

Statement of My Contribution to Science

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As a research associate with the support of Professor Michael Shuler at the Department of Biomedical Engineering at Cornell University, and with NIH-NCI funding from 2009 to 2015, I developed a research plan that would help me understand the personalized etiology of obesity.

As a scientist, entrepreneur, mentor, and coach, I can develop tools that will contribute to alleviating the burden of obesity and its comorbidities, which are the most significant cause of mortality in the world. What started as a clinical observational study provided evidence that suggested that human epigenetic changes are dynamic and can be transient and reversible. Furthermore, epigenetics can be monitored in vivo with plasma episensors (Ariza-Nieto et al. 2018) or in vitro using differentiated mesenchymal stem cells. My observations suggest ***epigenetic abnormalities are the leading cause of metabolic disorders*** (diabetes, obesity, dyslipidemia, high blood pressure, and even dementia, among others). Diagnostic tools to determine the person's risk for epigenetic abnormalities, using secretory episensors, allow the elucidation of the etiology, early diagnosis, prevention, or best treatment strategies to prevent metabolic disorders. It will also explore the development of new clinical diagnostic tools for personalized medicine based on secretory episensors. I have been a passionate scientist for as long as I can recall. My interest in human health and the environment's role in longevity has directed me to study the bioavailability of functional constituents in staple crops to determine the benefits humans obtain from the available agricultural products and food sources. Furthermore, the intensity and duration of physical activity regulate the expression of genes and their function. Individuals that engage in beneficial lifestyle changes respond with high variability to diet and physical activity, and the personalized epigenome plays a significant role.

Perhaps my most significant contribution to science has been inspiring scientific passion in the new generations. To date, I have had the great pleasure of mentoring two residents, 10 Master of Biomedical Engineering students, 12 undergraduate students, and 6 CDC-NDPP Coaches working with Community-Based organizations. My next goal is to guide many more students on their path through bench-to-bedside scientific knowledge and personalized medical discoveries as we observe, learn, and create solutions to devastating epigenetic abnormalities.