Board Member Spotlight:

Mark K. Santillan, MD

Dr. Mark Santillan, MD, brings a great deal of energy to his position as Assistant Professor in the Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, University of Iowa. As an active physician in the high-risk obstetrics clinic, researcher into the causes of preeclampsia, and Clinical Research Director for the Maternal Fetal Tissue Bank, that level of energy is a must.

Dr. Santillan's career began in Chicago as an undergraduate at Loyola University Chicago, where he conducted research in chemistry and biochemistry. Just before entering medical school, he participated in translational science testing of a new anti-platelet drug on Rhesus monkeys. According to Dr. Santillan, "Seeing the direct clinical correlation with basic research was what got me really interested in research." He was inspired as a medical student to pursue obstetrics, due in large part to the influence of Dr. John Gianopoulos, former Chair of Obstetrics and Gynecology at Loyola and Chief of Maternal Fetal Medicine, who had a true passion for teaching and taking care of patients. In the course of his training, Dr. Santillan became interested in high-risk pregnancies and realized that modern science has not explained the true mechanisms that drive many diseases

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in pregnancy such as preeclampsia and obesity related risks in pregnancy. It is this very issue that drives Dr. Santillan's clinical and research activities today.

While all of his early training was at Loyola University Chicago, Dr. Santillan brought his talents to the University of Iowa when he became a fellow in Maternal-Fetal Medicine and later an Assistant Professor in the Department of Obstetrics and Gynecology. In research funded by the NIH Reproductive Scientist Development Program (K12), Dr. Santillan is investigating the immunovascular mechanisms of preeclampsia, obesity, and hypertension in pregnancy. His studies utilize a novel immunologically-derived mouse model of preeclampsia. These mice are essentially normal until pregnancy, at which time they develop hypertension, proteinuria, kidney dysfunction, and vascular dysfunction, all hallmarks of preeclampsia. These translational studies in mice are being partnered with studies in humans to determine whether the same immunological factors that drive the preeclamptic phenotype in mice are also present in humans during pregnancy and fuel the development of preeclampsia. Dr. Santillan's research program has been heavily influenced by his early mentorship and ongoing collaborations at the University of Iowa with Drs. William Haynes, Stephen Hunter, Curt Sigmund, Justin Grobe, Eric Devor and Kimberly Leslie.

Other areas of active research include the potential use of microRNAs as a predictive marker and causal agent in preeclampsia. This line of research, funded by a Preeclampsia Foundation Vision Grant, explores whether the simultaneous regulation of multiple pathways by microRNAs might play a mechanistic role in the development of preeclampsia. He is also exploring the relationship between diet and preeclampsia in collaboration with Dr. Linda Snetselaar, Chair of Preventive Nutrition Education, and Dr. Katie Tharp, Department of Epidemiology, College of Public Health at University of Iowa. Their ongoing research is based on epidemiologic data that poor obstetric outcomes, including preeclampsia, growth restriction, preterm labor, and still births, are lower in people that eat a diet rich in fruit, vegetables, and antioxidants. Moreover, the children of these women have reduced incidence of eczema, asthma, and cardiovascular events, all conditions that have immunologic underpinnings. The goal of Dr. Santillan's study is to determine if eating a healthy diet can improve obstetrical outcomes in obese women and improve the cardiovascular health in their children.

In addition to his active practice in the high-risk obstetrics clinic and collaborative research endeavors, Dr. Santillan is the Clinical Research Director for University of Iowa IRB-approved Department of Obstetrics and Gynecology Maternal Fetal Tissue Bank. This bank is the obstetric arm of a family of biorepositories under the umbrella of the Women's Health Tissue Repository (WHTR). The purpose of this bank is to help accelerate research by providing researchers with biosamples throughout pregnancy along with pertinent clinical information in an unidentified manner such that patient privacy is protected. To date, the Maternal Fetal Tissue Bank has 1300 participants and over 20,000 aliquots of

material (i.e., maternal plasma, cord blood, placenta). Several projects and collaborations have sprung from the samples in this bank, most notably a collaborative effort with Dr. Jay Shendure at the University of Washington. Due to the purity of the DNA obtained from maternal plasma samples, it was possible to sequence the entire fetal genome. These data, recently published in Science Translational Medicine, illustrate the research that is possible using these precious tissue bank samples.

In his spare time, Dr. Santillan is completing a PhD in Translational Biomedicine as part of the University of Iowa Institute for Clinical and Translational Science's NIH-funded KL2 training program.

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