



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

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| Name(s) Amely Joly | Project Number S1714 |
| Project Title Detecting Diabetes by Polarizing Light | |
| Abstract Objectives/Goals Detecting diabetes is performed using various methods: blood tests, urine test strips, lasers, and even contact lenses. Unfortunately, each method hold their own fault; uncomfortable, not environmentally friendly, unreliable, or impractical. My objective was to find a new method to detect diabetes by addressing all these issues. Assuming that sugar can be used to detect diabetes and the physical property of the optical rotation of the glucose, I asked myself: Can the polarization of light in the urine detect diabetes in an ecological way? Methods/Materials The method consists of beaming a light source through urine samples with increasing glucose concentration and to measure the change in its angle of polarization. The materials are easy to find and affordable: Light source, light probe, a small container to hold the urine samples, a few mirrors, and polarized filters, all easily assembled into a small and self-contained unit, and connected to a laptop for processing the data. Results The experiments show a proportionality between the concentration of glucose in the urine solution and the change in the angle of polarization of the light source. The higher the concentration, the greater the angle of deviation, in accordance with Biot's law. When this deviation is above a certain value, we can ascertain the patient has diabetes. Conclusions/Discussion The research, experiments and initial results are very encouraging in finding a novel method of detecting diabetes in patients without the issues seen in other methods currently used. It is easy to perform, fast, reliable and reusable without any throwaway materials. The next step is to build a portable prototype and to validate the method further by working with doctors and patients. | |
| Summary Statement A novel and better method to detect diabetes by measuring the change in the angle of a polarized light beaming through a patient's urine sample. | |
| Help Received My physics and Chemistry teacher Mr. Julien Astruc, as well as my student colleagues Alice and Eliette. | |