# Assignment Summary

For this assignment, you will examine the effect of drugs on signal transduction pathways. First, you will research a drug that affects a signal transduction pathway. Then, you will create a visual representation of the signal pathway. Last, you will predict the effects of the drug on the signal transduction pathway.

**Background Information**

Signal transduction pathways have three stages: reception, transduction, and response. Reception involves a protein receptor that becomes activated by a signaling molecule called a ligand. The binding of the signaling molecule to the cell’s receptor initiates a signal pathway called transduction where molecules change in order to elicit a cellular response.

Alterations or malfunctions to this pathway can have drastic effects, sometimes positive, sometimes negative. These alterations can happen at any stage of the signaling pathway. Drugs are chemicals that can affect signal transduction pathways.

**Materials**

* Writing and drawing supplies (colored pencils, paper, etc.)
* Access to the Internet and other reference materials

# Assignment Instructions

For this project, you are expected to submit:

1. A completed version of this guide, featuring a visual representation of the signal pathway for the drug you have researched, a chart that describes the pathway, and written analysis questions.

**Step 1: Prepare for the project.**

1. Read through the guide before you begin so you know the expectations for this project.
2. If there is anything that is not clear to you, be sure to ask your teacher.

**Step 2: Choose a drug to research.**

1. Pick a drug to research.
   1. Angiogenesis inhibitor
   2. Anesthetic (lidocaine)
   3. Birth Control
2. Research your drug to see how it works. Be sure to try and identify the stages of signal transduction involved in how your drug works. Here are some useful sites.
   1. Center for Disease Control: *www.cdc.gov*
   2. National Institutes of Health: [*https://www.nih.gov/*](https://www.nih.gov/)
   3. National Cancer Institute *https://www.cancer.gov:*

**Step 3: Create a visual representation of your signal pathway that you have researched for you**r d**rug.**

1. This can be a flow chart or diagram. The chart or diagram should be a half page or larger, include a minimum of four steps, label each step, and provide -2 sentence description of the step.
2. Include the following
   1. Signaling molecule
   2. Receptor involved
   3. Transduction of the signal within the cell
   4. Cellular response
   5. Signaling cell (if applicable)

**Step 4: Record information about your pathway.**

1. In the **Signal Transduction Pathway** chart, record what happens in each of the three stages of signal transduction (reception, transduction, and response).
2. Explain how the stages are different in the presence of the drug.

**Step 5: Complete the questions in the written analysis section.**

**Step 6: Evaluate your project using this checklist.**

If you can check each box below, you are ready to submit your project.

* Does your visual include a ligand, receptor, transduction, and cell response?
* Did you complete your chart completely for all three stages?
* Did you complete the Written Analysis section, including your predictions on effects?

**Step 7: Revise and submit your project.**

1. If you were unable to check off all of the requirements on the checklist, go back and make sure that your project is complete. Be sure to save your project before submitting it.
2. Turn in your Signal Transduction Pathway diagram/flow chart, graphic organizer, and written analysis to your teacher. Make sure that your name is on it.
3. Congratulations! You have completed your project.

**Visual Representation of a Signal Pathway**

|  |
| --- |
|  |

**Signal Transduction Pathway Chart**

|  |  |  |
| --- | --- | --- |
|  | **Normal pathway** | **Pathway with drug present** |
| **Reception** |  |  |
| **Transduction** |  |  |
| **Response** |  |  |

**Written Analysis**

Answer the questions below.

1. Which stage is affected first by your drug? How is it affected?

1. Describe the effects the drug would have on the target cell and organism. Relate back to stages of signal transduction.