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General Information

Getting Started

There are a couple of ways to get started with StarCellBio:

1. Try an Experiment using a guest account

* To use StarCellBio as a guest, without creating either a student or instructor account, click **Try an Experiment** on the right side of the StarCellBio homepage.
* You will be taken to the **ASSIGNMENTS** page where you will have the opportunity to see a few example exercises.
* Note: when using StarCellBio as a guest, your work will not be saved. To save your work, you will need to create an account (see Create a Student Account or Create Instructors Account for more information).

2. Sign in

* To sign in to your account, click **SIGN IN** in the upper right corner of the StarCellBio homepage.
* Enter your username and password and click **SIGN IN NOW**.
* Note: When you log in to your account, your work will be saved.

Creating an Account

In StarCellBio, you may create either a student or instructor account. When you log in to your account, your work will be saved.

1. Create Student Account

To create a student account in StarCellBio, click **Create Student Account** on the right side of the StarCellBio homepage.

* Fill in your email address, password, and course code. Your instructor will provide you with a course code for your specific course.
* Note: Contact your instructor if you have not received the course code.

2. Create Instructor Account

* This option is currently unavailable in StarCellBio.

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Instructor Resources

The instructor resources are currently unavailable in StarCellBio.

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StarCellBio Resources

* Click **** **Contact** at the top of each page to provide feedback or report software bugs.
* Click  **Library** at the top of each page to access the reference material on experimental design and the experimental techniques available in the program. Additionally, the same reference material can be accessed by clicking the **Learn More** buttons that appear throughout the program.
* Click **** **User Guide** at the top of each page to access the StarCellBio user guide. Please note that the **** **User Guide** does not contain information on biological content and the experimental techniques available within the program. If you are unclear about any of the content addressed within the program, go to the  **Library** instead.

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Assignments

The **ASSIGNMENTS** page details a list of your assignments and a detailed description of each assignment.

The **Assignments** window contains a list of all of the assignments for a particular course.



To view a particular assignment, click on the assignment name in the **Assignments** window. The assignment will be shown in the right panel.

To navigate between parts of the assignment text, use the tool bar at the top of the assignment window or the arrows located at the bottom of each page of text.

Select **Start Experiments** at the bottom of the assignment window to start a new experiment. You will be automatically taken to the **EXPERIMENTS** page where you can start your experiment.

* If you have already previously started an experiment for an assignment, then click **EXPERIMENTS** to access the previously started experiment(s).

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Experiments

The EXPERIMENTS page contains everything that you need to perform your experiments.

You will find the following three navigation elements to help you navigate through the program at the top of each **EXPERIMENTS** page:

Next to the assignment name, there is a dropdown menu that displays the experiment you are currently viewing. To navigate between experiments for a particular assignment, select the appropriate experiment within the dropdown menu to the right of the assignment name.

To easily start a new experiment, use the **New Experiment +** button located to the right of the Experiment navigation dropdown menu.

The navigation tool bar is used to display your progress through the experiment and can be used for navigation as well. See the Navigation Tool Bar section for more information.

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Navigation Tool Bar

* The navigation tool bar appears at the top of each **EXPERIMENTS** page.
* The navigation tool bar in StarCellBio features the 3 experimental steps, with sub-steps displayed once a particular experimental technique is selected. The 3 steps are: Design, Setup & Run, and Select Technique.
* Gray buttons indicate a page that is not yet unavailable based on your progress through an experiment. To progress forward in the program, use the green navigation buttons at the bottom of each page.
* The button for the page that you are currently viewing will be denoted with a dark blue color. Buttons for pages that have previously been completed will be light blue. To navigate through previously opened pages within the program, select the appropriate button within the navigation tool bar.

Screen Shot 2013-03-29 at 11.35.19 AM.png

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A. Design Page

The questions on the **DESIGN** page are intended to help you think about and design your experiment.

* To design your experiment, write the question that your experiment is going to address, your hypothesis for the experiment, and select the experimental technique(s) that is (are) best suited for the analysis of your experiment.
* To rename your experiment, click inside the **Experiment Name** text box and type the new name. The experiment name can be no longer than 15 characters. The new name of the experiment will be displayed in the dropdown menu at the top of the **EXPERIMENTS** page once you navigate to the next page of the program.
* Click **EXPERIMENT SETUP** once you have designed your experiment.

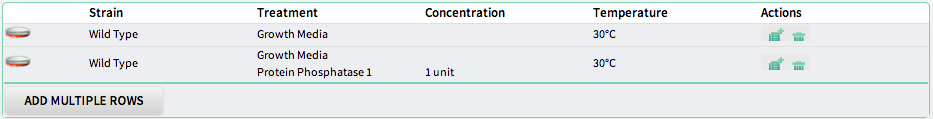
Notes:

* The responses provided to the questions within the **DESIGN** page are currently not required.

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B. Setup & Run

* To get started, select **Create new set-up** or select the appropriate experiment set-up from a previous experiment from the **Select pre-existing set-up as a template** dropdown menu. Some assignments will not have **Select pre-existing set-up as a template** as an option.
* Instructions for setting up your experiment are displayed directly above the experiment setup table.
* In some assignments, the ability to add one or multiple treatment protocols to the setup table will be available by clicking the **Add Samples** button at the bottom of the setup table. Within the **Add Samples** pop-up window, select all the strains and treatments you would like to add to the experiment setup table and click **Add Samples** at the bottom of the **Add Samples** pop-up window. If the **Add Samples** button is not shown at the bottom of the setup table, it means that your current assignment lacks this functionality.

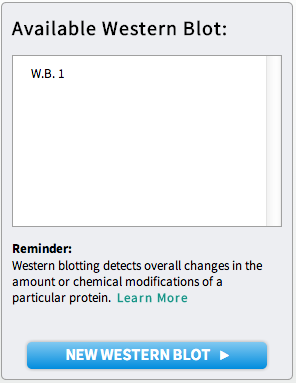


* Each row in the experimental setup table represents an individual treatment protocol.
* Click the Alison Brauneis:Users:AlisonBrauneis:Dropbox:StarCellBio:User Interface Development:Work with Jamie Waters - Graphic Designer:Production:png files for production:SCB_Icons:SCB_Icons_copy.png copy icon on the right side of each row to duplicate a particular treatment protocol. If the ability to edit a treatment protocol within the setup table is available to you in your assignment, then edit the duplicated treatment protocol as needed by clicking within the appropriate dropdown menus. Not all assignments have the functionality to copy a treatment protocol.
* Click the  trash can icon on the right side of each row to delete a particular treatment protocol.
* Click **RUN EXPERIMENT** once you finish setting up your experiment. You will be prompted to confirm that you would like to proceed with your experiment setup. Either click **EDIT SET-UP** to go back to edit your set-up or click **CONFIRM SET-UP & RUN** to run your experiment. After you confirm your experiment’s set-up, you will be unable to change your treatment protocols for this particular experiment.

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C. Select Technique Page

* To start a new western blot, flow cytometry, or microscopy experiment, click **NEW WESTERN BLOT**, **NEW FLOW CYTOMETRY**, or **NEW MICROSCOPY**, respectively. Please note that some assignments will only have a subset of the experimental techniques available. Experimental techniques that are not available within an assignment will appear grayed-out.
* To view the results of or to finish a previously started technique, select the particular name of the experimental analysis in the appropriate experimental technique window on the **SELECT TECHNIQUE** page. The program will navigate to the last edited page for the previously started technique.



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Western Blot Experimental Technique Pages

General Information

1. Navigating the Western Blot Experimental Technique pages

* To start a new western blotting experimental technique, click **SELECT TECHNIQUE** within the Navigation Tool Bar and then click **NEW WESTERN BLOT** to begin a new western blot.
* Each western blot analysis within one particular experiment is displayed in its own tab directly underneath the Navigation Tool Bar.
* Navigate between various western blot analyses by selecting a particular tab while viewing the western blot experimental technique or by selecting a western blot within the **Western Blot Analyses** window on the **SELECT TECHNIQUE** page.

2. Renaming a Western Blot Experimental Technique

* Each western blot analysis tab will be labeled ‘W.B. 1’, ‘W.B. 2’, etc.
* To rename your western blot experimental technique, click on the western blot experimental technique name in the tab and then type in your new name. The name must be no more than 10 characters in length.

3. Adding a new Western Blot Experimental Technique

* To add another western blot experimental analysis, either:
  + Click the ‘Add’ tab while on the Western Blot Experimental Technique page, or
  + Navigate to the **SELECT TECHNIQUE** page and click **NEW WESTERN BLOT** to add a new western blot experimental analysis to your experiment.

4. Removing a Western Blot Experimental Technique

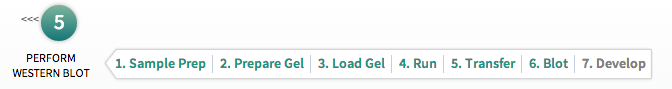
* To delete a western blot, click the ‘x’ icon in the tab for the appropriate western blot on the western blot experimental technique page.

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Western Blot Experimental Steps

A progress bar, which indicates all of the steps of and your progress in each western blot experiment, will appear at the top of each experimental technique page.

There are 7 steps to complete a western blot: 1) sample preparation, 2) prepare gel, 3) load gel, 4) run, 5) transfer, 6) blot, and 7) develop. Your progress through these steps is illustrated in the horizontal sub-progress bar at the top of each western blot. The instructions for each step of a western blot are detailed below.



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1. Sample Preparation

On this page, you will select the samples that you would like to prepare for western blot analysis by selecting the checkbox to the left of each sample. This will result in the creation of protein lysates that are suitable for western blotting analysis.

* Select each sample by selecting the checkbox to the left of each sample or, alternatively, click **Select All** at the bottom left of the **Sample Prep** window to select all of the samples at once.
* To unselect all the currently selected samples, click **Clear All** at the bottom right of the **Sample Prep** window.
* For each sample selected, select the appropriate lysate type from the **Lysate Type** dropdown menu.

Note: some western blotting experiments will only have one available lysate type.

* If the ability to select more than one lysate type is an available option in your assignment, select the appropriate lysate type(s) in the **Lysate Type** dropdown menu. If you would like to remove one lysate type for a sample, click the ‘x’ icon to the right of the lysate type to remove it.
* Click **PREPARE LYSATES** once you have selected and specified lysate types for all of your samples.

Important considerations:

* Each western blot gel has 15 lanes. When designing your experiments, remember to reserve one lane for loading the protein size marker.
* You can only select samples from your current experiment. To perform a western blot with samples from a different experiment, you will need to navigate to the other experiment in which the samples were created. See Navigation for more information on navigating through the program.

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2. Prepare Gel

* To prepare your gel, select the appropriate percentage of polyacrylamide for your gel.

Note: if specific percentages of polyacrylamide are not available as options for your assignment, they will not appear.

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3. Load Gel

Once you have prepared the polyacrylamide gel, all of the lysate samples that you previously prepared are now ready to be ordered into the desired order and loaded in your gel.

* Click **Add Marker +** to load the protein size marker. The marker will be added to your samples list.
* To re-order the samples in your list, either click and drag them into the desired order or alternatively, select a sample and use the up and down arrows to move them into the desired order.
* Click **LOAD GEL** once you have prepared and re-ordered your samples.

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4. Run

Once you have loaded all of your samples into your gel, each well will contain one sample to which the blue loading dye was added before loading. The gel is ready to be run and transferred. This step of a western blot is not currently illustrated in the program.

* Click **RUN GEL & TRANSFER** once you have loaded your gel.

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5. Transfer

Once the samples have finished running through the gel, the proteins will be automatically transferred from the polyacrylamide gel to the blotting membrane. This step of a western blot is not currently displayed in the program.

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6. Blot

Once the proteins have been transferred to a membrane, the membrane is ready to be blotted with antibodies to detect the protein(s) of interest.

* Select the appropriate primary antibody in the **Primary Antibody** dropdown menu.
* Select the appropriate secondary antibody in the **Secondary Antibody** dropdown menu.

Note: ensure that you select an appropriate secondary antibody that will recognize your chosen primary antibody.

* Click **BLOT & DEVELOP** once the blotting conditions have been selected.

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7. Develop

After clicking **BLOT & DEVELOP**, the program generates a simulated western blot film for the selected blotting conditions.

The **Exposure Time** slider can be adjusted to alter the intensity of the bands on the western blot.

* To increase the amount of time that the film is exposed to the blotting membrane, move the **Exposure Time** slider to the right.
* To decrease the amount of time that the film is exposed to the blotting membrane, move the **Exposure Time** slider to the left.

A tool tip is available to measure the protein sizes represented by the bands on the western blot.

* Hover your cursor over the film. Horizontal and vertical red lines will appear. The horizontal line can be used to measure the relative protein size of a band on the blot by indicating the corresponding molecular weight (in kDa) in a text box to the right of the film. The vertical line will be useful in aligning the band(s) to a particular sample in a lane.
* As a reference, if the marker was included on the gel, then the protein sizes (in kilodaltons or kDa) corresponding to the bands within the protein size marker lane on the blotting membrane are shown to the right of the film.

The same membrane can be re-probed with an antibody that recognizes another protein.

* Click **RE-PROBE** to strip the membrane of the current blotting conditions and probe the same membrane with an antibody that recognizes another protein. An additional tab labeled ‘BLOT’ will be generated.
* Select the appropriate blotting conditions (primary and secondary antibodies), as described in the **6.** **Blot** section above.
* Once a membrane has been blotted and developed more than 3 times, then use the arrows to easily navigate between the tabs with each of the western blots.

Important experiment considerations:

You should control for the amount of protein loaded within the lanes of your gel since differences in protein levels within your experimental conditions could be due to differences in the amount of protein loaded for the various samples.

* To do this, re-probe each blot with an antibody that detects a protein whose levels are not altered in response to your specific experimental conditions. This protein can serve as a loading control.

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Flow Cytometry Experimental Technique Pages

General Information

1. Navigating the Flow Cytometry Experimental Technique pages

* Click **SELECT TECHNIQUE** within the Navigation Tool Bar and then click **NEW FLOW CYTOMETRY** to add a new flow cytometry experimental analysis to your experiment.
* On the flow cytometry experimental technique page, each flow cytometry analysis within one particular experiment is displayed in its own tab directly underneath the Navigation Tool Bar.
* Navigate between different flow cytometry analyses by selecting a particular tab while viewing the flow cytometry experimental technique or by selecting a particular flow cytometry analysis within the **Flow Cytometry Analyses** window on the **SELECT TECHNIQUE** page.

2. Renaming Flow Cytometry Experimental Techniques

* Each flow cytometry analysis tab will be labeled ‘F.C. 1’, ‘F.C. 2’, etc.
* To rename your flow cytometry analysis, click on the flow cytometry analysis name in the tab and then type in your new name. The name must be no more than 10 characters in length.

3. Adding a Flow Cytometry Experimental Technique

* To add another flow cytometry analysis, either:
  + Click the ‘Add’ tab while in the flow cytometry experimental technique page, or
  + Navigate to the **SELECT TECHNIQUE** page and click **NEW FLOW CYTOMETRY** to add a new flow cytometry experimental analysis to your experiment.

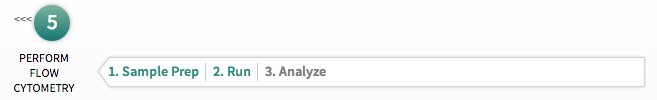
4. Deleting a Flow Cytometry Experimental Technique

* To delete a flow cytometry analysis, click the ‘x’ icon in the tab for the appropriate flow cytometry analysis you would like to delete.

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Flow Cytometry Experimental Steps

A progress bar, which indicates all of the steps of and your progress in each flow cytometry experiment, will appear at the top of each experimental technique page.

There are 3 steps to complete each flow cytometry analysis: 1) sample preparation, 2) run and 3) analyze. Your progress through these steps is illustrated in the horizontal bar at the top of each flow cytometry experimental technique window. The instructions for each step of a flow cytometry experimental technique are detailed below.

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1. Sample Preparation

On this page, you will select the samples that you would like to prepare for flow cytometry analysis by selecting the checkbox to the left of each sample. This will result in the creation of samples that are suitable for flow cytometry analysis.

* Select each sample you would like to prepare for flow cytometry by selecting the checkbox to the left of each sample or, alternatively, click **Select All** at the bottom left of the **Sample Prep** window to select all of the samples at once.
* To unselect all the currently selected samples, click **Clear All** at the bottom right of the **Sample Prep** window.
* For each sample selected, select the appropriate treatment of cells in the **Cell Treatment** column. If only one cell treatment is available in your assignment, the available treatment will be automatically selected for you.
* For each sample selected, select the appropriate DNA content treatment in the **DNA content treatment** dropdown menu. Please note that in some assignments only one type of treatment will be available.
* Click **PREPARE SAMPLES** once you finish selecting your samples.

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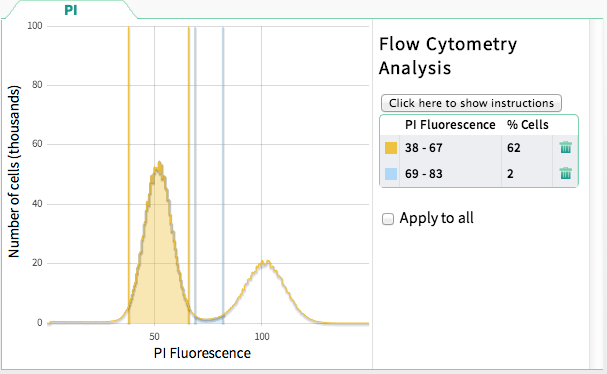
2. Run

* Click **RUN SAMPLES** at the bottom of the **Samples** window to run your samples through the flow cytometer.

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3. Analyze

On this page, you will view and analyze the flow cytometry data for each of your samples.

* Select a sample name in the **Samples** window to view a graphical representation of the flow cytometry data for each sample. The displayed graph corresponds to the currently highlighted sample.
* The graphical representation of the flow cytometry data is a histogram of the results. The X-axis corresponds to the amount of fluorescence emitted by each cell and detected by the flow cytometer due to the selected cell treatment. The Y-axis corresponds to the number of cells with a particular level of fluorescence.
* Click **ANALYZE DATA** at the bottom right to analyze the data represented by each histogram.
* Under **Analysis Tools**, select the appropriate icon for the type of flow cytometry analysis you would like to perform. The histogram Alison Brauneis:Users:AlisonBrauneis:Dropbox:StarCellBio:User Interface Development:Work with Jamie Waters - Graphic Designer:Graphic Design Documents:2014 01-10:Icons:histogram_icon.png flow cytometry analysis tool will allow you to 1) divide the flow cytometry histogram into color-coded segments that represent populations of cells with varying levels of fluorescence and 2) determine the percentage of cells within each segment. To create a segment within your graph, click and drag within the graph to create your desired segment. A segment will be created and the vertical lines will indicate the left and right boundaries of the segment. To alter the position of the segment, drag the left and right vertical lines to the desired position. Repeat to create a different segment.
* The range of fluorescence levels represented by each segment and the corresponding percentage of cells within each fluorescence range will be displayed in the **Flow Cytometry Analysis** table.
* Select **Apply to All** to apply the designated segments in one histogram to all the other histograms within your active flow cytometry analysis. The same flow cytometry analysis will be applied to all of the flow cytometry histograms. To make changes to an individual graph, uncheck **Apply to All** and analyze the specific histogram as desired.
* Click the  trash can icon in the **Flow Cytometry Analysis** table to delete a particular segment from the analysis.

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Microscopy Experimental Technique Pages

General Information

1. Navigating the Microscopy Experimental Technique pages

* Click **SELECT TECHNIQUE** within the Navigation Tool Bar and then click **NEW MICROSCOPY** to add a new microscopy experimental analysis to your experiment.
* On the microscopy experimental technique page, each microscopy analysis within one particular experiment is displayed in its own tab directly underneath the Navigation Tool Bar.
* Navigate between different microscopy analyses by selecting a particular tab while viewing the microscopy experimental technique or by selecting a particular microscopy analysis within the **Microscopy Analyses** window on the **SELECT TECHNIQUE** page.

2. Renaming Microscopy Experimental Techniques

* Each microscopy analysis tab will be labeled ‘M. 1’, ‘M. 2’, etc.
* To rename your microscopy analysis, click on the microscopy analysis name in the tab and then type in your new name. The name must be no more than 10 characters in length.

3. Adding a Microscopy Experimental Technique

* To add another microscopy analysis, either:
  + Click the ‘Add’ tab while in the Microscopy Experimental Technique page, or
  + Navigate to the **SELECT TECHNIQUE** page and click **NEW MICROSCOPY** to add a new microscopy experimental analysis to your experiment.

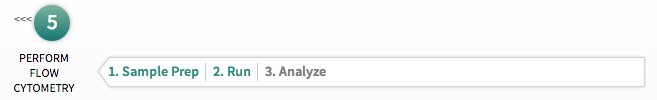
4. Deleting a Microscopy Experimental Technique

* To delete a microscopy analysis, click the ‘x’ icon in the tab for the appropriate microscopy analysis you would like to delete.

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Microscopy Experimental Steps

A progress bar, which indicates all of the steps of and your progress in each microscopy experiment, will appear at the top of each experimental technique page.

There are 3 steps to complete each microscopy analysis: 1) microscopy preparation, 2) load, and 3) analyze. Your progress through these steps is illustrated in the horizontal bar at the top of each microscopy experimental technique window. The instructions for each step of a microscopy experimental technique are detailed below.

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1. Microscopy Preparation

On this page, you will select and prepare your samples for microscopy analysis. This will result in the creation of samples that are suitable for microscopy analysis.

* Select each sample you would like to prepare for microscopy by selecting the checkbox to the left of each sample or, alternatively, click **Select All** at the bottom left of the **Sample Prep** window to select all of the samples at once.
* To unselect all the currently selected samples, click **Clear All** at the bottom right of the **Sample Prep** window.
* For each sample selected, select the appropriate type of microscopy analysis you would like to perform in the **Microscopy Analysis** column. If only one microscopy analysis is available in your assignment, the available treatment will be automatically selected for you.
* For each microscopy analysis selected, select the appropriate conditions to perform the microscopy analysis in the **Conditions** column. Based on the selected microscopy analysis, only one type of condition may be available.
* In some assignments, there will be an option to select more than one type of microscopy analysis for each sample. If this option is available, a second sub-row will appear with options to select in the **Microscopy Analysis** and **Conditions** columns.
* Note: the microscopy experimental technique draws upon real microscopy images. As a result, not all microscopy analyses or conditions will be available for each sample in your experiment depending on image availability.
* Click **PREPARE SLIDES** once you finish selecting and preparing your samples for analysis.

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2. Load

* Click **LOAD** at the bottom of the **Samples** window to load your samples onto the microscope.

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3. Analyze

On this page, you will view and analyze the microscopy data for each of your samples.

* Once you click **LOAD**, the first sample in the **Samples** window will be automatically loaded on the microscope for you. To change the sample being viewed on the microscope, select another sample name in the **Samples** window to view a sample under the microscope. The displayed image corresponds to the currently highlighted sample.
* Depending on the choices selected on the Microscopy prep page, some samples may have more than one type of microscopy analysis that was performed. Each different microscopy analysis will appear in an additional tab. To navigate between microscopy analyses, select the appropriate tab.
* To view the image, adjust the microscope controls:
  + *Navigation arrows*. To move the image around the microscope lens, click the green navigation arrows to move in the appropriate direction. Alternatively, use the arrows on the keyboard to move the image around the lens.
  + *Light on/off switch and brightness slider*. Click on or off to turn the light on and off, respectively. Use the arrows on the brightness slider to adjust the light intensity, or brightness, on the microscope. Note that adjusting the brightness only works when the light is on.
  + *Laser on/off switch*. Click on or off to turn the laser on and off, respectively.
  + *Filters*. Select the appropriate button to change the filter on the microscope. There are four options: red (R), green (G), blue (B), and all filters (A). Unavailable filter options will appear in gray. Note that changing the filter will not change the image when the laser is off.
  + *Course and fine focus*. Use the up and down arrows to adjust the course and fine focus on the left and right, respectively.
  + *Objective*. Depending on the available images, select the microscope objective to use. If there are no options for changing the objective, then the current objective will be displayed.

Lab Notebook

This feature is currently unavailable in StarCellBio.

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