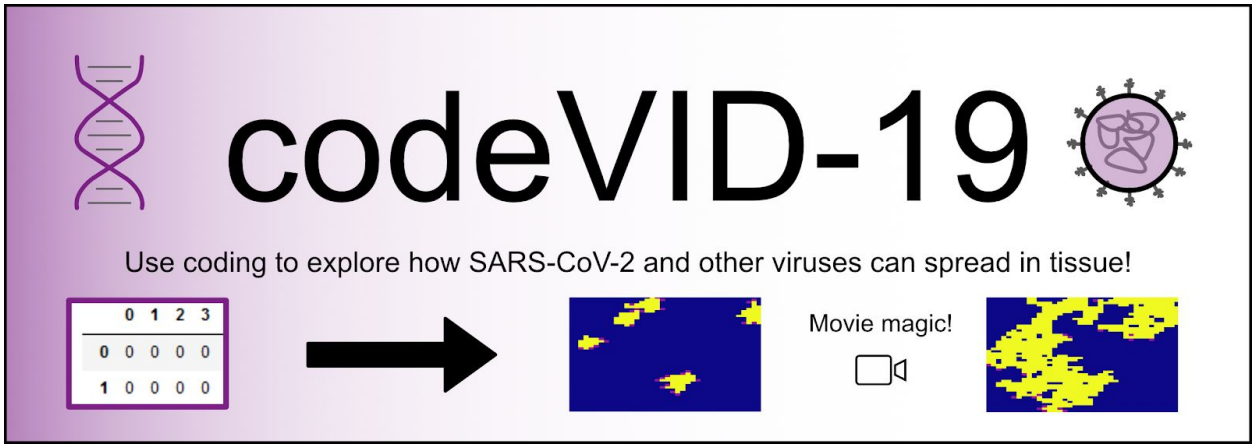

See powerpoint PDF for background information

Place to get code for activity - run python in jupyter notebook:
https://mybinder.org/v2/gh/jennifer-bio/2021_viralTissueWorkshop/HEAD

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Worksheet

- **Before you start running code in the jupyter notebook**

1. Think about the parameter **INFECT_PROB**, which stands for 'infection probability':
    a. If **INFECT_PROB** is set to 0, what would happen to the healthy cells next to a Viral Assembly (VA) cell? Or the healthy cells next to a Viral Release (VR) cell?

    b. If **INFECT_PROB**is set to 1, what would happen to the healthy cells next to a Viral Assembly (VA) cell? Or the healthy cells next to a Viral Release (VR) cell?

Run simulation and visualize

2. When you run the below code how many times do you run **one_time_step(tissue, infect_prob)**?

```
n_time_steps = 30
tissue_frames = t_time_step(n_time_steps, tissue, infect_prob =
INFECT_PROB)
```

3. Once you have made your first movie, think about the image
    a. What do the legend colors represent?

    b. Describe what you see happen over time in the animation: what is the end state and how did it get there

4. Run the simulation again and change the value of **INFECT_PROB**
    a. What happens if **INFECT_PROB** = **0.05**?

    b. What happens if **INFECT_PROB** = **0.95**?

5. What would happen if you double the value of **max_starting_infected**?
   Note that the actual number of starting infected cells is a random number within the range 0 to **max_starting_infected**. So try running the simulation 3 or more times.
   a. How does **max_starting_infected** influence the number of starting infected cells?

   b. How does the number of starting infected cells change the simulation?

Plot infection with immune system over time

6. Before you run the final cell in this section to generate the simulation, what do you predict will happen? How will this be different than the previous simulation?

7. Re-run the simulation and change the **n_immune_recruited** value
   a. What happens when you change **n_immune_recruited** to **0**?

   b. What happens when you change **n_immune_recruited** to **10**?

8. What do you think could be some reasons that different people have different immune response levels?

9. If you were to simulate the effect of the individual having had a vaccine, how would the immune system behavior change?

Final questions

10. What is one biological feature/behavior that you learned about today, or already knew about, which was not represented in these simulations?

11. Do you think all viruses would behave the same as in our simulations? Can you think of any which might behave differently?

If you have any comments or suggestions for running this workshop in the future please send a direct chat message to the speaker.

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Additional Resources

Download code for future: https://github.com/jennifer-bio/2021_viralTissueWorkshop/

Interesting things to learn and some places to go after conference to continue learning:

Background knowledge related to this activity

- Cell biology
- Viruses in people
    - Short article - immune system https://www.thepartnershipineducation.com/resources/immune-system
    - Full course https://www.edx.org/course/viruses-how-to-beat-them-cells-immunity-vaccines

Technical skills - shares skills with data science

- Computer coding
    - https://www.codecademy.com/
    - https://www.dataquest.io
    - Edx - a few course examples I have not looked into
        - https://www.edx.org/course/programming-for-everybody-getting-started-with-pyt
        - https://www.edx.org/course/python-basics-for-data-science
    - Partial course available online for introduction to python: https://www.cs.hmc.edu/twiki/bin/view/CS5 and with biology motivated problems: https://www.cs.hmc.edu/twiki/bin/view/CS5Green (textbook completes the information)
- Statistics
    - StatQuest with Josh Stramer: https://www.youtube.com/user/joshstarmer