph nodes**
- 6. Matching T cells multiply**
- 7. T cells call other cells to destroy antigens**
- 8. Plasma B cells release antibodies**
- 9. T cells match up with phagocytes and antigen pieces**

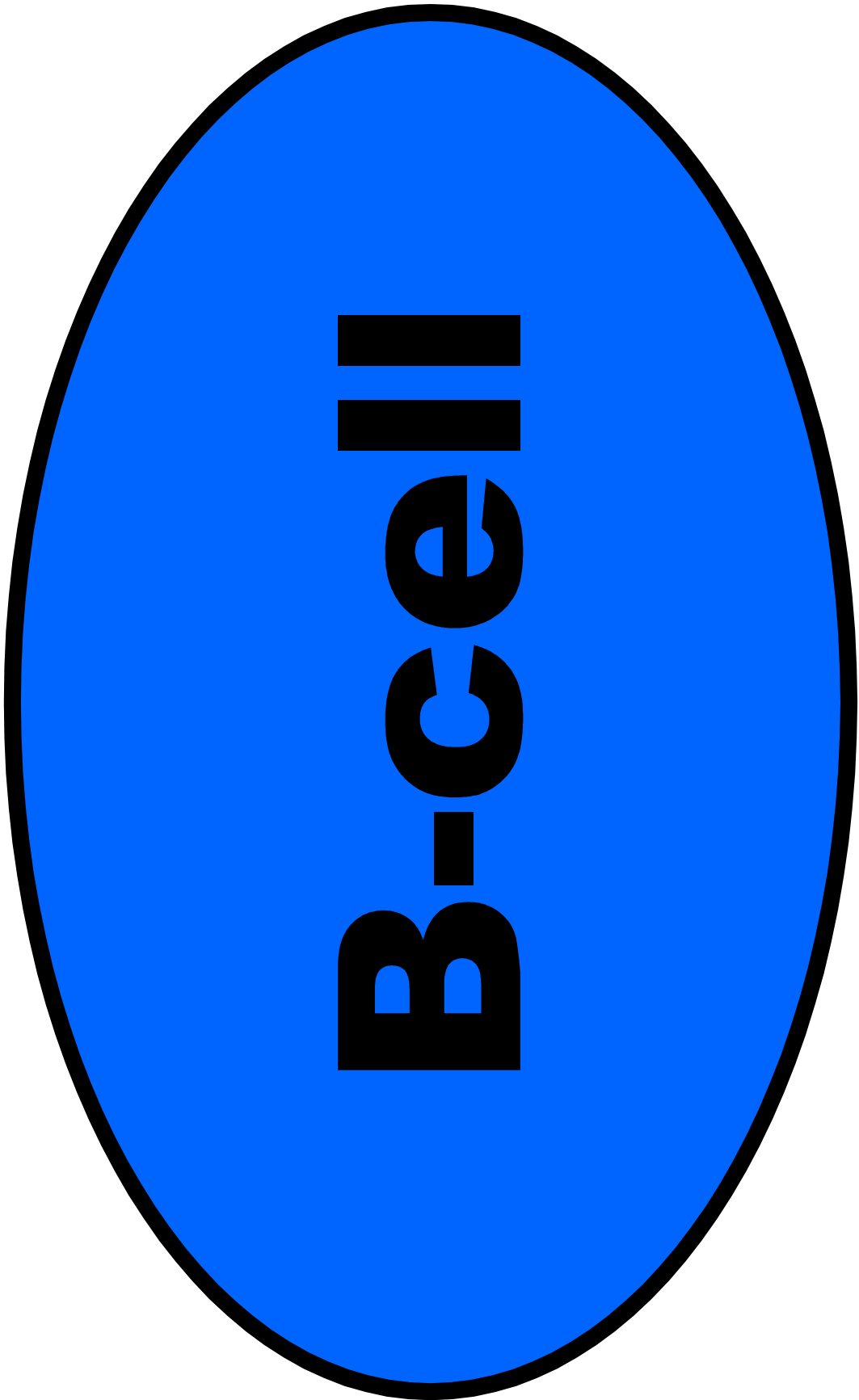
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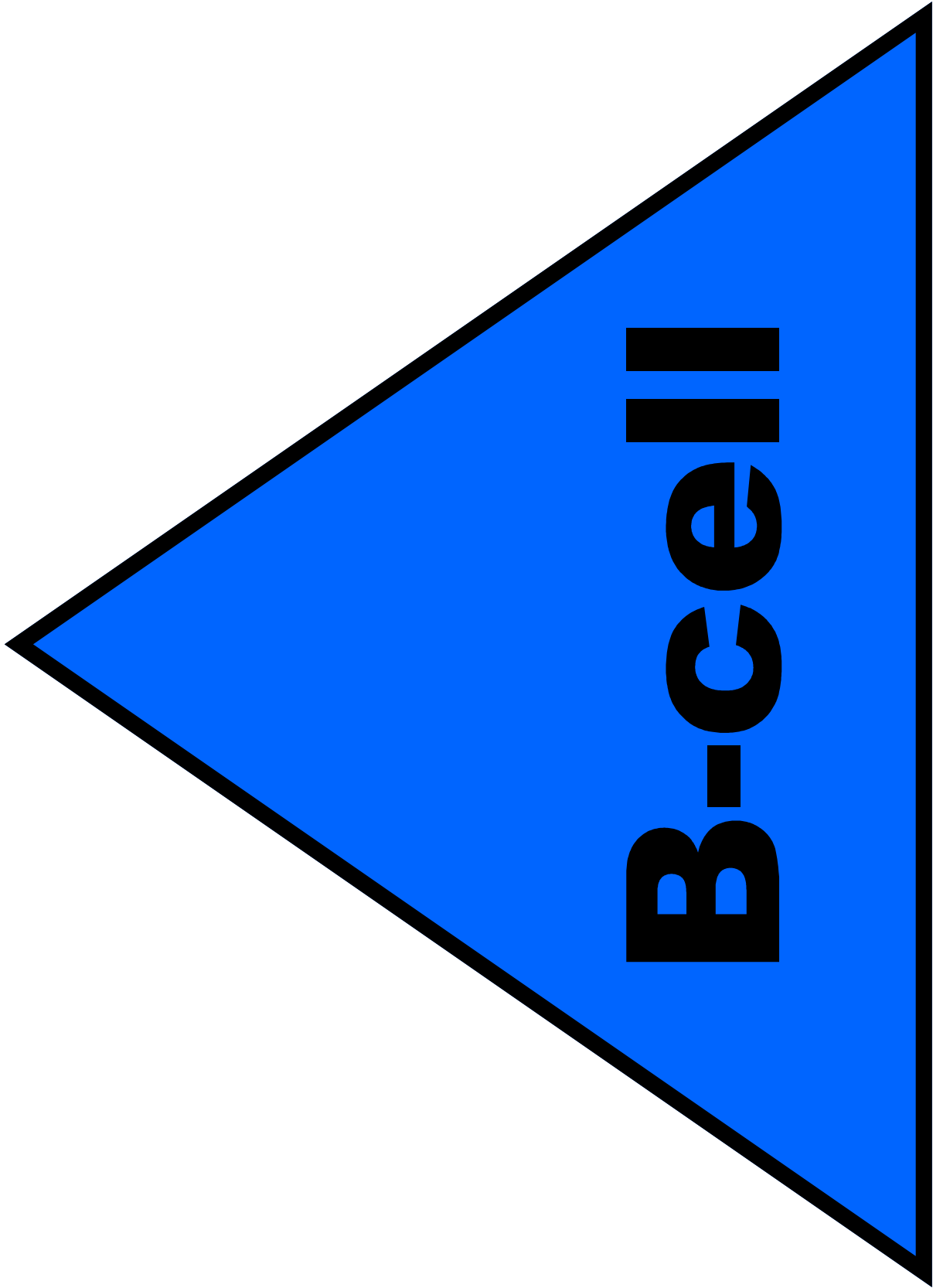


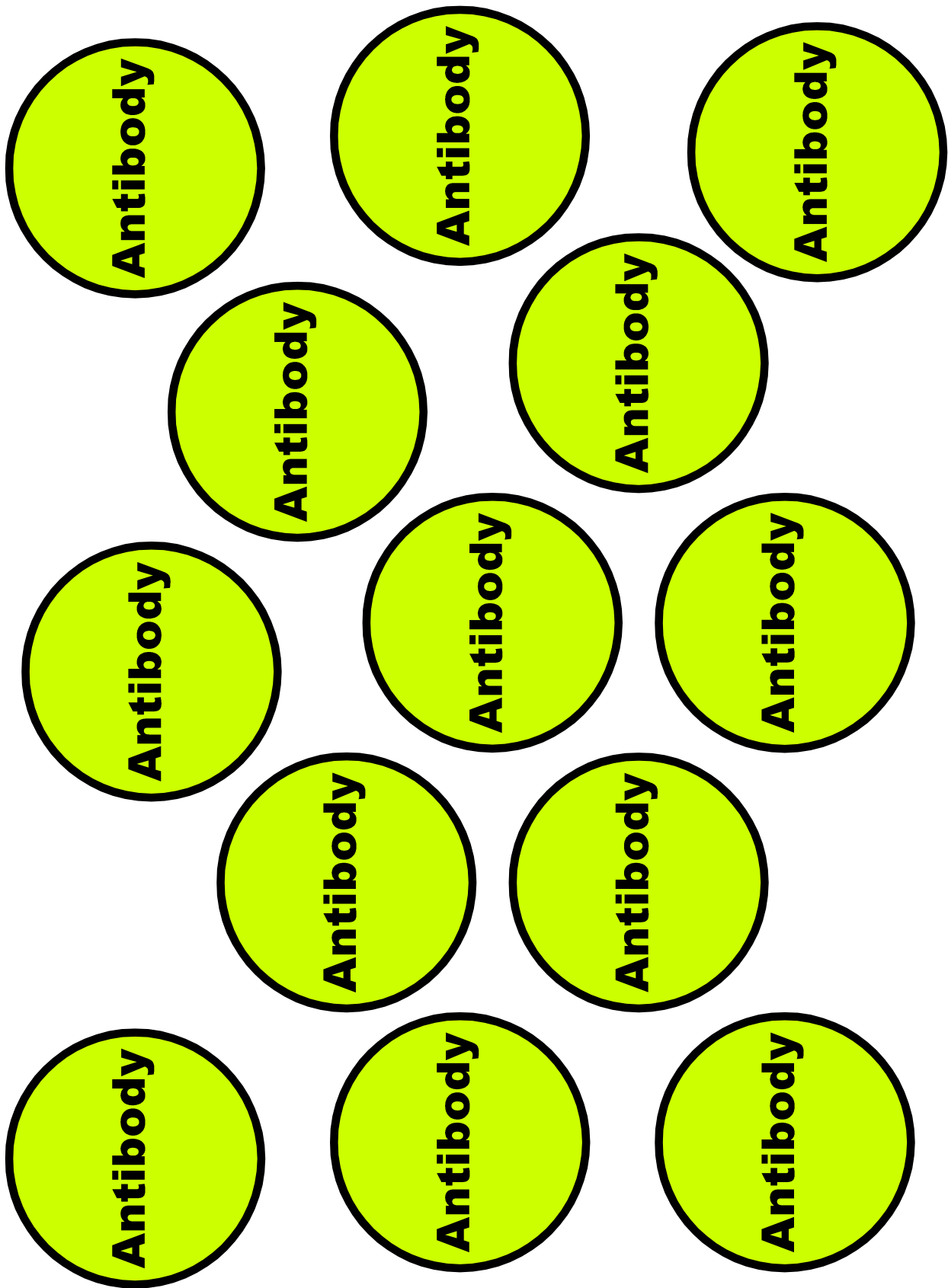
Plasmas
B-cells



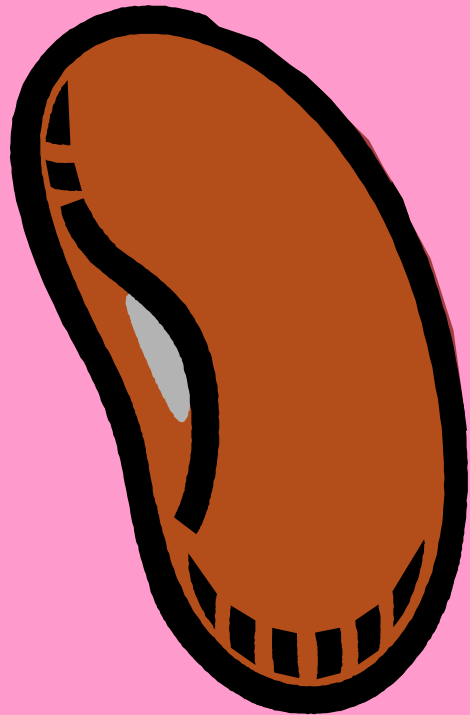


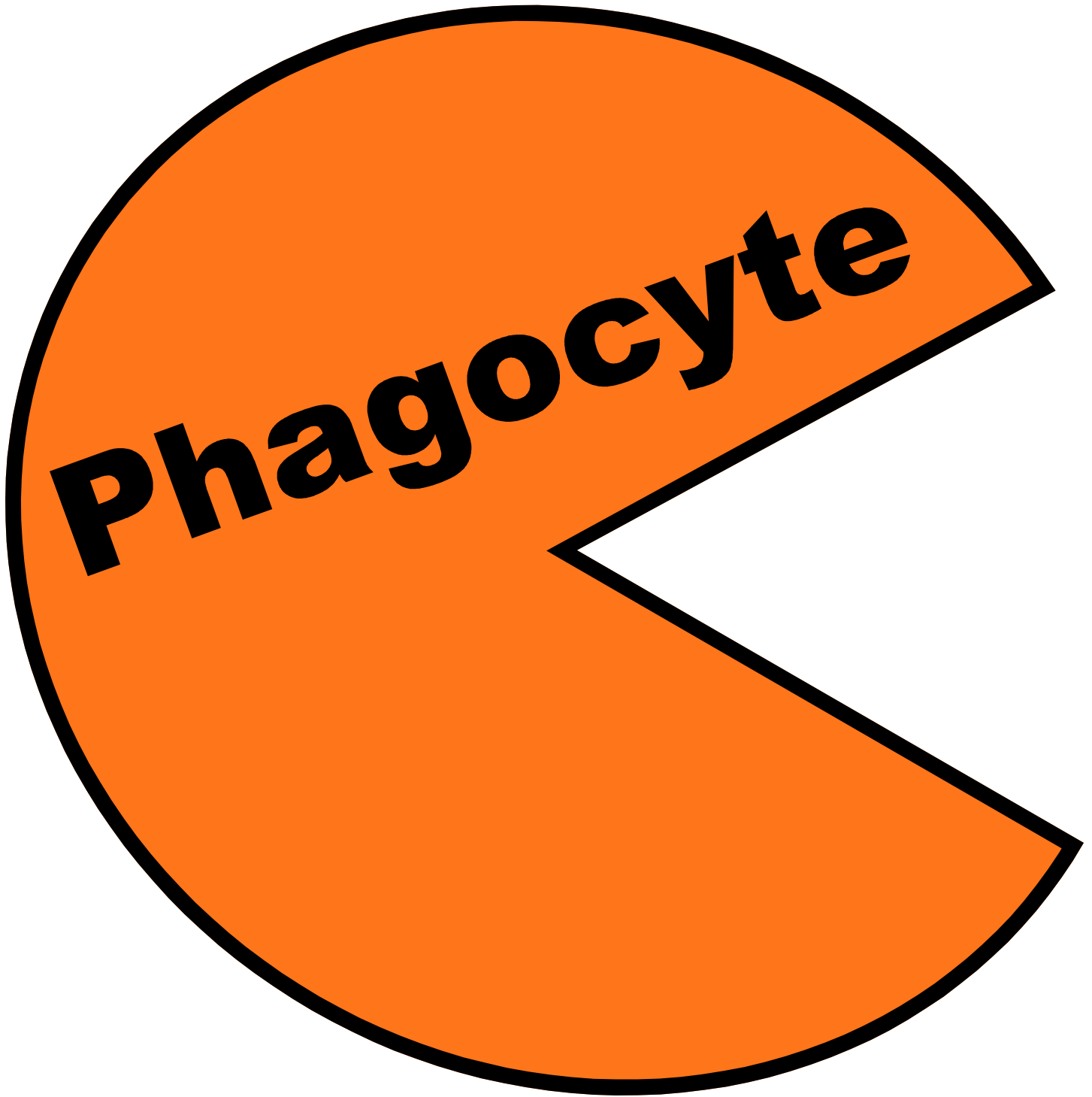


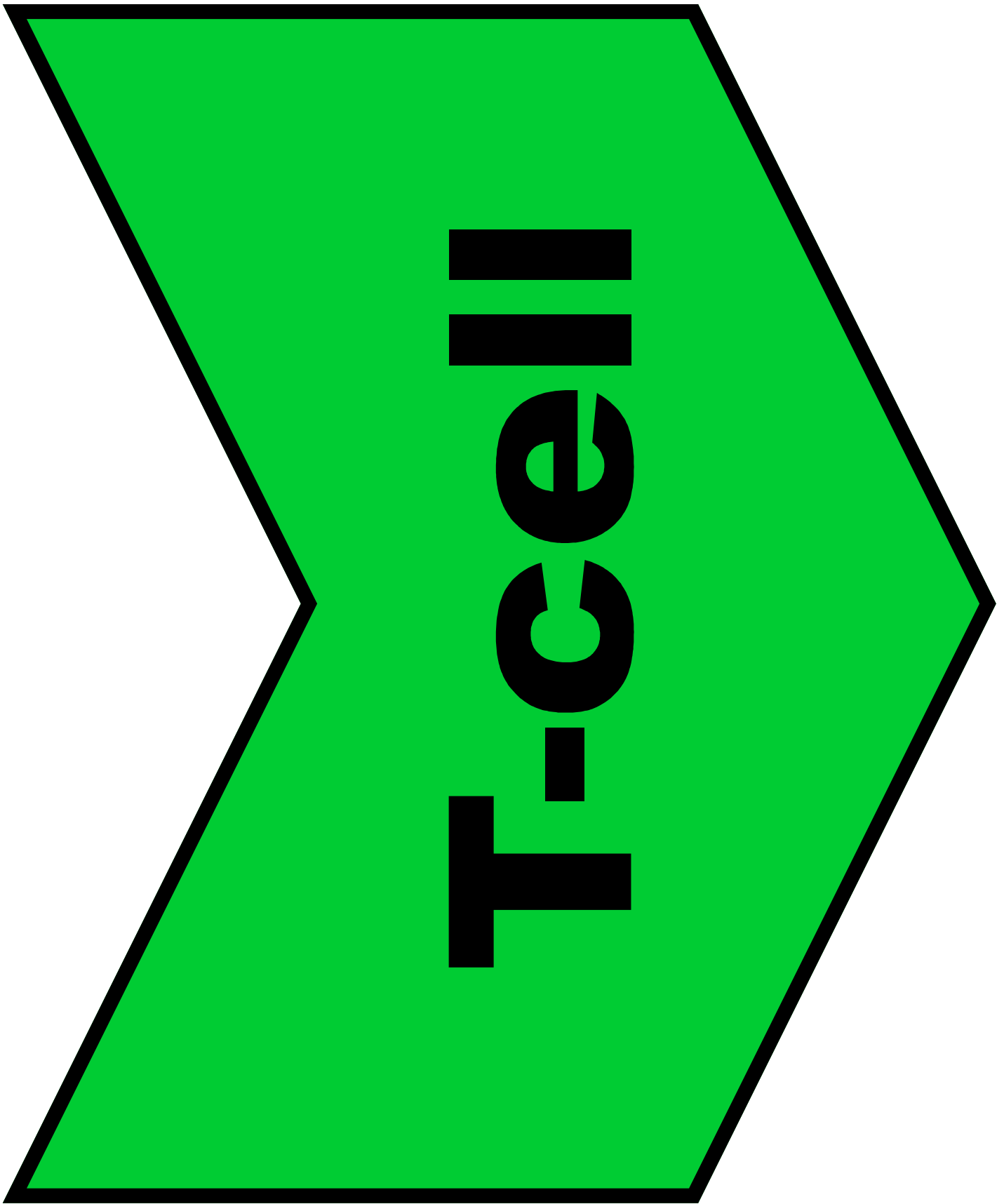


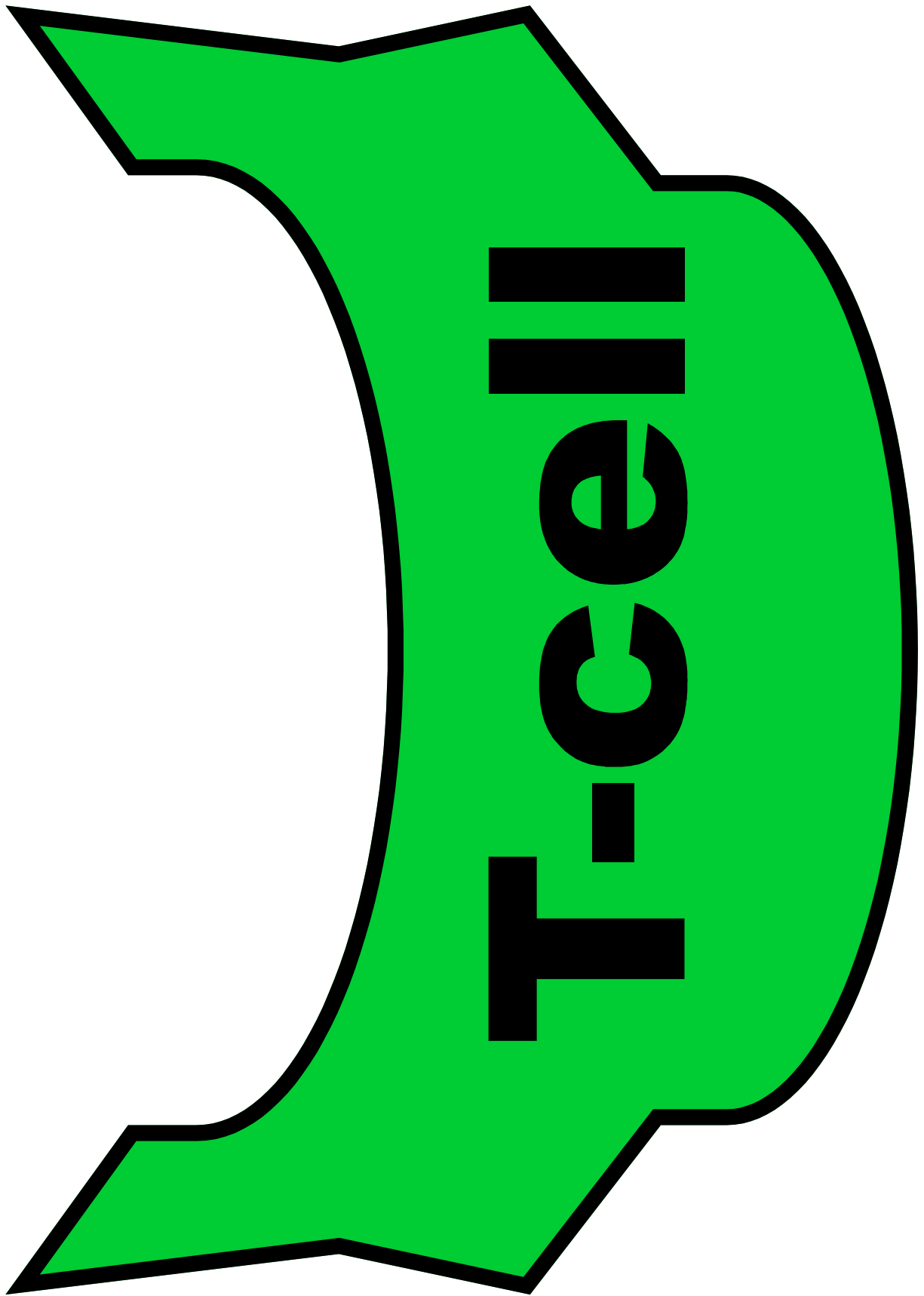


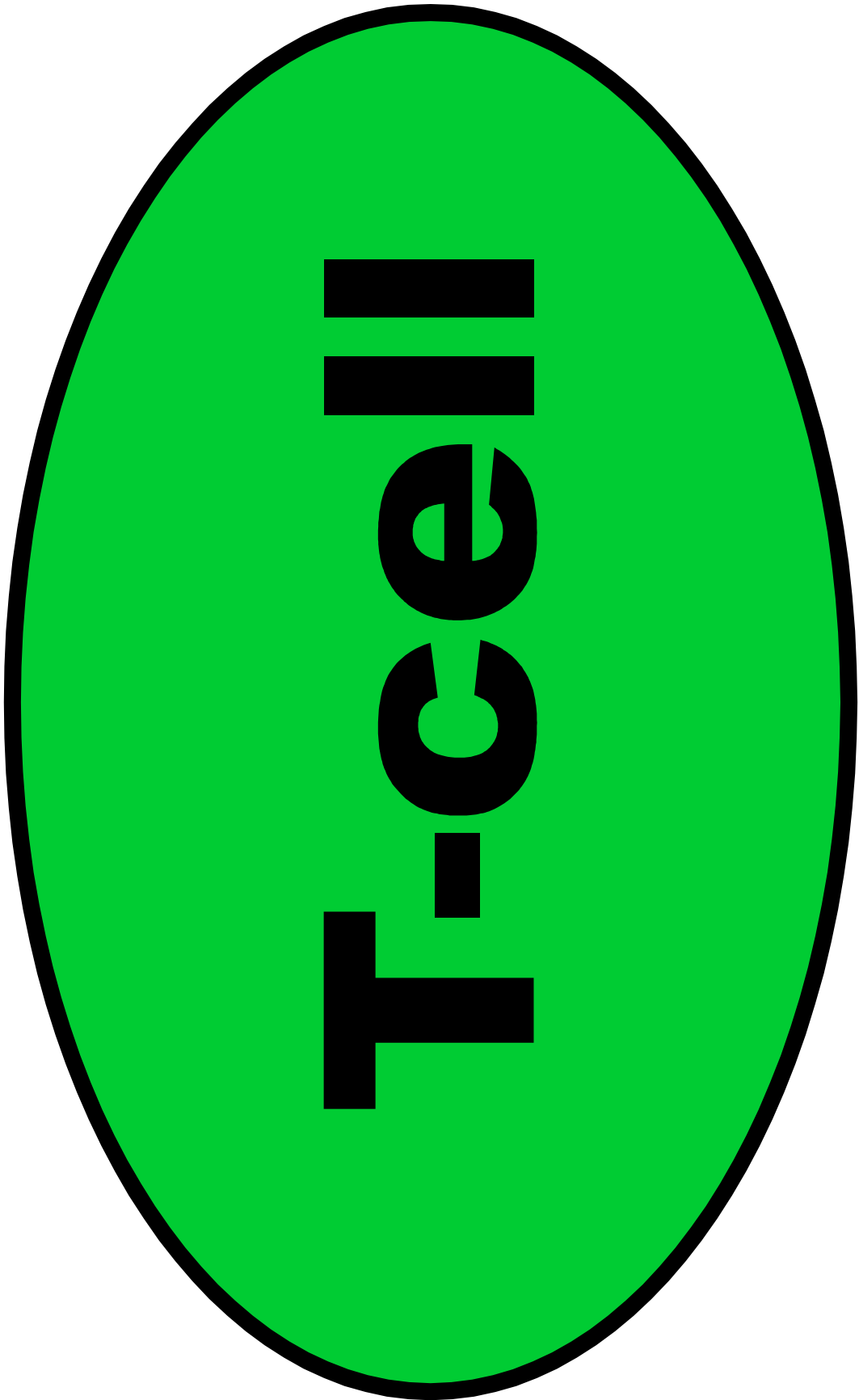
Lymph Node

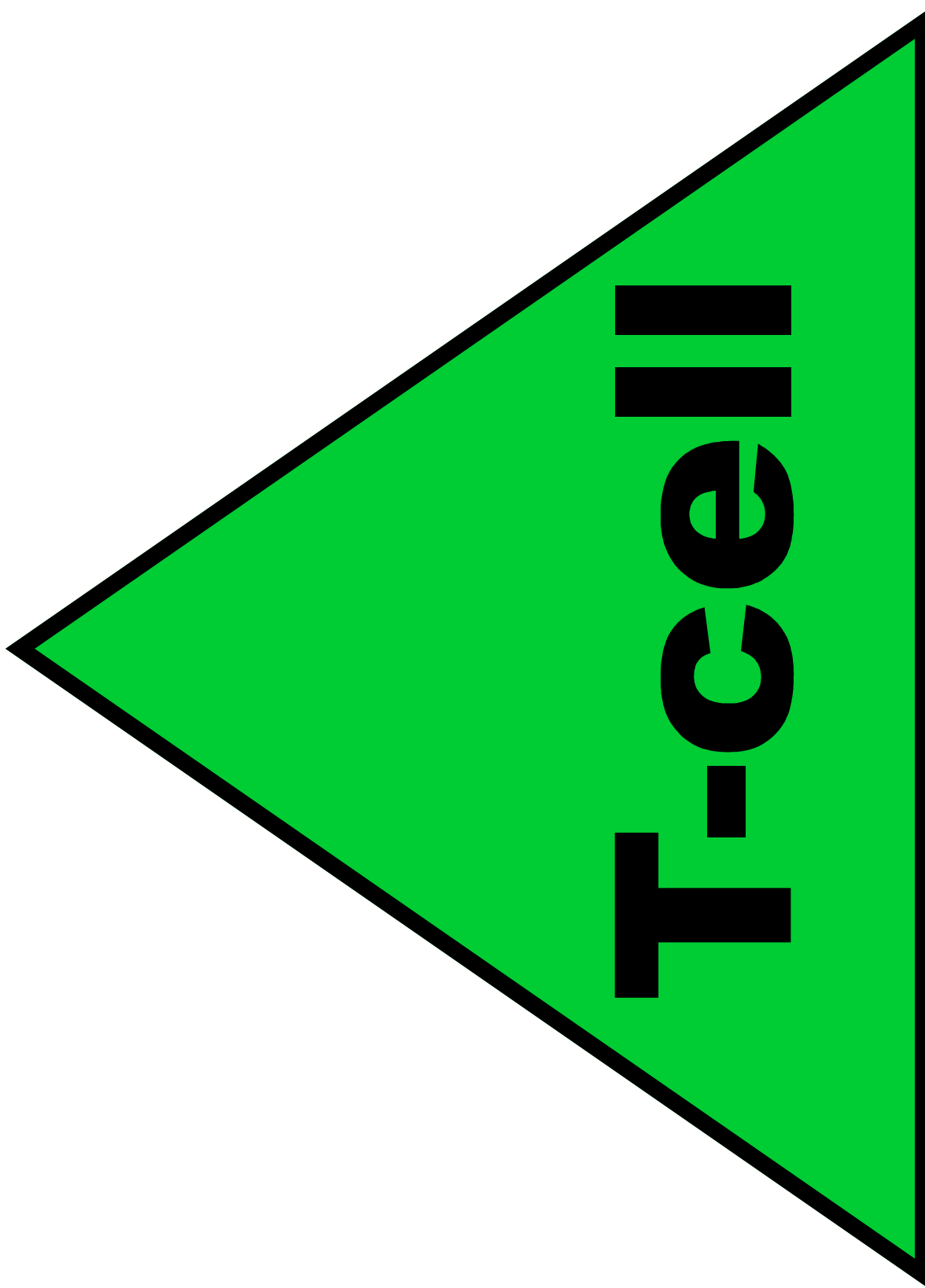












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www.who.int

Additional Activities and Resources for Teachers, Students and Parents

Band-aids and Blackboards: When Chronic Illness or Some Other Medical Problem Goes to School. An interactive website especially for kids with illnesses. Also contains links to other kid-oriented health/science activity websites.

www.faculty.fairfield.edu/fleitas/contents.html

Big Chalk on the Web and Homework Central

Lesson plans and homework resources for students and teachers in elementary, middle and high school.

www.bigchalk.com

DiscoverySchool.com: Lesson plans for teaching AIDS issues, the health risks of body art, and other health-related concepts.

school.discovery.com

The Handwasher's Brigade Presents: How To Wash Your Hands! Videotape. PKIDs, 1999.

The National PTA: Resources especially for parents on a variety of issues, including infectious diseases in schools.

www.pta.org