Subcutaneous Drug Delivery Implant

A Practice Understanding Task

Purpose: RTI International is an independent, nonprofit research institute dedicated to improving the human condition. They combine scientific rigor and technical expertise in social and laboratory sciences, engineering, and international development to deliver solutions to the critical needs of clients worldwide. Students will use given data to find the mean and standard deviation to determine which Excipient is better suited to use for the specific API.

Career Field:
Biopharmaceutical Technology
Lesson inspired by RTI International

WTCC Associate Program of Study and Contact Person:
Biopharmaceutical Technology – Joel Houston (919) 866-5345

NC Math 4 Standards:
SP.1.2 – Comparative experiment
SP.1.4 – Data visualizations

Unit Alignment:
NC Math 4 - Unit 7 – Statistical Inference
WTCC Math 110, 121, 171, or 143 ??

Common Core State Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Prerequisite Skills

- Finding mean
- Finding Standard Deviation

Time Required
The time required to complete this activity is approximately ____90___ minutes.

Materials Needed

- Student Activity Sheet
- Desmos Launch Activity - student
- Demos Launch Activity - teacher
- Data given in Excel

The Teaching Cycle:

Launch:

Assign the Desmos activity as homework the night before to help students with new vocabulary and some practice with setting up a spreadsheet to find mean and standard deviation.

Warm-up: Talk about the ingredients of Aspirin and ask the students to list out the API and the excipient (new terms from the Desmos activity).

Ask students what they think of the following:

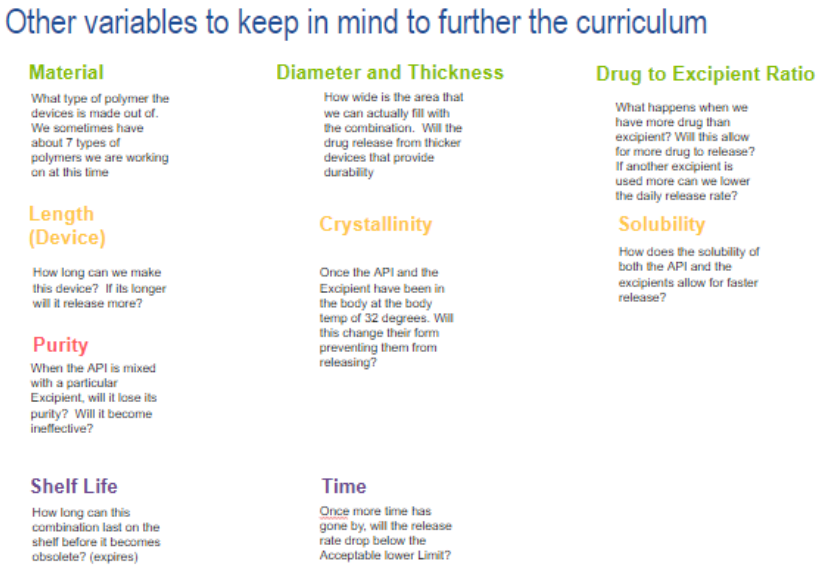
- What is the benefit of having an implant for needed medicine as opposed to taking pills?
- What would be the result if a patient was getting too little or too much of the medicine?
- In your words, why are statistics important here?
- From the video, what is the importance of the standard error?

Explore: Have students work in pairs to complete the Student Activity Sheet.

Students should be able to work through T1 on their own. They will be given the data in a spreadsheet and need to create the equations to find the mean, standard deviation, and standard error. They can then use that info to create line graphs in the spreadsheet. If they prefer, they can enter the data in their TI84 Plus CE.

Walk around to each group to see their progress. Once they have the calculations and graphs, they will be able to answer the questions on the Student Activity Sheet. Have them move on to T2. Again, they will be creating equations in the spreadsheet to find the mean, standard deviation, and standard error. They will then graph it and answer the questions.

Discuss – when you talk to each group after T1 – Have the group share which excipient best fits the limits for the API. Ask if they were able to eliminate an API. Discuss the other variables (you may need to guide them a little here to get them thinking about it). Once you are convinced with their understanding, they should move on to T2.



Link the Answer Key

Exit Ticket: For homework, have them make their conclusions for T2.

Two example assessments for testing: Students will be assessed on finding mean and standard deviation. They will also be tested on describing graphs using SOCS.