



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Anish Seshadri	Project Number S0920
Project Title Wearable Diagnostic Point of Care Instrument for AGE Correlated Degenerative Diseases Using Smartphone Technology	
Abstract Objectives/Goals The goal of the project is to construct a novel, point of care biomedical device using smartphone technology that can reliably and economically determine pentosidine concentration in a patient's skin and provide a risk assessment. This device consists of two parts: component one and component two. Component one is a spectrophotometer constructed primarily from an unmodified iPhone 4S and an emission light source made up of an ultraviolet light source with a short band-pass filter. The absorption of light by skin results in the formation of excited molecules, which then return to the ground state and emit their energy in the form of light. Thus, emission of UVA wavelengths causes auto-fluorescent excitation in pentosidine, a biomarker and protein component of Advanced Glycation End (AGE) Products. Methods/Materials LED light bulb, Iphone 4S, short bandpass filter. Results Twenty tests were conducted per subject consecutively using the WDIDD. The raw data collected from the WDIDD is in the form of RGB pixel values that are then dynamically transferred to Excel's graphic utility. Data from each corresponding data point from each of 20 tests was averaged to give a final data set that had cancelled out a majority of the random values. Specific data modeling methods were used in order to analyze and process the massive bulk of data that were on the order of tens of thousands of data points per participant. WDIDD's merit was evaluated for three criteria: reproducibility, validity and statistical significance of results compared to pentosidine's behaviors which increases in concentration linearly with age, and is extremely high in patients with AGE related degenerative diseases. Conclusions/Discussion The Wearable Diagnostic Instrument for AGE Correlated Degenerative Diseases (WDIDD) was created to provide a method for identifying patients at risk of or already ailed by diabetes or other degenerative diseases related to AGE build-up.	
Summary Statement The Wearable Diagnostic Instrument for AGE Correlated Degenerative Diseases was proven both functional and valid in measuring levels of pentosidine and predicting risk assessment for AGE correlated degenerative diseases.	
Help Received I did the research and designed and built the device myself including the software and experimentation.	