THE IMMUNE SYSTEM GAME

(a large group game that resembles “human chess”)

Target age group: ages 11-15 (but could also be used with older)
For how many players: up to 24 players (but could accommodate a few more if necessary)
Time needed to explain the game to the players: about 15 minutes
Approximate playing time: 20-25 minutes per game (There are enough BODY EVENT questions for two games. You can play without the body events, also, if you want to play more games.)

Purpose of the game: This game is intended as a review activity. You’ll need to find a source of information about the role of T cells and B cells and how they work together. You don’t need anything complicated, just some basic information.

Disclaimer: This game oversimplifies the immune system quite a bit. The focus of this game it to reinforce the idea that B cells and T cells work together to fight antigens (invaders). This does not provide in-depth information about these cells, and is only intended to be an introduction to them.

You will need:

--a large playing area marked out in an 8 x 8 grid (*see notes below)
--a name tag for each player, telling what kind of cell they are. Make sure they are big, so they can be read quickly and easily. A full sheet of colored paper taped to both front and back would be good. If you plan to re-use the game in the future, you might consider making the tags out of squares of colored felt. They could almost be more like costumes. You can be as simple or as elaborate as you want to. Body cells don’t really need a label. You can just assume all unlabeled players are body cells. (Body cells will also remain seated so that will help to distinguish them.)
--antibody ”tags” for the B cells (either a clothespin or a piece of colored paper with a loop of tape on one side)
--index cards and a marker (or you could use pieces of paper cut to about that size)
--the list of questions

Set up:

Making the playing grid:
You will need to make an 8x8 grid on the floor. If you happen to be playing in a room that has a tiled floor, you could use the tiles as a guide. You might want to use yarn stretched out and taped to the floor at intervals, or you could use the blue masking tape (the kind painters use for edging.). If you are putting tape on a carpet, you can probably get away with using regular masking tape or duct tape, as these will peel off most carpets easily. Just test the tape ahead of time and make sure it comes off the floor. (Don’t use Scotch tape or old masking tape, as these could almost impossible to remove.) If you use yarn, make sure the yarn is not loose or the players might trip on it. If you can play outside on a driveway or parking lot, you can mark out the square with chalk. Outdoors would be a great option if you have it available to you.

Write the numbers 1 to 8 and the letters A to H on index cards and lay them, in order, next to the squares on two sides of the square, so that you have labeled the grid in the manner of the game “Battleship.” Each square will correspond to a pair of coordinates, such as A5 or D3.
Cut up a few index cards into small squares and write a coordinate on each one (A1, A2, A3, etc). For a quick short-cut that makes fewer cards to write, you could skip every other coordinate and write A1, A3, A5, A7, B2, B4, B6, B8, C1, C3, etc). Each player will draw one of these at random to find out where they will begin on the board.

Preparing to play:

Here is a suggested distribution of roles according to how many players you have. You don't have to follow these guidelines exactly (you may have reasons for adapting) but they'll help you organize.

number of players you have

	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
body cells	2	2	3	3	4	5	6	6	6	7	7	7	7	8	8	8	8
B cells	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	4	4
killer T cells	2	2	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4
viruses	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	4
bacteria	1	2	1	2	2	2	2	2	3	3	3	3	4	4	4	4	4

Another way you could adapt the game for fewer players is to use something else to represent body cells, such as pillows or large pieces of paper. (The only drawback with doing this is that the viruses won't be able to turn the body cells into more viruses.)

NOTE: If you are only playing with only about a dozen players, you want to consider down-sizing the playing area from 8x8 to 7x7, or even 6x6.

To assign parts at random, cut slips of paper according to the number of players who will be playing, and write a role (virus, T cell, etc) on each one. Put the slips of paper into a bag or box and have the players draw one out at random. If you will be playing for than one round, make sure that the players who were body cells in the first round get to be immune cells or pathogens during the second round. (To do this, just temporarily remove the body cell card from bag while the former-body cells are drawing new cards. When they are done drawing, then replace the body cells card into the mix and continue with having the rest of the players draw cards.)

NOTE: Make sure each player is wearing a "name tag" that tells what kind of cell they are (except the body cells won't don't necessarily need a name tag, as mentioned previously). Also make sure you have a few extra virus tags for body cells who will become viruses during the course of the game.

The object of the game:

The pathogens try to kill the body cells. The immune cells try to protect the body cells by counterattacking the pathogens. To kill a cell, the pathogen just moves onto the body cell's square. If the pathogen is a virus, it can turn that body cell into a virus. (In real life, viruses use body cells to make more viruses.) If the pathogen is a bacteria, the killed body cell just moves off the board like a captured chess piece does. Sometimes this game ends with the immune system winning. Sometimes it ends with the pathogens successfully killing all the body cells. (Fortunately for us, in real life the immune system wins almost all of the time.)

Rules of movement:

Body Cells must stay put during the course of the game unless they are turned into a virus as the result of a virus attack.

Viruses and bacteria may move one space any direction except diagonal.

--For bacteria to attack a body cell, they simply move onto the space the body cell is on, just like in a chess game. (But remember, no diagonals!) The body cell must then leave the board.

--When a virus attacks, it does not move onto the cell's space. The virus simply puts a virus tag onto that body cell. The body cell player stands up and is now a virus! (Make sure you have extra virus tags available.) Remember, no diagonal tagging!

B cells may move 2 spaces, but not diagonal. They may only tag antigens, not capture them. B cells may tag any pathogen that is standing on a space adjacent (right next to) theirs on one of the flat sides. They cannot tag diagonally.

Killer T's may move only one space, but can move in any direction. T cells are free to move or capture on the diagonal. They can only capture things that have an antibody tag already on them. To kill a pathogen, the T cell must move onto the pathogen's space. The pathogen must then leave the board.

Basic method of play:

The game is a combination of independent movement on the board by each type cell AND a series of "body events" that are read from the two following lists.

Basic format: Pathogens move, immune system cells move, body event is read. Repeat.

Give each of the body cell players one (or two) of the "body events" to read aloud on their turn. (Just read them in numerical order.) However, this is not required. The body events can also be read by the supervising adult, or an official student "narrator." Whatever works best for your situation.

The game begins withe the pathogens (viruses and bacteria) making a move. They all move at the same time. (Even though in real life pathogens can't really coordinate their activity, don't discourage the positive social interactions that might occur between players as they discuss a bit of strategy.)

After the pathogens have had their turn (which shouldn't take more than 15 seconds or so) then the immune system cells get their turn.

Then the first "body event" is read out loud so everyone can hear. There will be special instructions for particular cells that will come into play on the next round.

Continue this pattern until either all the body cells OR all the pathogens are gone from the board. If you still need more playing time after the last body event is read, just continue playing, alternating between pathogens and body cells, until one side wins. (You could also just start recycling the body events, and start over again with number 1.)

If you happen to run into any unusual situations that are not covered in the basic rules of play, the supervising adult will need to decide what to do. Just do what works best for your situation. As long as everyone is abiding by the same rules, it's a fair game.

Suggestion: If you are playing more than one round, make sure the players who were body cells the first time get to be immune cells or pathogen the second time.

Teaching tip: If you've done some reading about the immune system before playing, you'll find that various scenarios may come up during the game that lend themselves to (very brief) spontaneous "tangent" discussions. For example, there really are diseases that affect B cells (at the end of game 2). How exactly does this affect the function of the immune system? And what would happen if the B cells got mixed up and started tagging body cells? Would body cells then get attacked? (Yes, these are called auto-immune illnesses. The body begins attacking its own cells my mistake.)

BODY EVENTS FOR GAME 1

You may want to cut these into individual slips and give one to each “body cell” player.
Or, a supervising narrator (the teacher) may read them out loud.
These are written as though the body is talking about itself.

1) Today I went on a 5-mile run, even though I was not feeling well. This used up a lot of my energy so now I have less energy for fighting pathogens. My immune system feels weak and the pathogens have an advantage. Both viruses and bacteria may move 2 spaces on this turn instead of just one.

2) I am now running a fever. This stimulates my immune system into action. On this turn, the T cells may also move 2 spaces, just like the B cells.

3) I just received a shot of interferon, a medicine that interferes with the ability of viruses to attack cells. Viruses may not move on this turn, only bacteria.

4) The doctor prescribed an antibiotic to help fight off a bacterial infection. Bacteria may not move on this turn, only viruses.

5) I decided to stop taking my antibiotics even though the doctor said to finish the whole bottle. Any bacteria who are out of the game may re-enter on any available square only the edges.

6) I went to visit a sick friend and was exposed to more pathogens. Two viruses who got captured may re-enter the game at any available edge space.

7) When I got sick this time, I really took good take of myself. I drank plenty of fluids and got lots of rest. This helped my immune system. Both B cells and T cells may take an extra step on this next turn.

8) I got another infection, but this time I did what the doctor said and took my antibiotics for the full ten days. All the bacteria are now out of the game.

9) I just found out that you can catch the same bacteria more than once. The bacteria may re-enter the game on any available edge space.

BODY EVENTS FOR GAME 2:

1) I ate nothing but junk food this week, and therefore I did not get the vitamins and minerals I needed. My immune system is feeling very weak. The B cells may only move one space, and the other cells may move but may not capture.

2) This week, I did much better with my nutrition. I also made sure I got plenty of rest and the right amount of exercise. My immune system feels much better. B cells may move 3 spaces, and the other white cells may move 2 spaces.

3) It's allergy season and I have "hay fever" symptoms. My immune system feels overwhelmed with all the extra antigens and is having trouble keeping up. The B cells may only move one space and T cells may not move at all.

4) Allergy season is over, and my immune system is back to normal. However, I attended a week-end retreat with my friends and got exposed to lots of viruses. Immune cells move normally, but viruses may move one extra step.

5) I decided to have a sleep-over party and we ate junk food and stayed up all night. The next night I had to stay up late doing homework. I don't feel so well today. I think I feel a cold coming on. Viruses get to move one extra step.

6) I have come down with a disease that affects the functioning of my B cells. The B cells may move on this turn, but they may not tag.

7) I took medicine that will help my B cells to start functioning again. B cells may start tagging again, but they are still weak and can only move one space.

8) I got a shot of anti-viral medicine to help my weak immune system fight off the viruses. All immune system cells function as usual. Viruses standing in rows A, C, E, and G must leave the board. Bacteria may stay.

9) I had to take a course of antibiotics to get rid of an infection. All bacteria must leave the board EXCEPT any who happen to be standing in rows B or G. (These will represent antibiotic-resistant bacteria.)