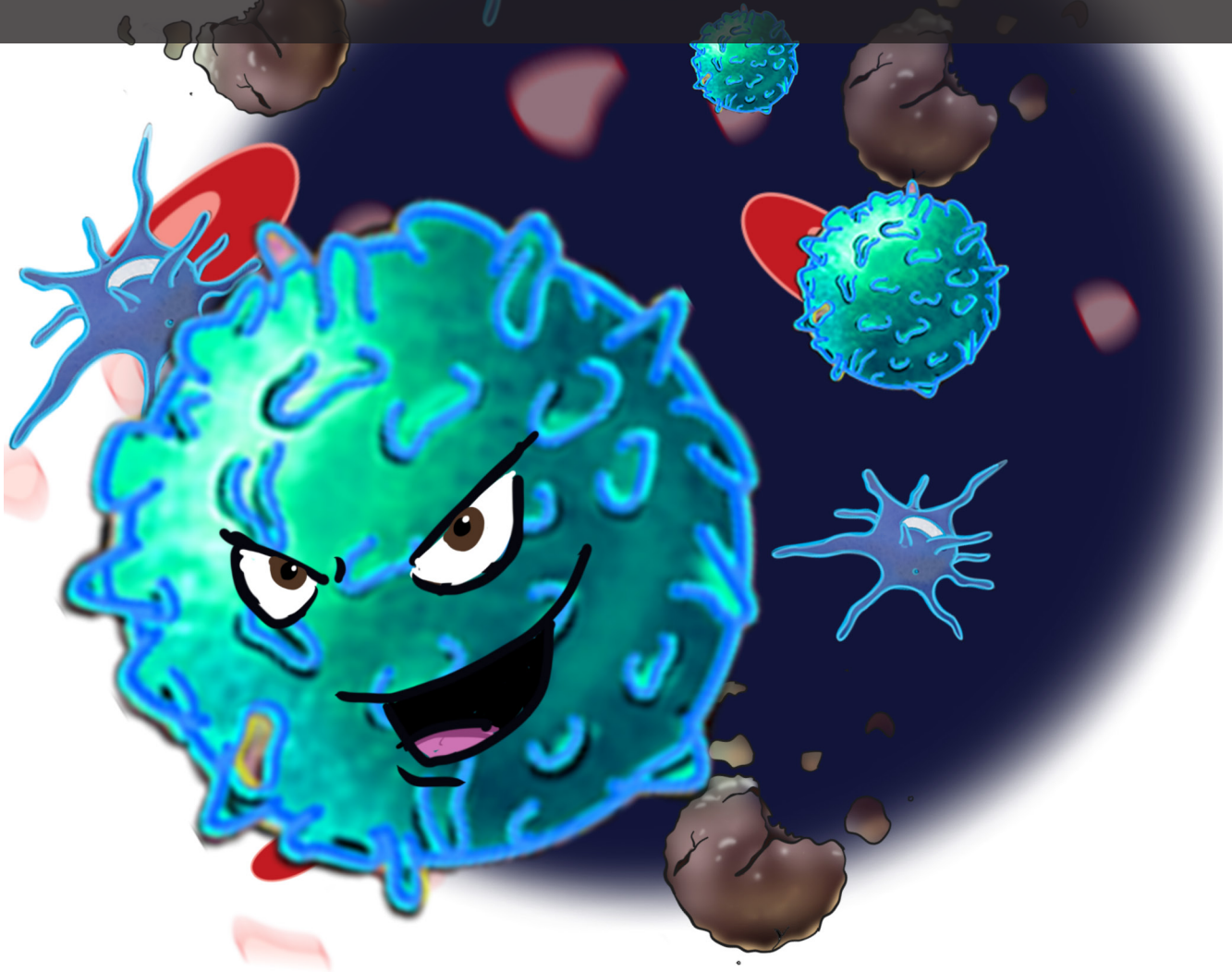


Cancer Immunity Cycle **BLAST!**

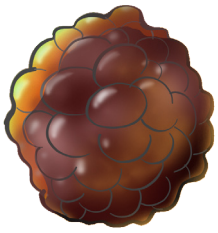
Workbook and Wireframe



Paige Blumer
Advanced Illustration Techniques
Assignment 3
For John Daugherty and Christine Armstrong

December 6th, 2016

Character Index



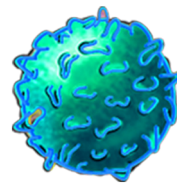
Tumor Cell



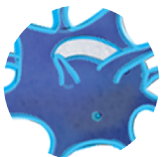
Antigen



Red Blood Cell



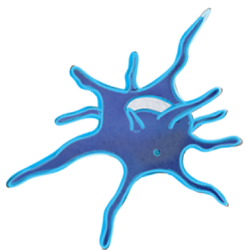
T Cell



Young Dendritic Cell



Lymph Node



Mature Dendritic Cell



Bad Guy

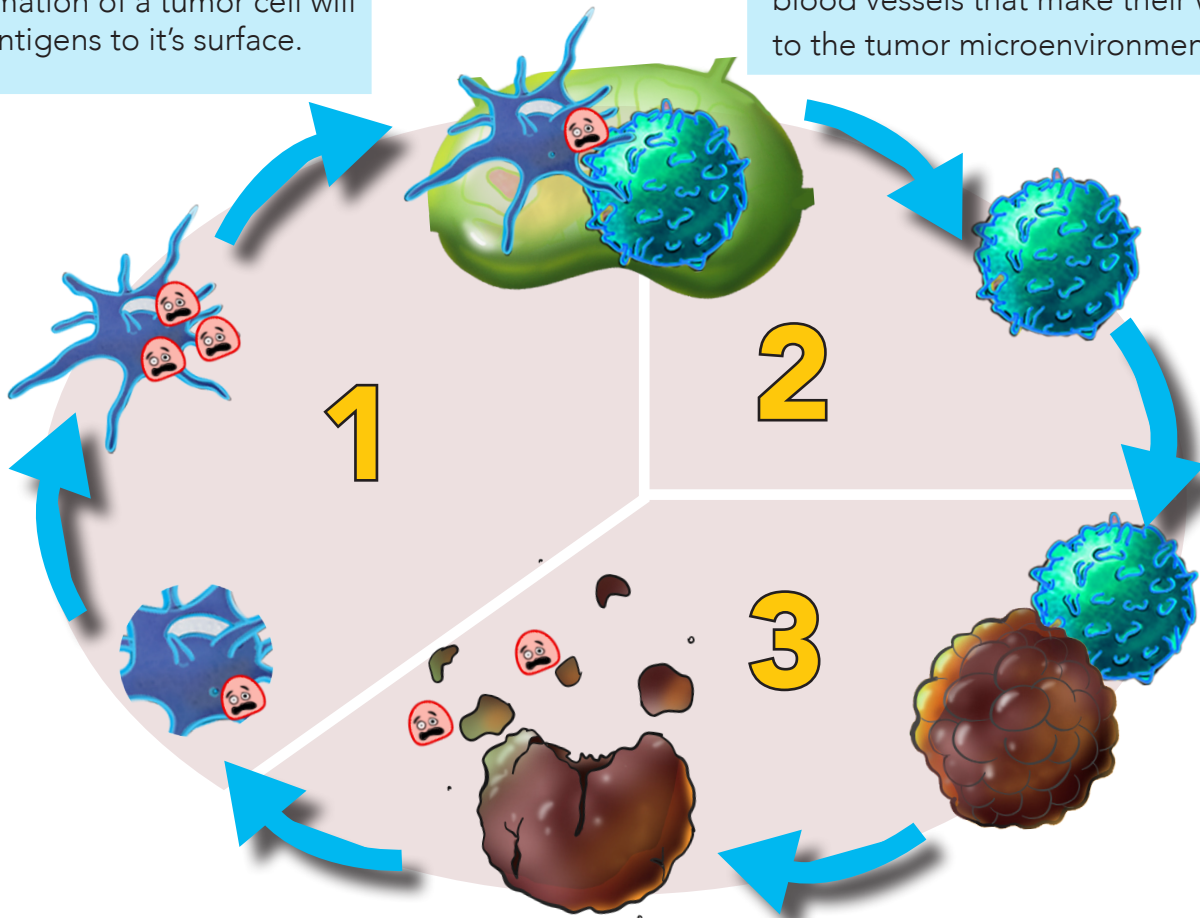
The Cancer Cell Immunity Cycle

The Cancer Immunity Cycle is a complex mechanism by which the immune system can protect the body from cancer. As the cycle repeats itself, a positive feedback loop is created to attack cancer cells within the body.

THE CYCLE HAS THREE STAGES:

1. The initiation of propagation of anti-cancer immunity. Within the tumor microenvironment, the formation of a tumor cell will bring antigens to its surface.

2. Dendritic cells pick up these antigens, and bring them to the Paracortex of a local lymph node to present them to T Cells. The T-cells are activated by this process, and exit the lymph node via blood vessels that make their way back to the tumor microenvironment.

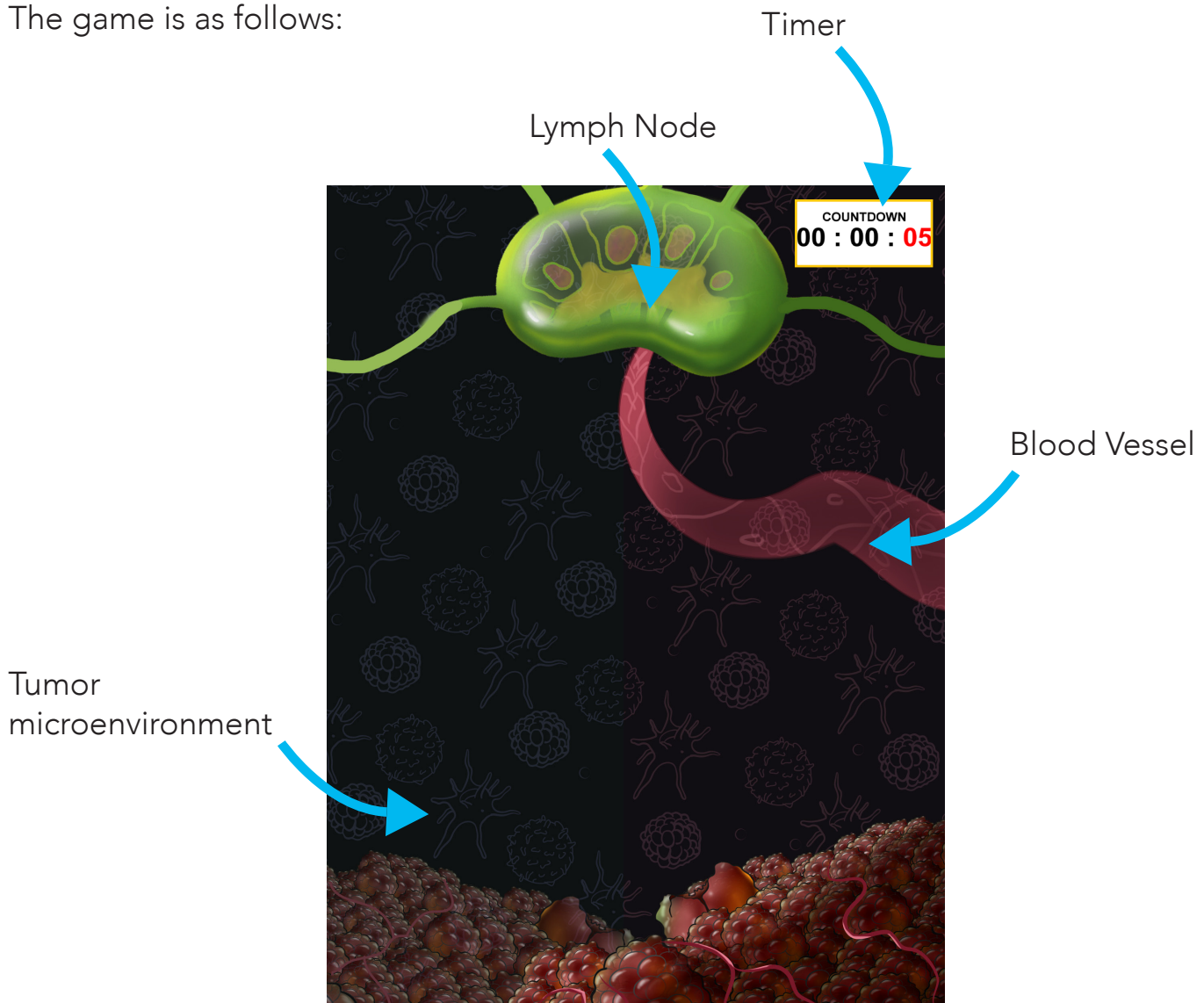


3. The T cells recognize and kill the target cancer cells. The cells die and release additional antigens into the surrounding area, allowing them to be picked up by young dendrites, and the cycle to continue.

The Game

Cancer Immunity Cycle BLAST! is a game application for teaching medical students about the cancer immunity cycle. It is designed to be repetitive, and addicting, allowing the students to recognize the characters and their roles. The purpose of the game is to eliminate all cancer cells before time runs out and the tumor has reached it's growth limit. Specific obstacles will be placed strategically to challenge the player by obstructing the cycle and promoting tumor growth. These obstacles will get gradually more difficult to overcome with each level. Points will be awarded as players beat previous time records. Positive reinforcement includes a point system, and catchy sounds and visuals as each character performs their job. Especially gratifying will be the explosion of the tumor cell and the antigens escaping into the microenvironment.

The game is as follows:



How to Play



Countdown begins

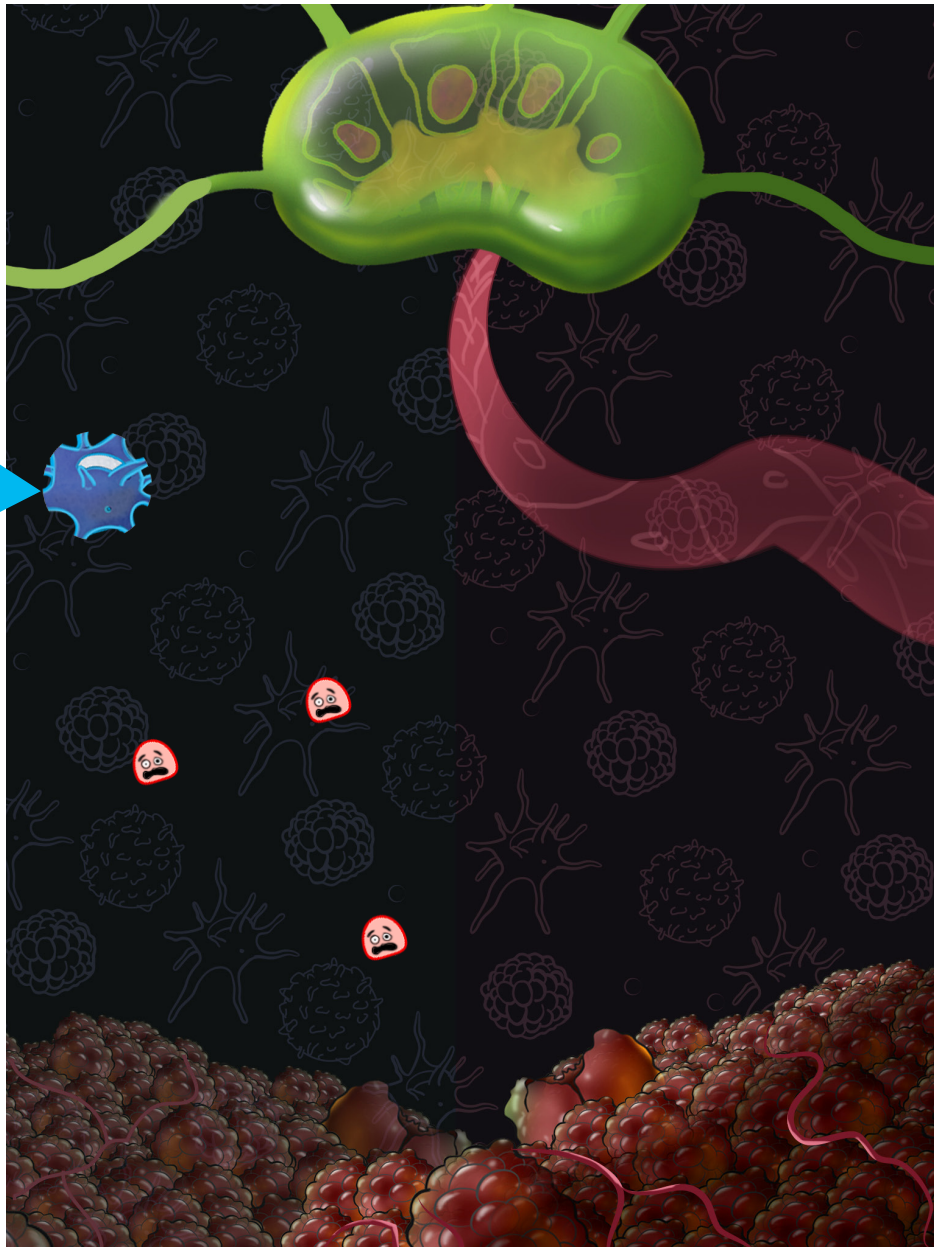
COUNTDOWN
00 : 00 : 05

START

The game begins with a tumor cell exploding and releasing into the tumor microenvironment

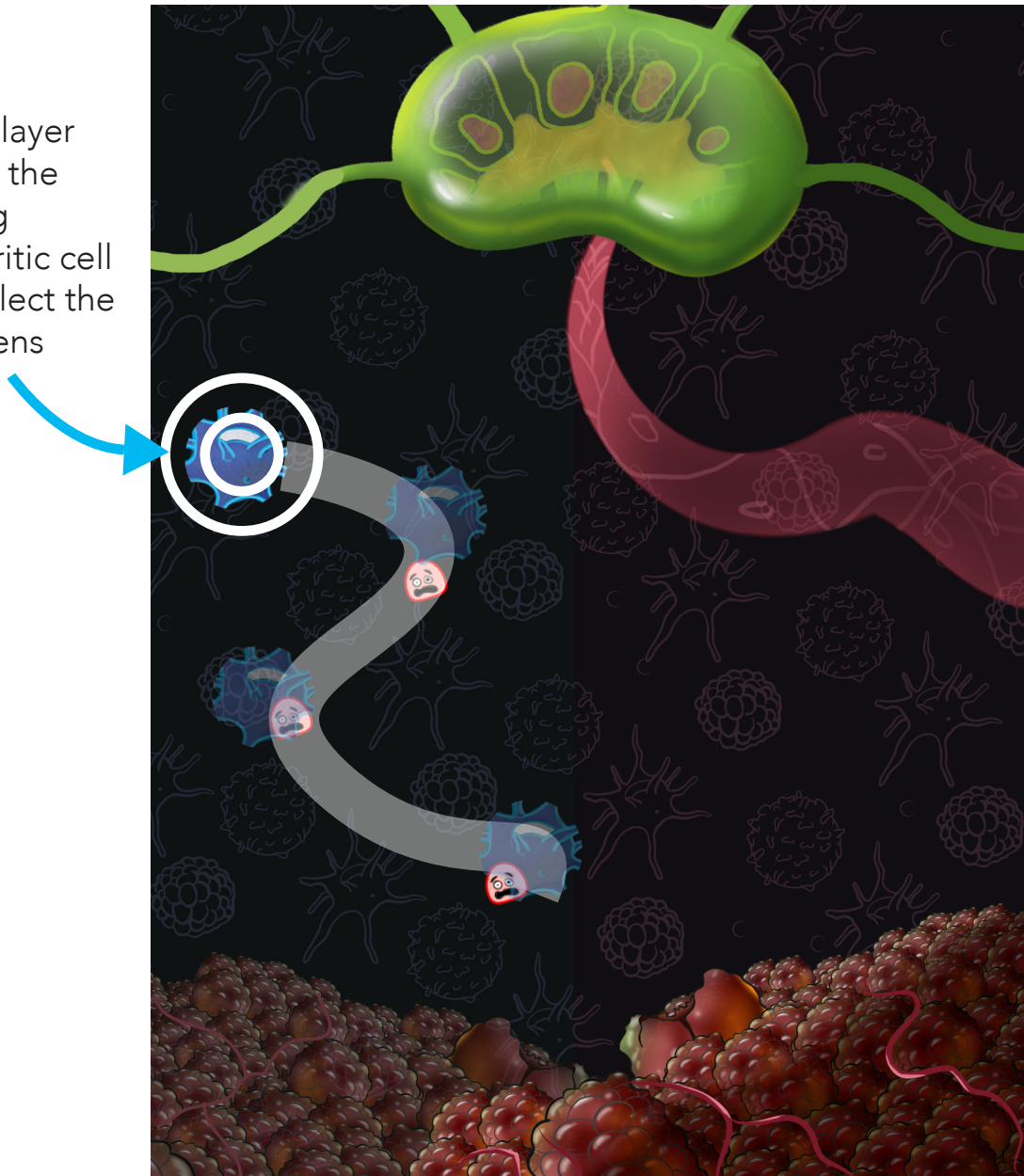
How to Play

A
young
dendritic
cell appears

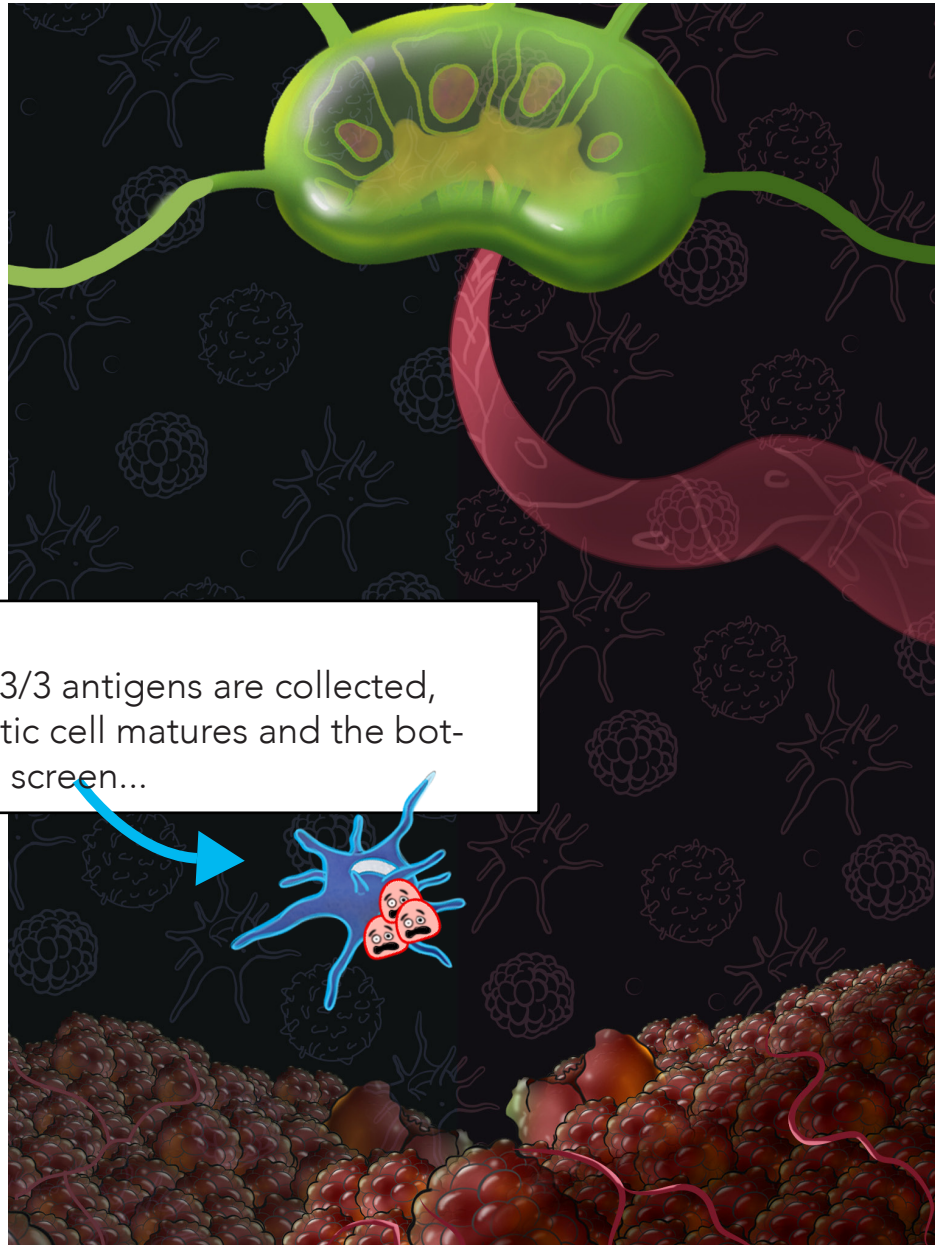


How to Play

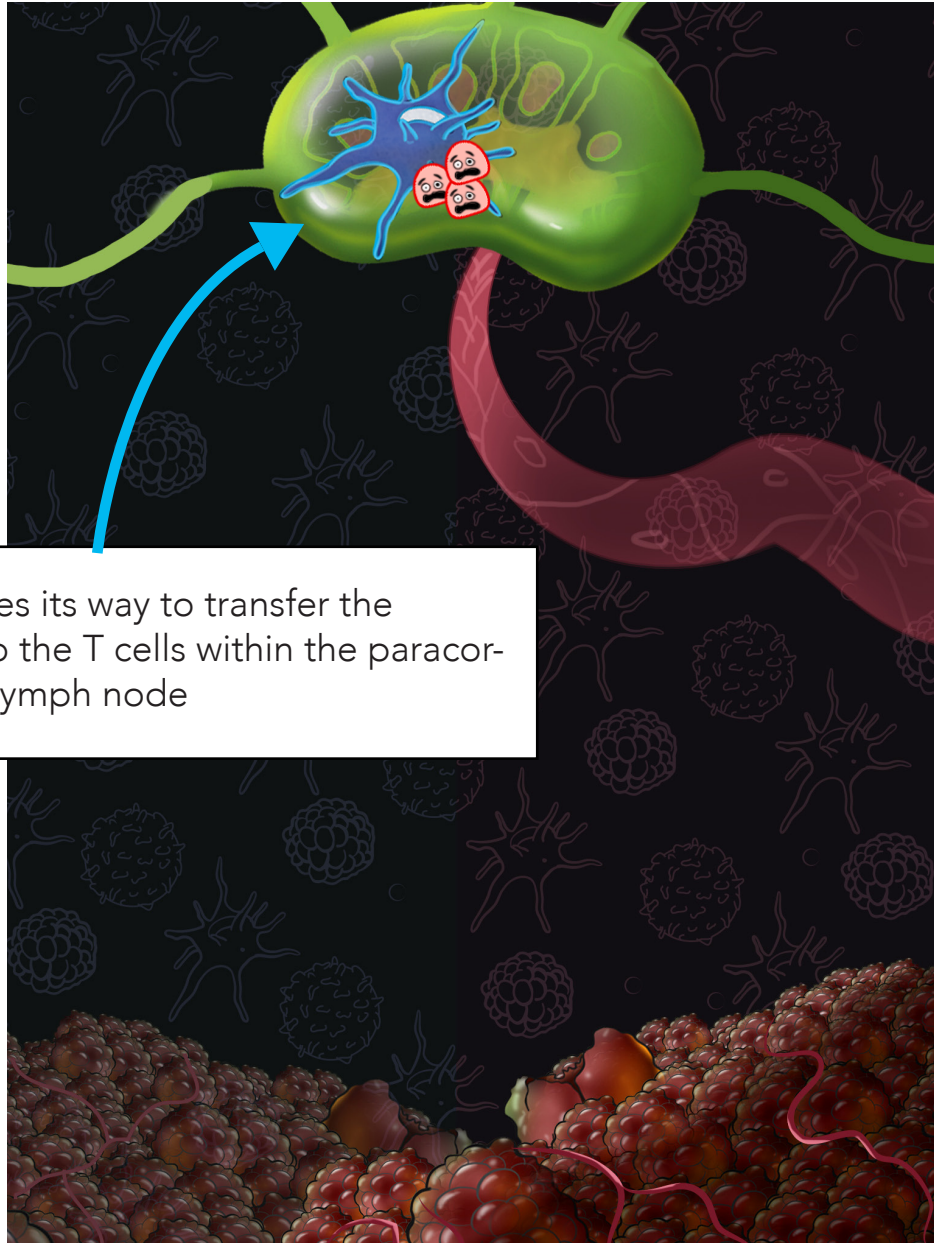
The player
drags the
young
dendritic cell
to collect the
antigens



How to Play



How to Play

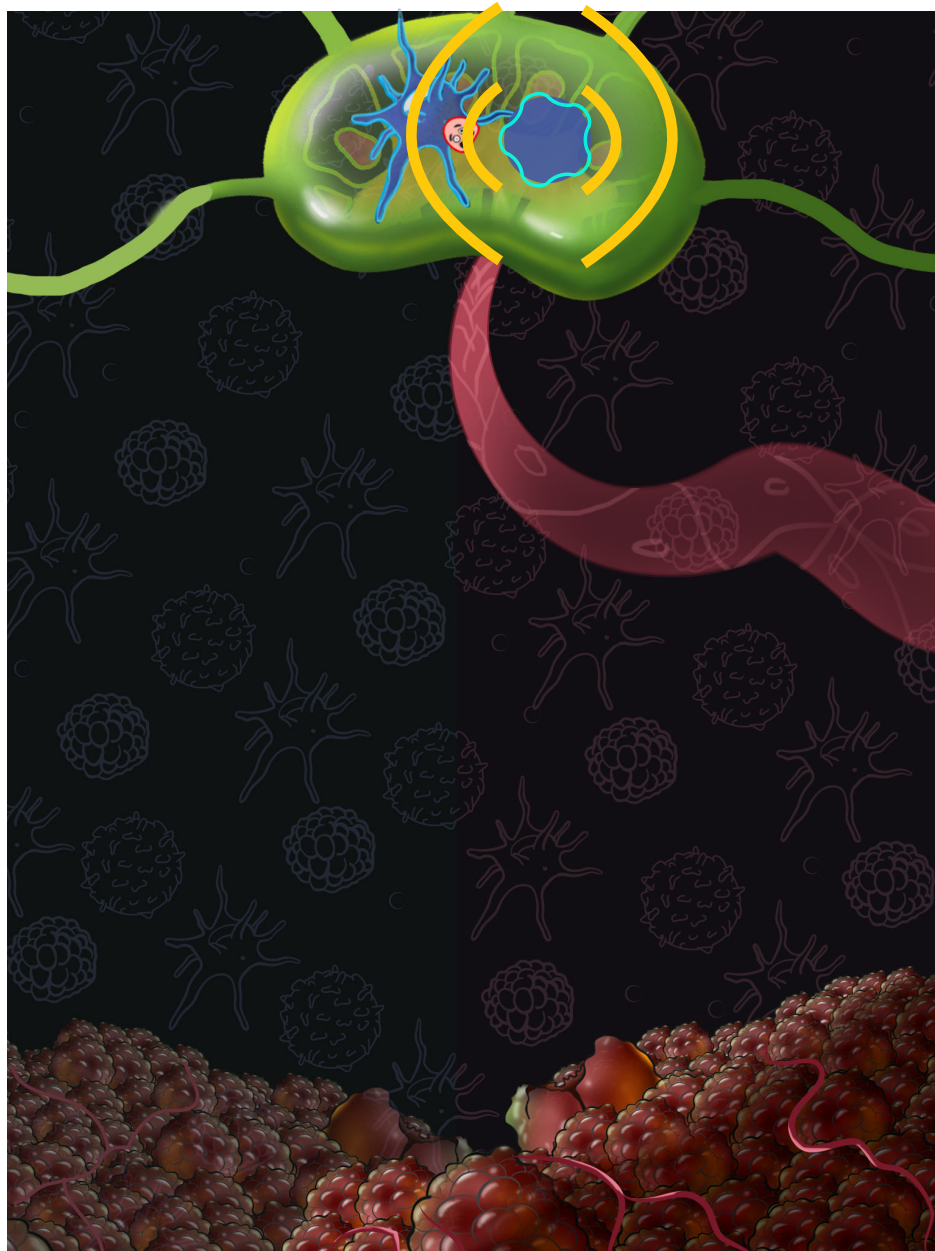


...and makes its way to transfer the antigens to the T cells within the paracortex of the lymph node

How to Play

A T-Cell appears in the lymph node and is activated by the dendritic cell.

Activation occurs and the T cell morphs into a new shape.



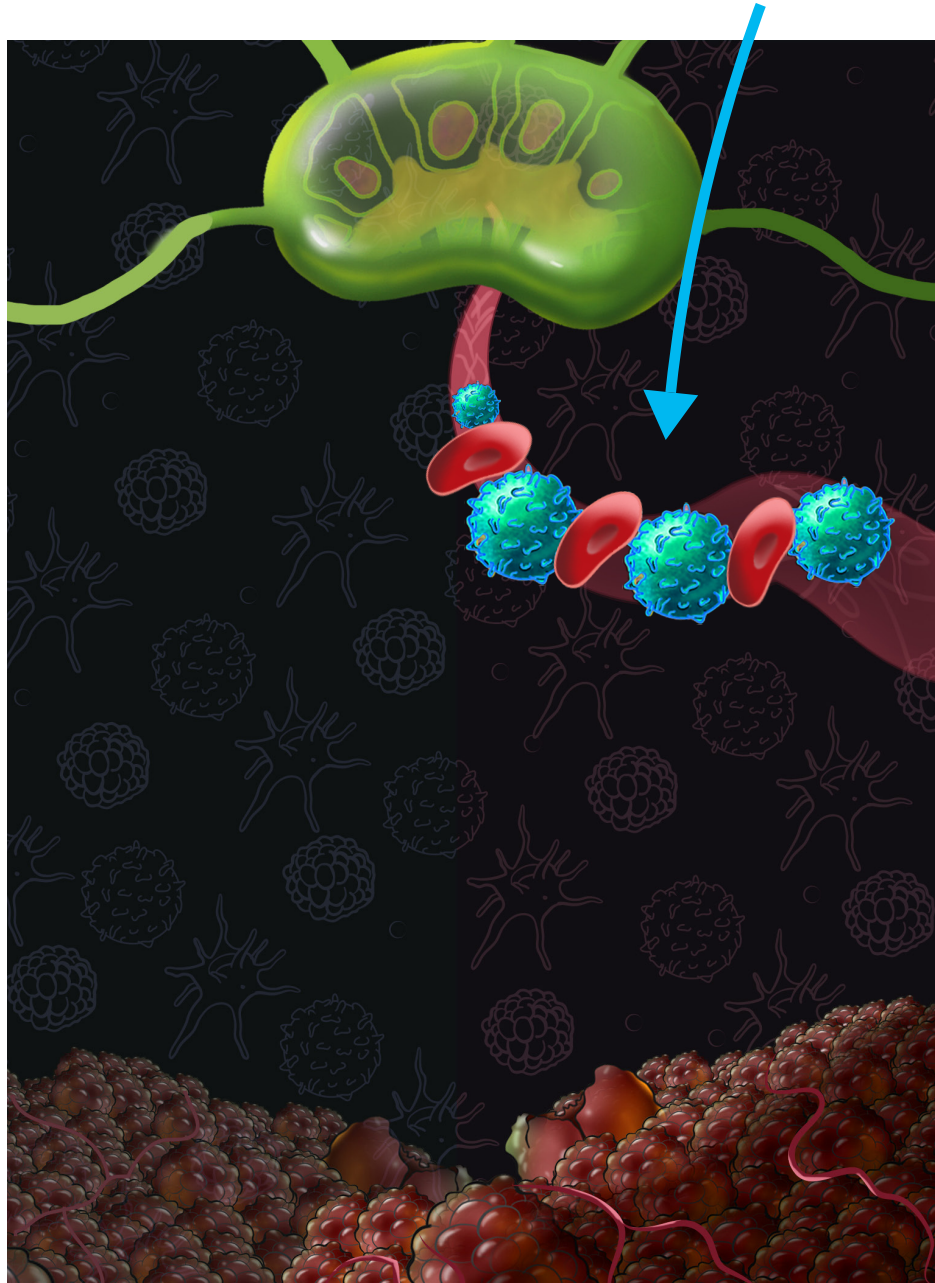
How to Play

The activated T cell enters a queue within the blood vessel.



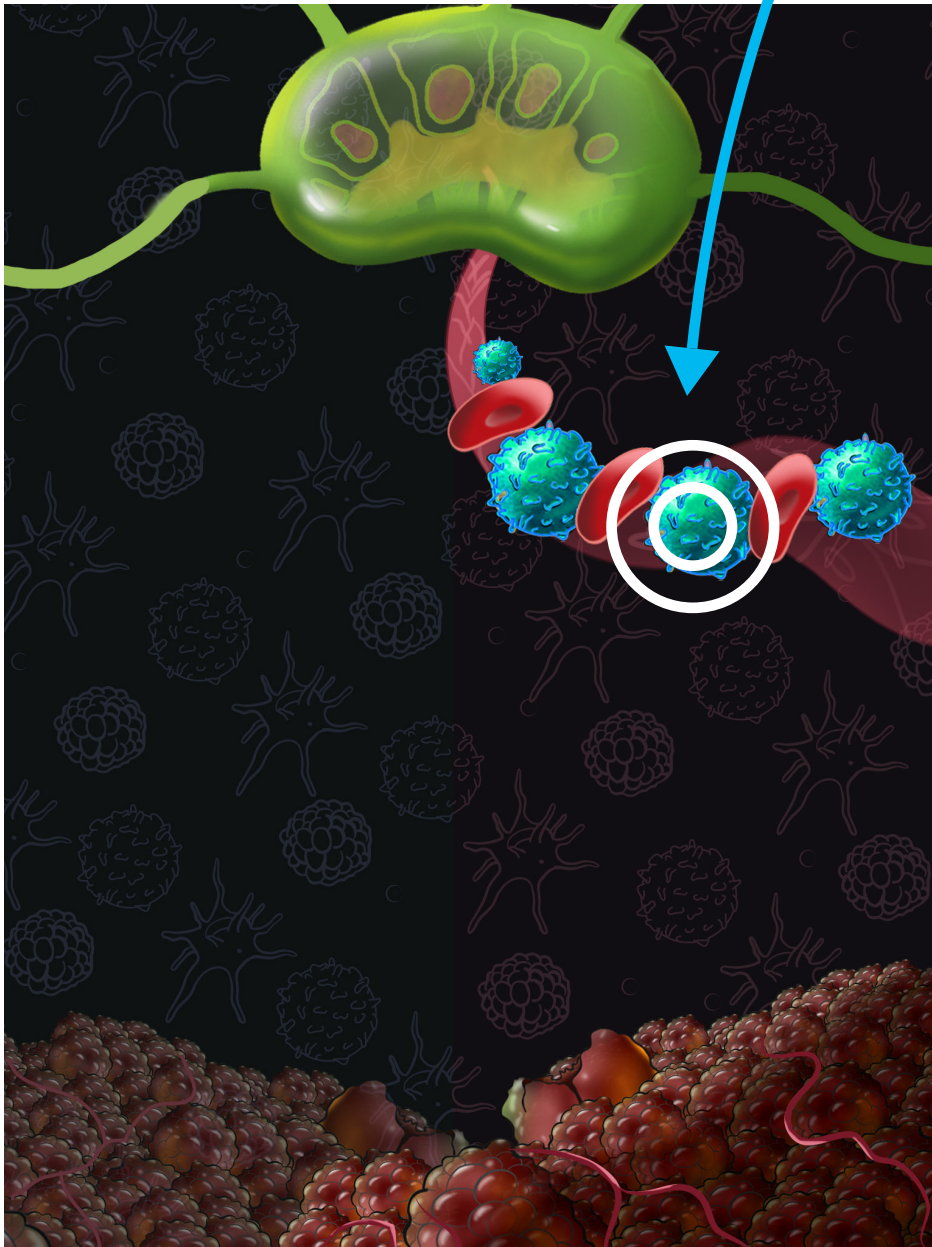
How to Play

Red Blood cells
also make it into
the queue.



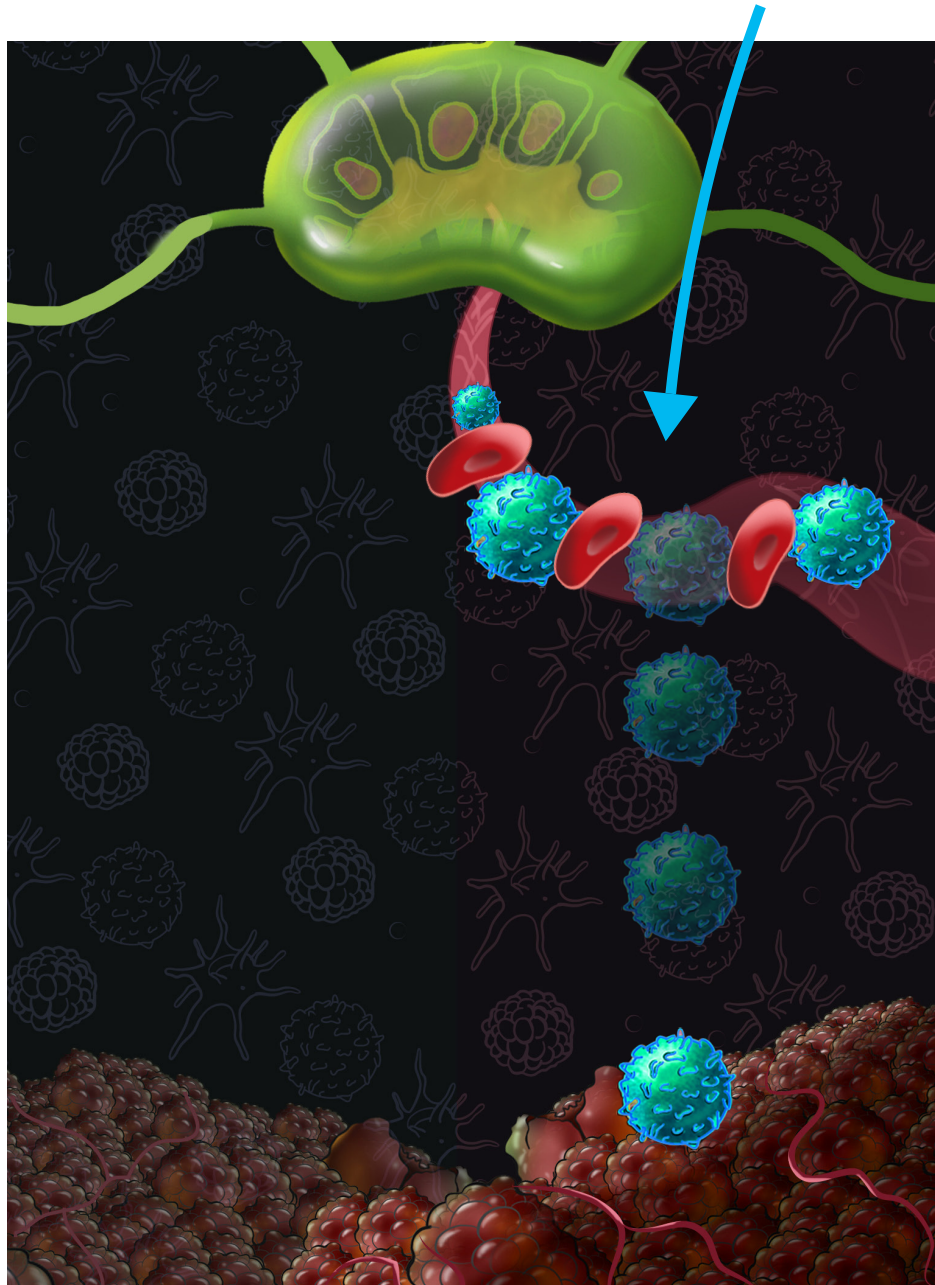
How to Play

T cells in the vessel pulse as prompts to be tapped.

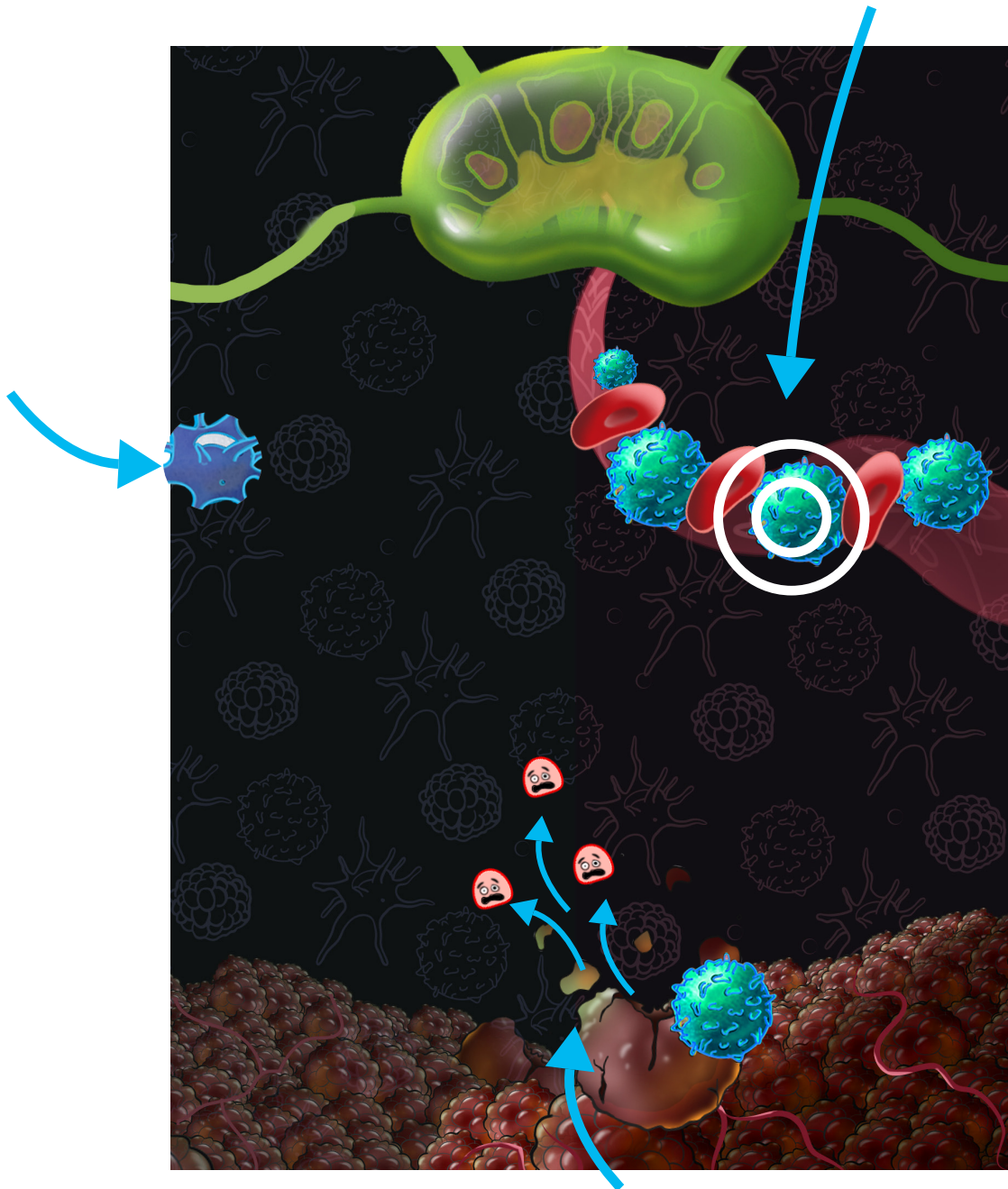


How to Play

Tapping a T cell enables it to drop and attack a tumor cell.



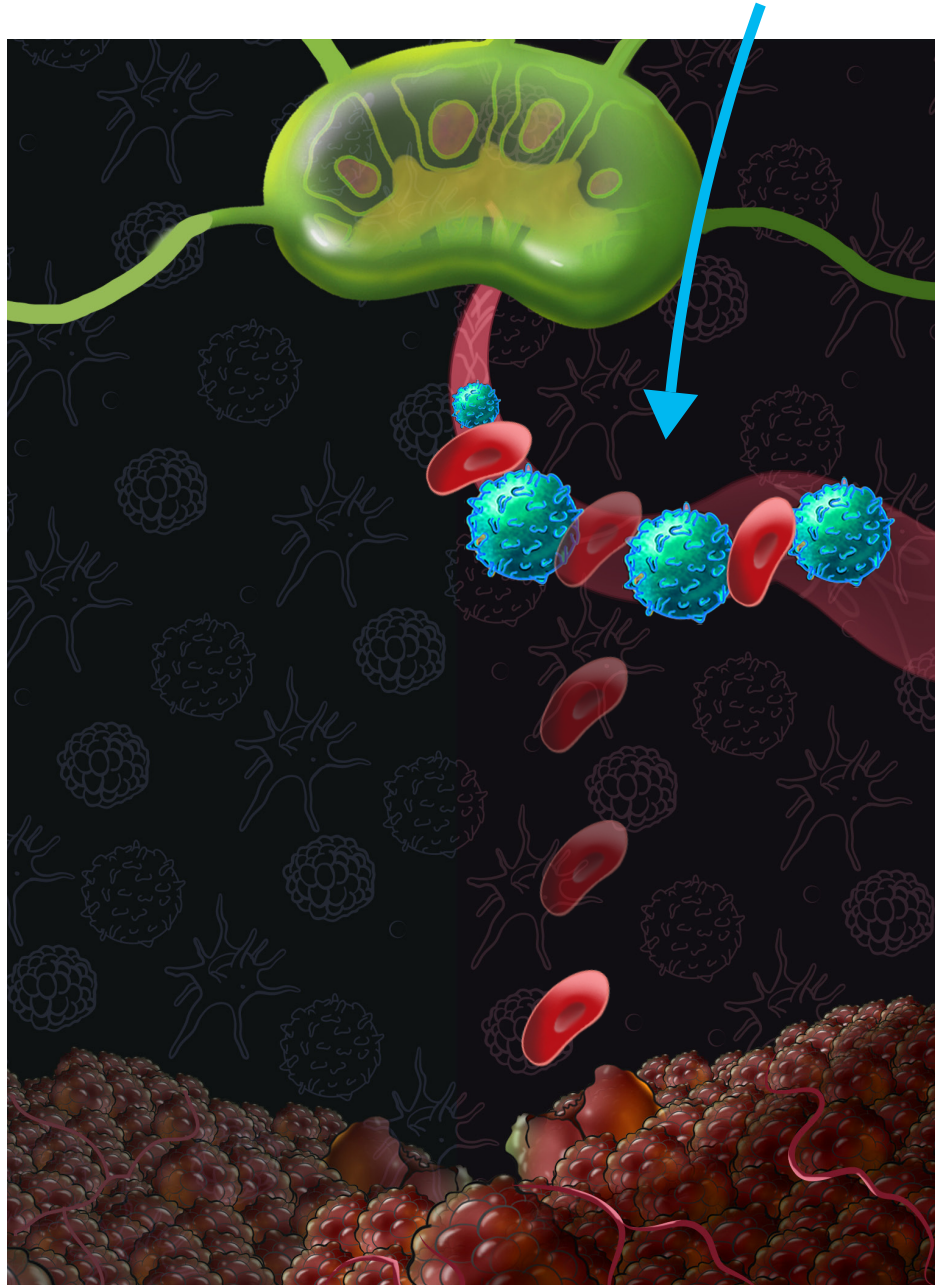
How to Play



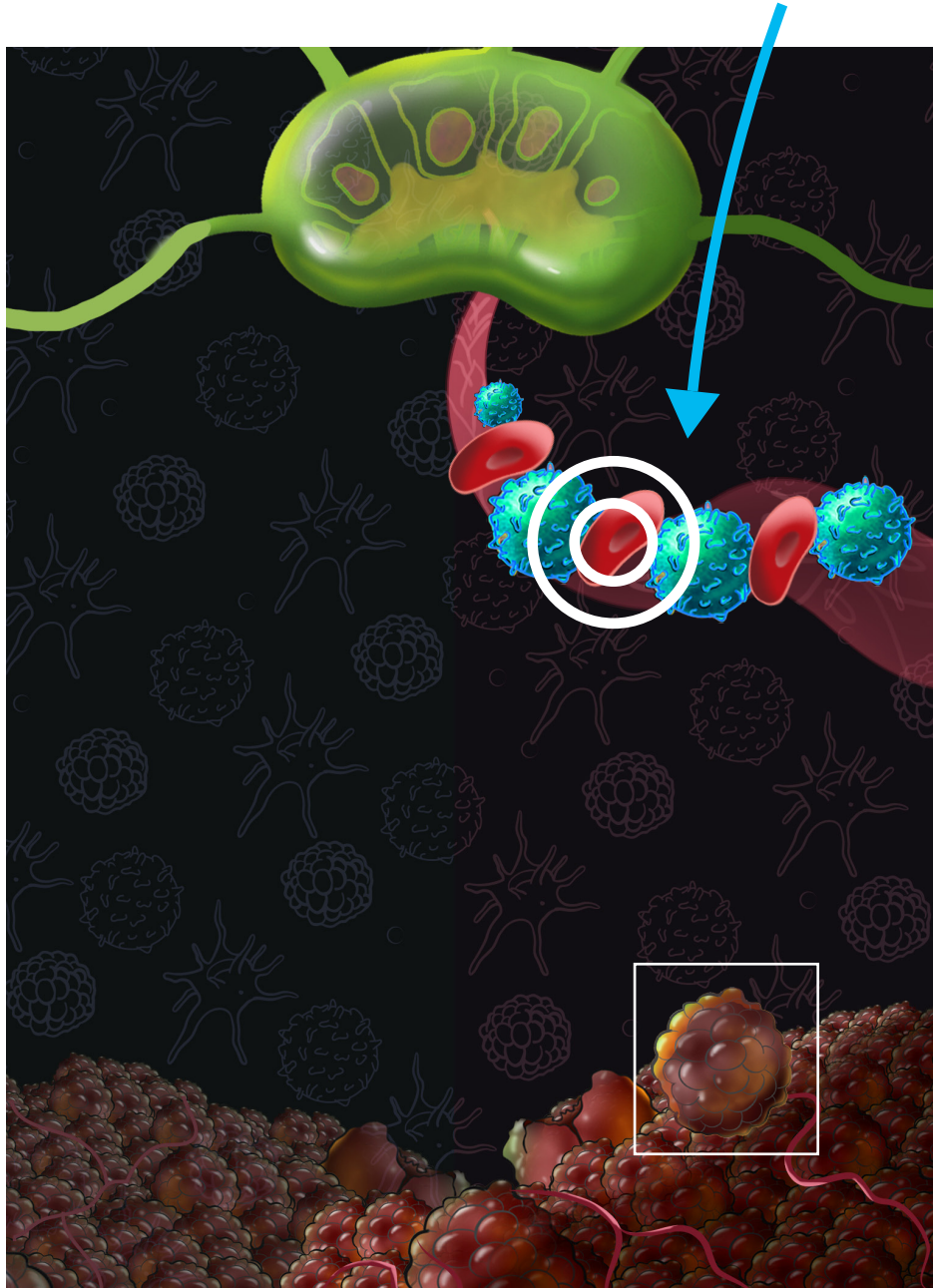
For every T cell that drops, one tumor cell explodes, is removed from the pile, and releases antigen to be picked up by young dendritic cells. The cycle continues.

How to Play

Accidentally tap a
red blood cell....



How to Play



...and the tumors cells are fed. A new tumor is added to the pile

How to Play

Tapping too many red blood cells, or not eliminating enough tumor cells over time will result in a tumor cell pile up and game over.

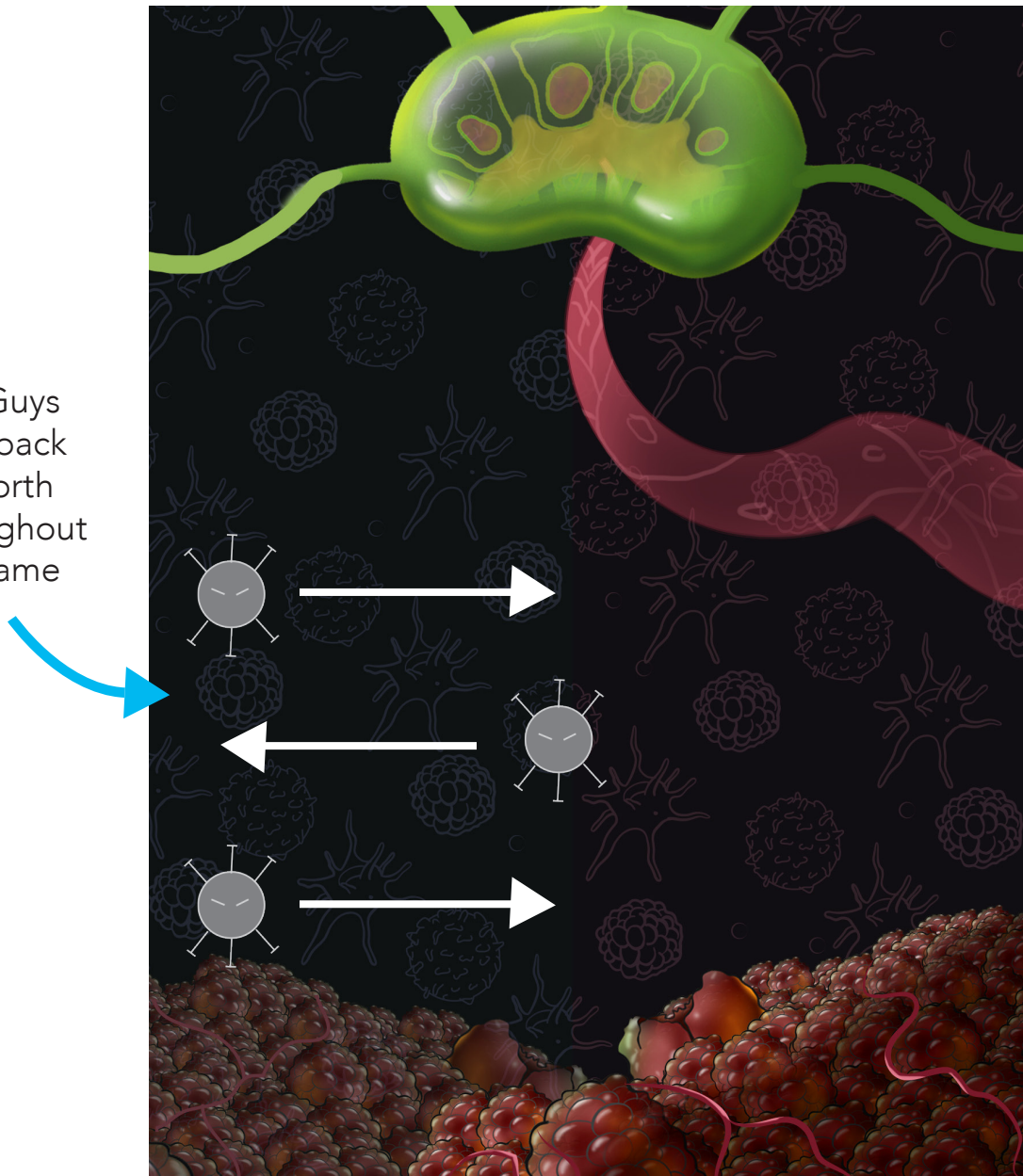


How to Play



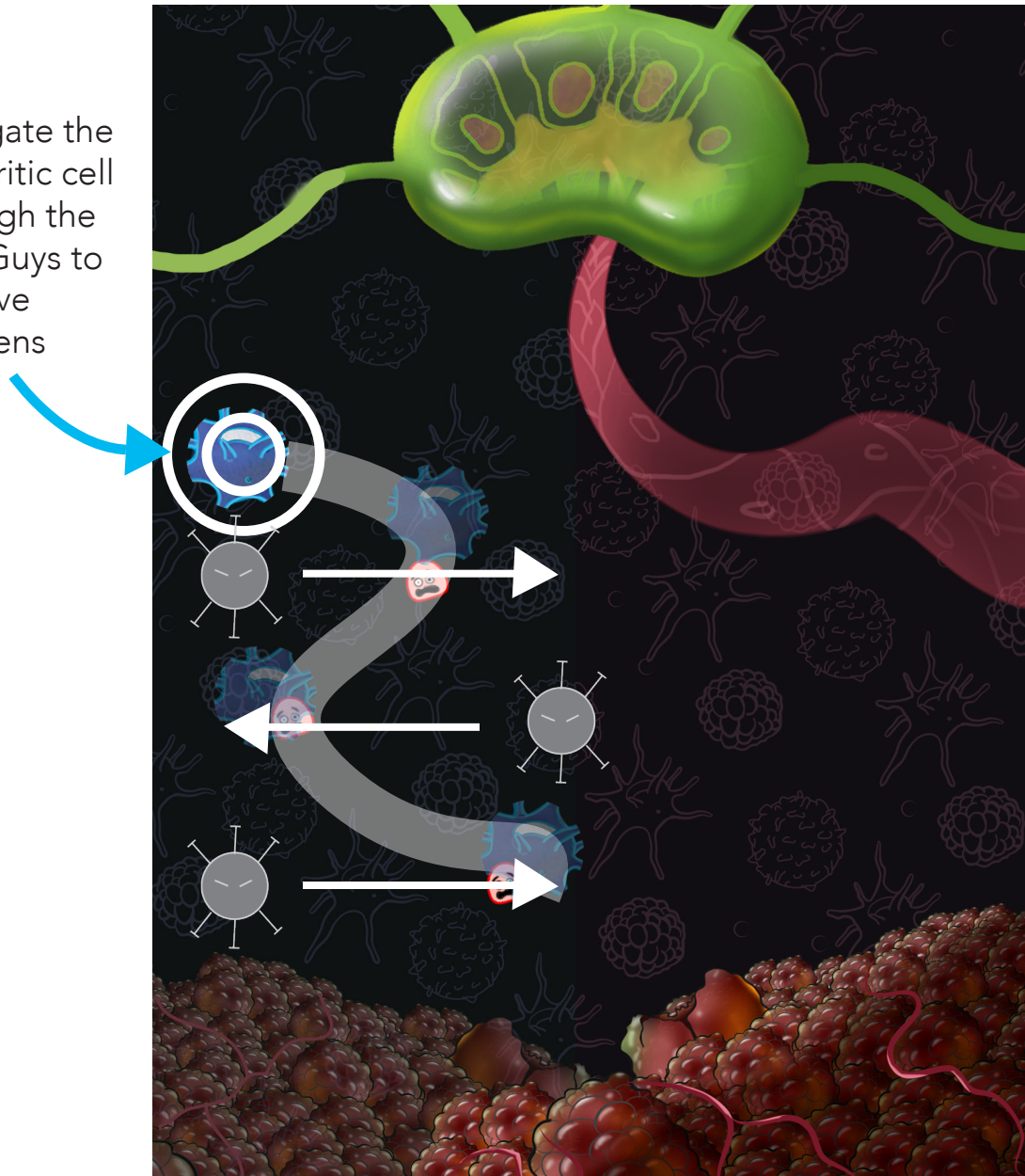
How to Play

Bad Guys
slide back
and forth
throughout
the game



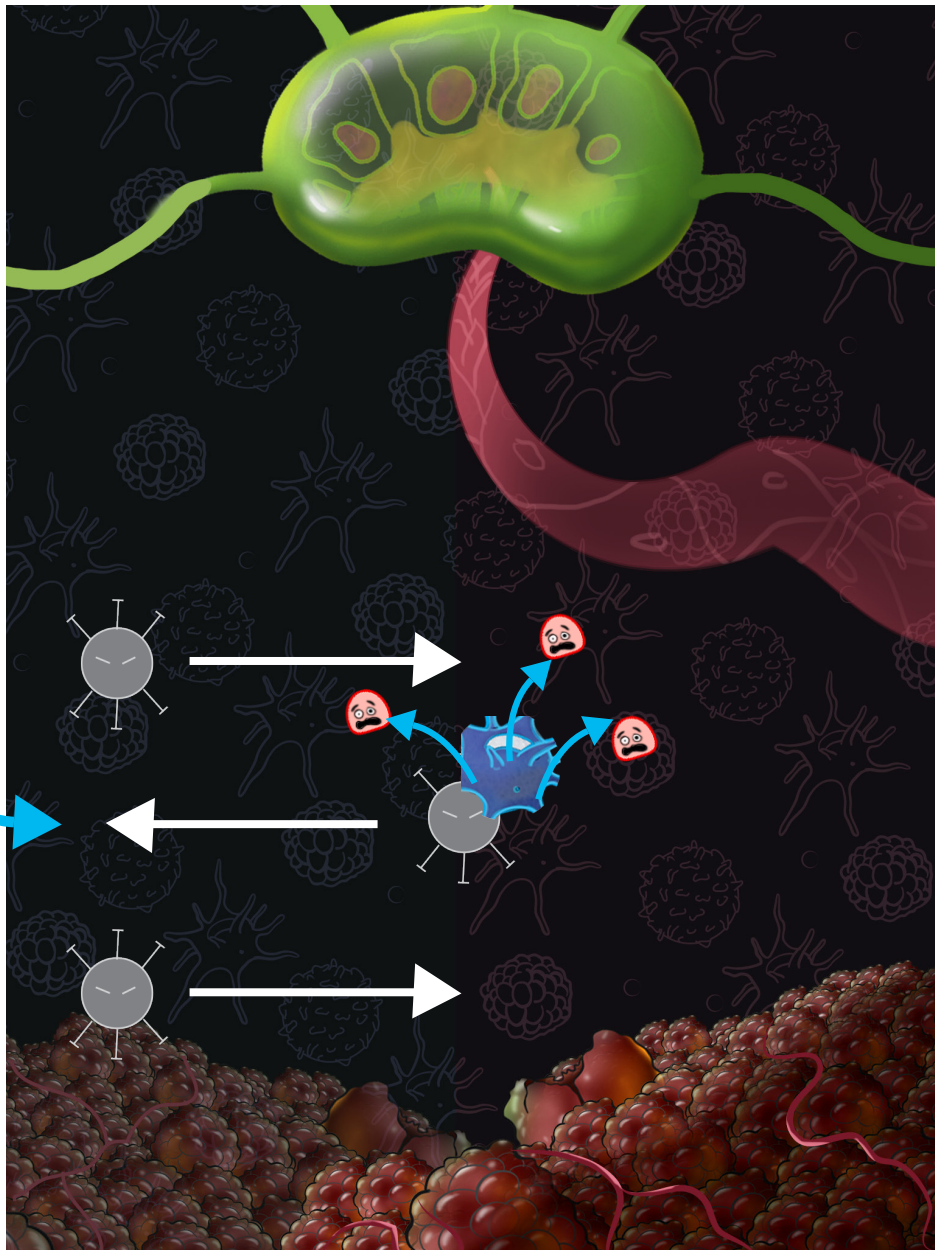
How to Play

Navigate the dendritic cell through the Bad Guys to retrieve antigens



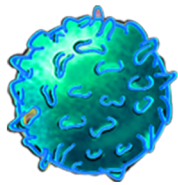
How to Play

If the dendrite touches a Bad Guy, the antigen spills out and the dendrite goes back to the beginning



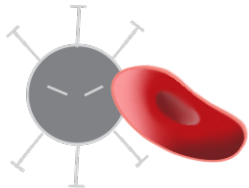
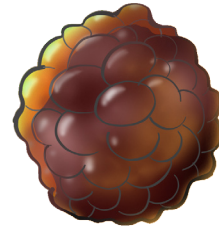
How to Play

Collect the antigens as fast as you can!



Tap as many T cells as Possible

Eliminate all the tumor cells



Avoid Bad Guys and Blood Cells

Can you beat the clock and make it to the next level?

Workbook- Sketches and problem solving

This is what I want to accomplish
for Illustration Assignment 3:

Subject: cancer cell immunity cycle

Target Audience: phys/onc and the sales reps showing them

My goals → It needs to be INTUITIVE

Informative:

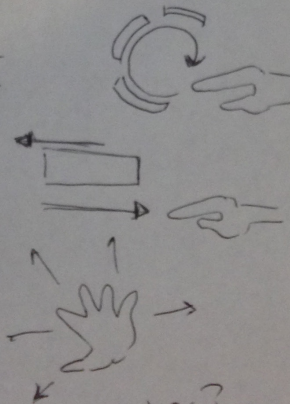
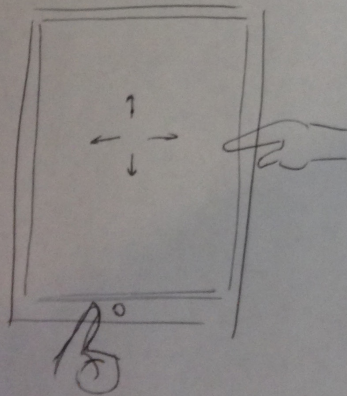
Educational:

Immersive:

Describe the whole cycle

Style: vector, cool, gamelike
or
very realistic

An iPad



What is familiar?
- simple, organic, abstract shapes.

High quality content
★ polished design
easy navigability!

★ INTERACTIVITY!
engage! Motivate to learn!

→ provide info so they feel they're learning.

- create a story

- include video, audio, images, outside sources.

- Emotional response! Can they relate?

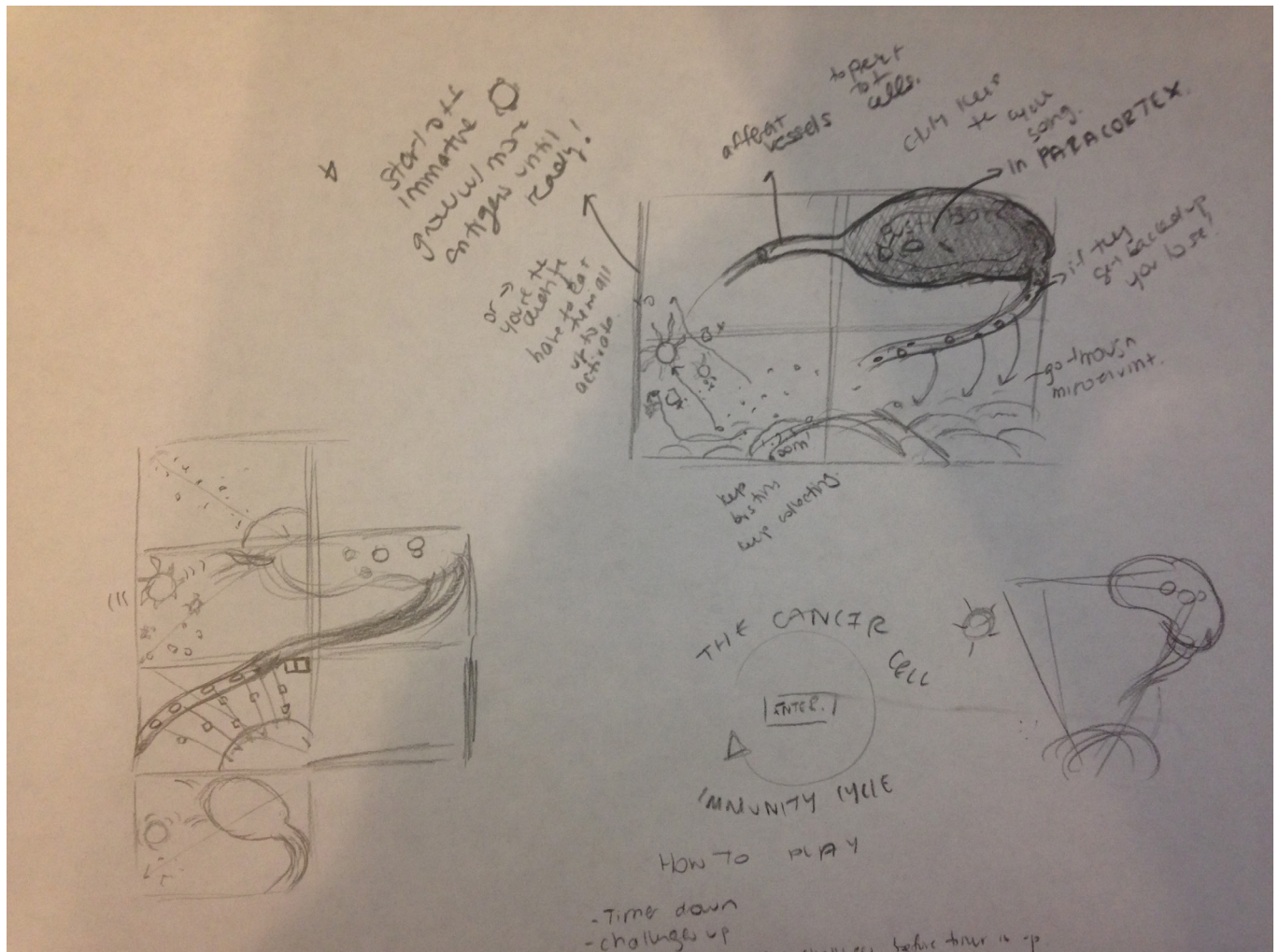
- encourage group collaboration.

- Reward as

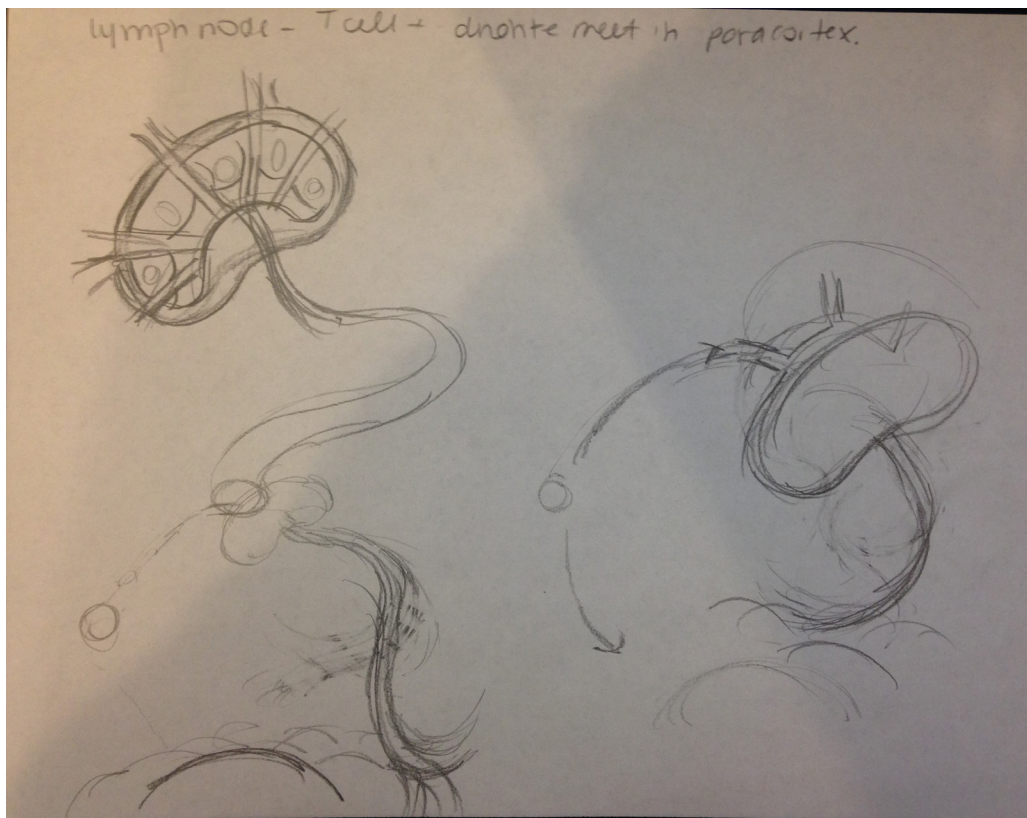
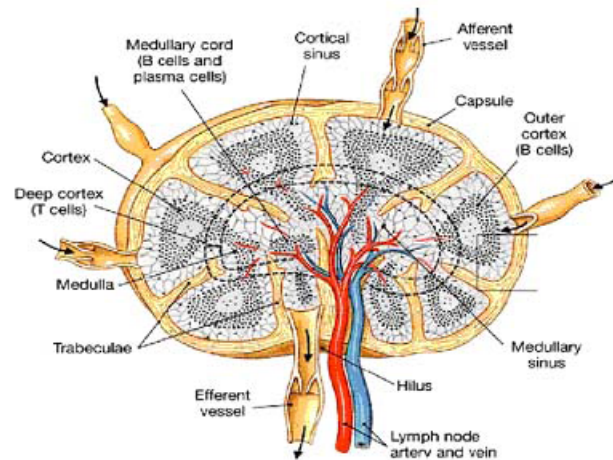
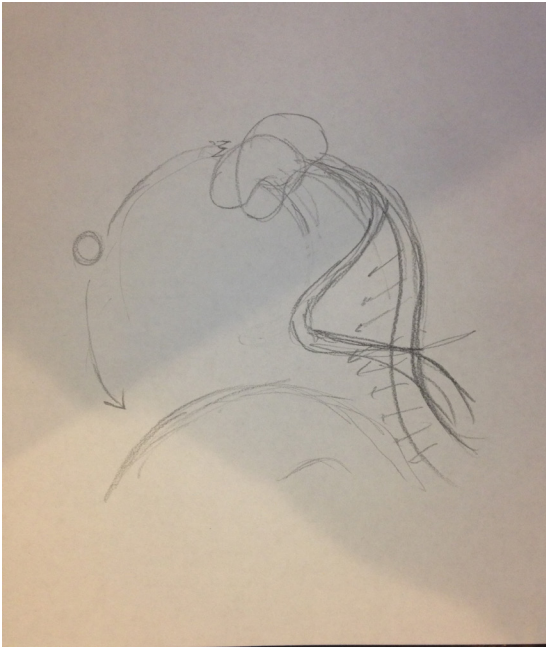
- gamification/ education

- nudge to try at new things.

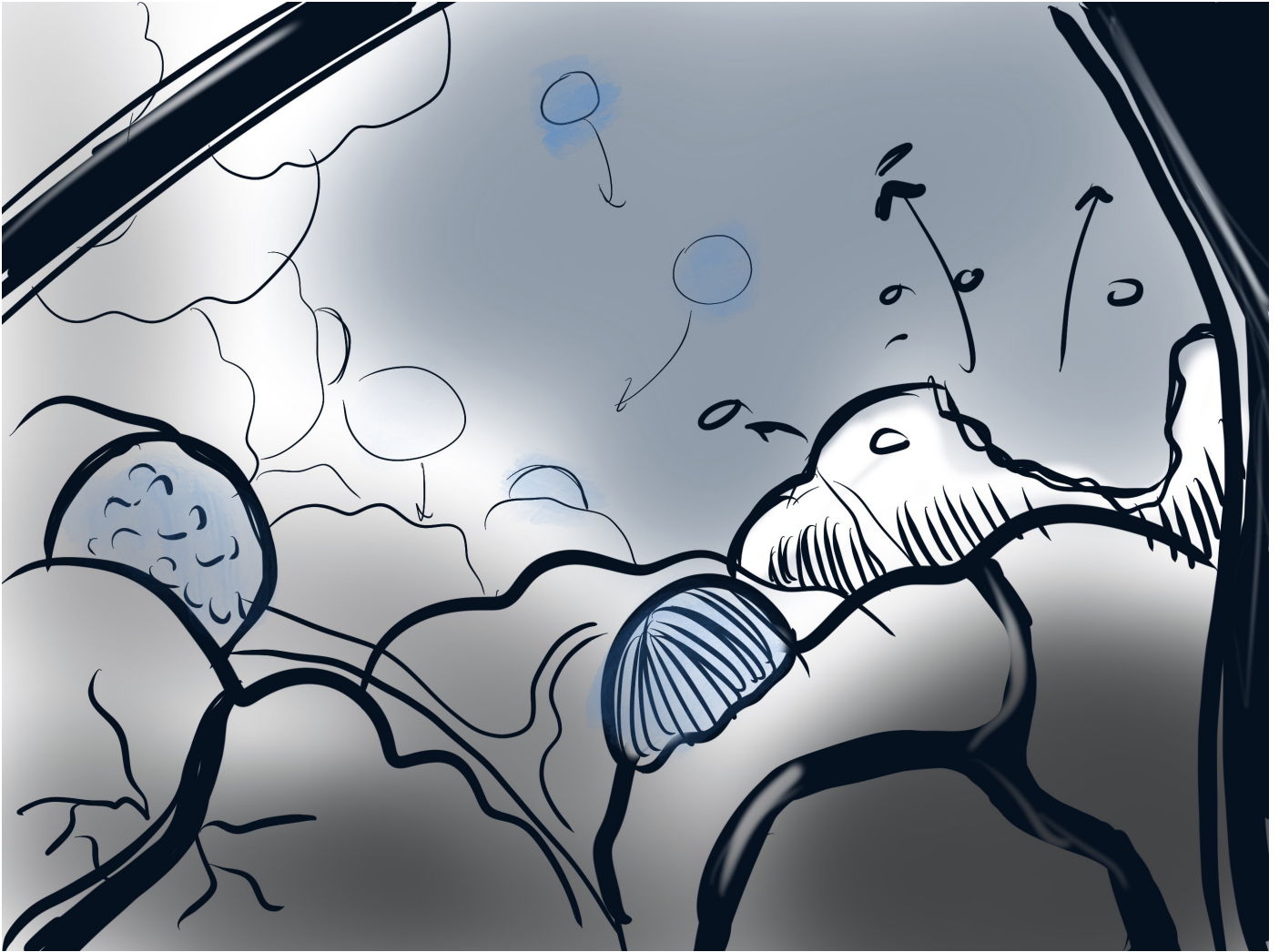
Workbook- Sketches and problem solving



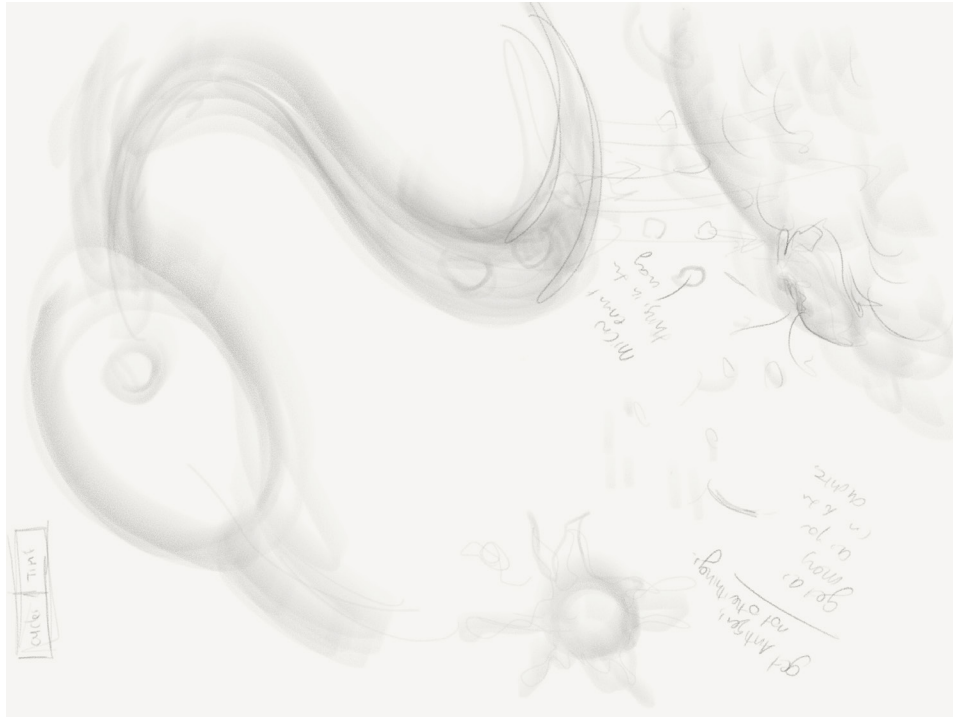
Workbook- Sketches and problem solving



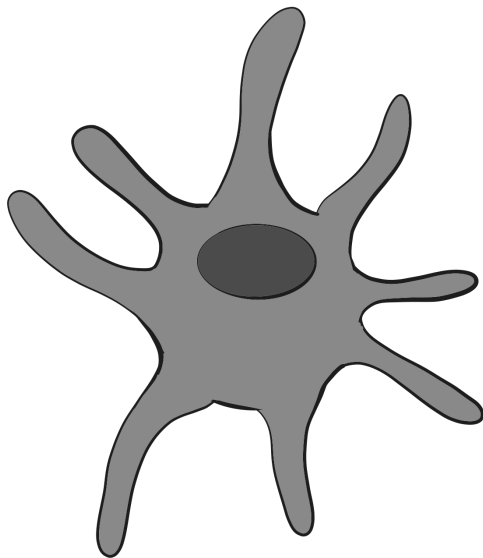
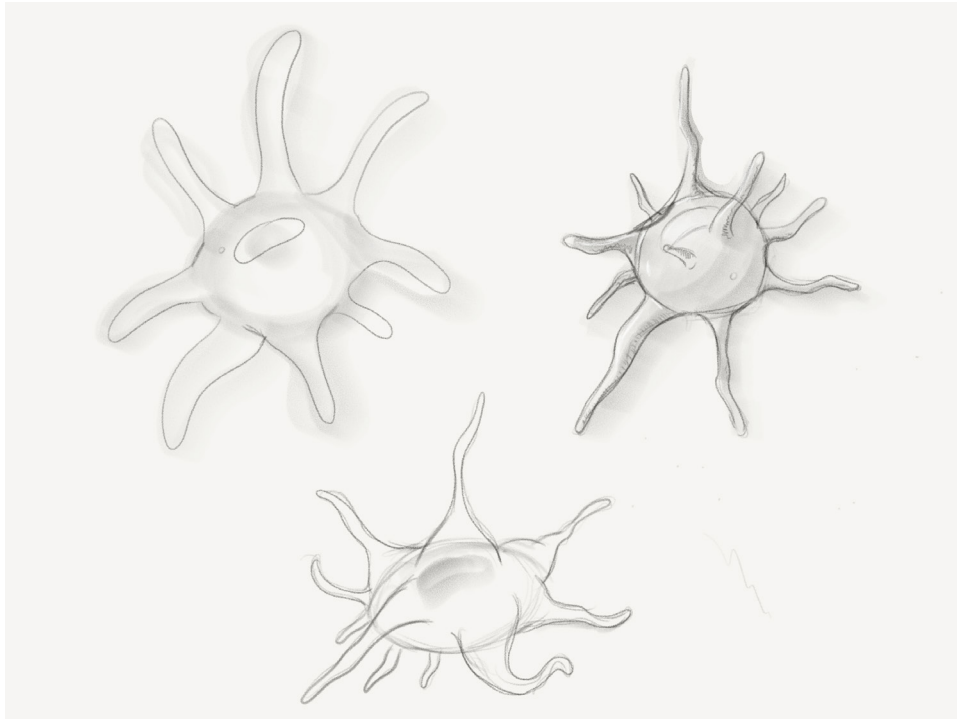
Workbook- Sketches and problem solving



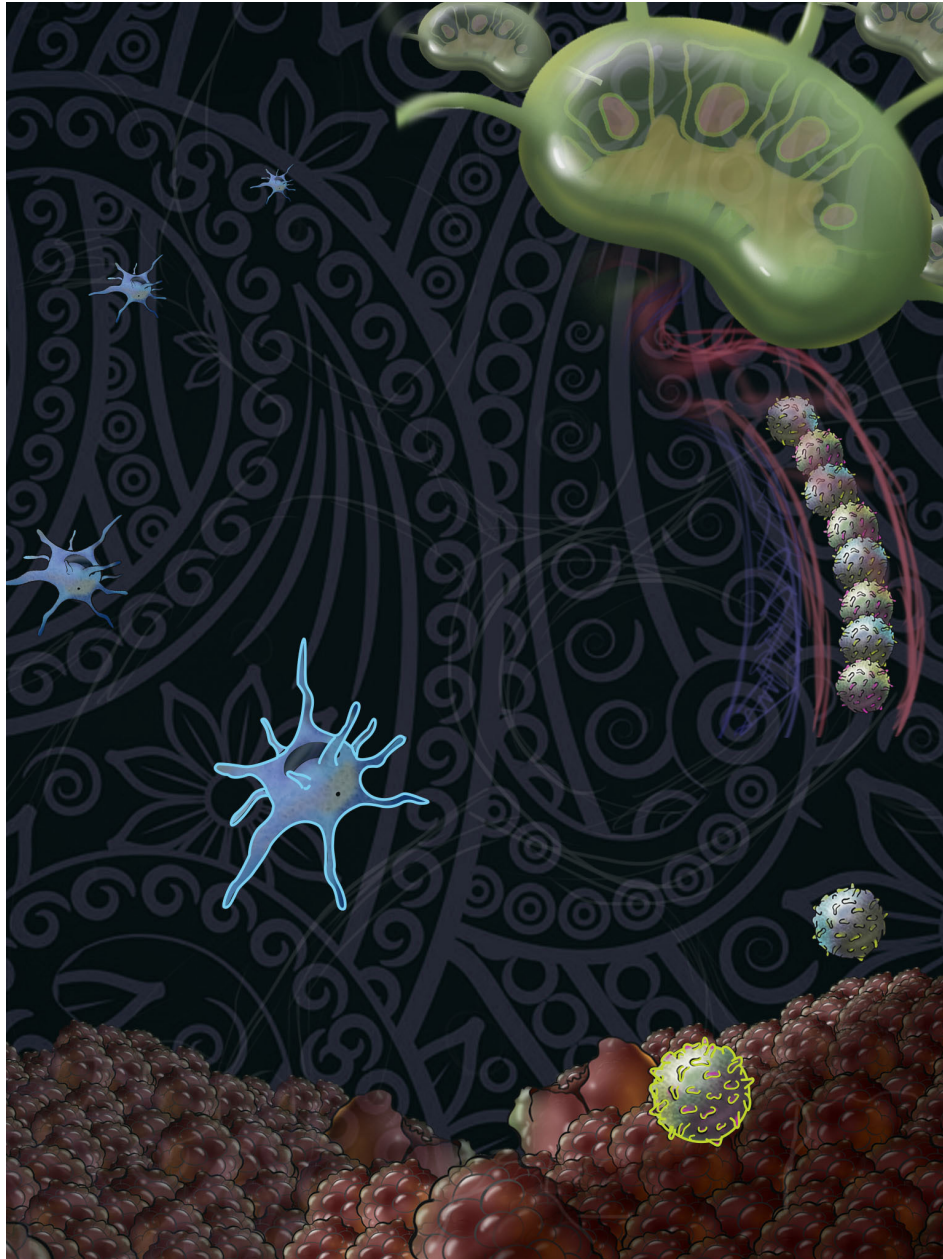
Workbook- Sketches and problem solving



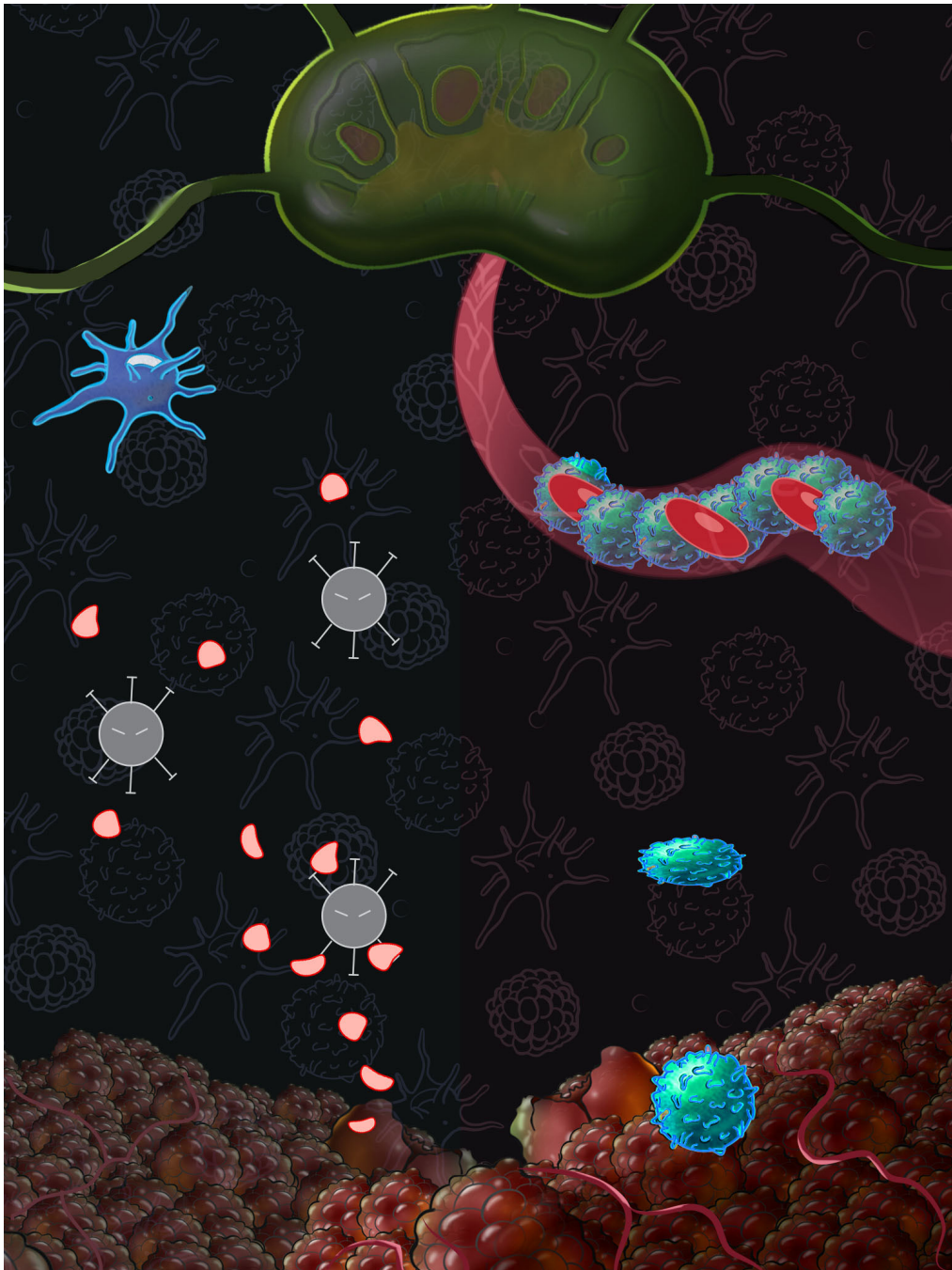
Workbook- Sketches and problem solving



Workbook- Sketches and problem solving



Workbook- Sketches and problem solving



Workbook- Reflections and Challenges

This project allowed me to explore the cancer cell immunity cycle in a creative and explorative way I have never attempted before. I have been addicted to the creation of this game and it has opened me up to opportunities to explore gamification and patient education. There are definitely some elements I would tune up should this become a real game in the future but for the scope of this assignment I am pleased and excited.

Challenges for this project included the thought process regarding where things would go, how they would move, what makes them intuitive, and how to keep it true to the cycle. Even though these were challenges, I did not feel overwhelmed as I often do with illustration. It was fun to explore making this game work.

Workbook- References

- 1) Genentech references provided by Christine Armstrong
- 2) <http://www.researchcancerimmunotherapy.com/overview/cancer-immunity-cycle>
- 3) The Function of Tumor Microenvironment in Cancer Progression- www.aacr.org
- 4) Tumor Microenvironment Network- tmen.nci.nih.gov
- 5) T- Cell- Wikipedia
- 6) Dendritic cell- Wikipedia
- 7) Lymph node- bitesized.immunology.org
- 8) Randolph, G. J., Swartz, M. A., & Angeli, V. (2005). Dendritic-cell trafficking to lymph nodes through lymphatic vessels. *Nature Reviews Immunology*, 5(8), 617-628. doi:10.1038/nri1670
- 9) *Immunity*. 2013 Jul 25;39(1):1-10. doi: 10.1016/j.immuni.2013.07.012. Oncology meets immunology: the cancer-immunity cycle. Chen DS1, Mellman I.