

## TEACHER'S NOTES & LEARNING TARGETS for CELL STAINING PROTOCOL

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Day	Learning Target/Success Criteria	Lesson Plan Notes
1 - 2	<p><u>Target:</u> Understand the purpose of cell staining and the process of one method of staining prokaryotic cells</p> <p><u>Success Criteria:</u> I can describe why cell staining is an important tool for a biologist. I can gram stain an unknown bacteria and use the results to identify the bacteria.</p>	<ul style="list-style-type: none"><li>● Introduce concept of cell staining</li><li>● Students begin working on prokaryotic cell staining activity through gram staining</li></ul>
3	<p><u>Target:</u> Describe the process of fluorescent cell staining; Explain how fluorescent cell staining differs from gram staining and how fluorescent cell staining can be used in the context of the cancer patient cohort.</p> <p><u>Success Criteria:</u> I took notes on the fluorescent cell staining powerpoint; I completed a Venn diagram comparing gram staining with fluorescent cell staining.</p>	<ul style="list-style-type: none"><li>● Introduce "Fluorescent Cell Staining" in the context of the breast cancer cohort, using the Powerpoint</li><li>● Highlight differences between gram staining and fluorescent cell staining by completing a Venn diagram</li></ul>
4 - 5	<p><u>Target:</u> Use needed lab skills to complete the process of fluorescent cell staining; Analyze results to determine patient outcomes.</p> <p><u>Success Criteria:</u> I followed the fluorescent cell staining protocol. I analyzed a photograph of my results to determine if my patient was ER+.</p>	<ul style="list-style-type: none"><li>● Students will complete an adapted version of the "Cell Staining Protocol"<ul style="list-style-type: none"><li>○ See notes below on how to modify the procedure so it can be done in a high school classroom</li><li>○ The modifications involve substituting reagents and switching out student results with previously taken photographs</li></ul></li><li>● Students will analyze results and add information to ER+ column in the patient data table</li></ul>

### Additional notes:

For use in the high school classroom, modifications should be made to "Part 6: Staining DNA in the Nucleus" on the student protocol. Steps #29 - 33 should read as follows:

*29. Add 400  $\mu$ L of the NucBlue Solution (labeled Nuc).*

*30. Cover the slide with foil and incubate at room temperature overnight. Be sure to label with your initials.*

*31. Your instructor will photograph the stained cells using the EVOS FL fluorescent microscope and will share your group's photos with you during the following class period.*

Photos shared with students during the following class period will not be their actual results (given that most high schools will not have access to a fluorescent microscope) but will be substituted with photographs of results obtained by other science teachers and SCC biotech students. This will still give the high school

students practical experience with lab skills (pipetting, etc.) needed in a eukaryotic cell staining protocol while being mindful of safety and equipment limitations in the high school classroom.

Students will also have prior experience with gram staining and will get to see their actual results during that process.

Additionally, during the fluorescent staining lab reagent substitutions should be made as follows:

- Wash buffer = distilled water
- mER = distilled water
- Perm = distilled water
- Block = distilled water
- Actin =distilled water
- Nuc =distilled water

Note on cells:

As most labs do not have an inverted microscope, teachers could use other cells heat fixed to a flat microscope slide. Ideally, the cells would be the same type as shown in the fluorescent microscopy pictures. A set of slides with unstained cells could be provided by Shoreline CC as part of the kit, or prepared by the teacher on their own. If teachers did not want students to use a light microscope to view the cells prior to staining, the slides could be blank, thus only microscope slides and distilled water would be all that is needed.

Note on stain times:

In order to fit into a 1 hr time block, slide incubation times could be reduced as needed.