

# SAN JUAN NM REGIONAL SCIENCE & ENGINEERING FAIR

## JUNIOR AND SENIOR DIVISION

### ABSTRACT & CERTIFICATION

**TITLE:** Food Carbs and Artificial Pancreas

**Name:** Alexandra S. Bessinger

**School:** Pinon Hills Academy

**Grade Level:** 8th

**Type the Body of Your Abstract Here (250 Word Maximum)**

Last year's research project focused on perception of sweetness and its relationship to glucose and food processing. In this year's project, new questions were raised with emphasis on a diabetic diet and diabetes treatment by means of an artificial pancreas. The project had two parts. In its science part, in addition to glucose, the concentration of sucrose and lactose were measured in 6 solid, 6 viscous and 6 liquid foods; the concentration of fructose was researched. The 2021 science project methodology was built on 2020 project based on measuring glucose % by using URS-1G test strips; color change after 30 sec was matched to controls. Controls were made by using glucose dilutions to create 2%, 1%, 0.5%, 0.25%, 0.125%, and 0.0625% concentrations; water was 0%. It was expanded; it involved testing invertase and lactase activity and determining glucose linear time point in order to measure sucrose and lactose concentrations. The foods' Glycemic Index, Glycemic Load, Insulin Index and Carb Factor was examined; their meaning to diabetic diet was discussed. In the engineering part, an artificial pancreas model, a device of continuous sensor providing the information to auto-correcting pump how much chemical (insulin) should be given, was created. The engineering part involved assembling the electrical circuit on the breadboard, making the conductivity sensor and then testing the artificial pancreas model by applying the concept of acid/base chemistry and an electrical circuit.

1. The student independently performed all procedures as outlined in this abstract  Yes  No
2. This project is a continuation.  Yes  No
3. This project is being presented at  SJRSEF  NMJAS Paper Competition

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Alex Bessinger  
Student's Signature

01/30/2021  
Date

