LK Hornberger MD
Biosketch Career Evolution & Research

Overview:

Dr Lisa Hornberger is the current Director of the Fetal & Neonatal Cardiology Program, Professor of Pediatrics (Division of Cardiology) and Obstetric & Gynecology at the University of Alberta in Edmonton. For nearly 2 decades she has been involved in clinical, educational and research endeavors in fetal cardiovascular health and disease. She has published over 120 articles and co-authored textbooks in the clinical and fundamental sciences focused on the early diagnosis, evolution, management and outcomes of fetal heart disease. She has established 4 world class Fetal Cardiovascular Programs at the University of Toronto (1996-2003), at the University of California, San Francisco in collaboration with the internationally recognized UCSF Fetal Treatment Center (2003-2008), and now at the University of Alberta, where she supervises 2-4 clinical research fellows per year from pediatric cardiology, perinatology and neonatology subspecialties.

Research Directions

My research over the past 2 decades has focused on the prenatal diagnosis, natural evolution, management and outcome of structural, functional and rhythm related cardiovascular disorders detected in utero. Although this research has been largely clinically focused, I have also had experience in fundamental sciences, exploring factors that influence myocyte proliferation using a human fetal myocyte cell culture system and cardiovascular imaging of various animal models, and in population based research, screening over 10,000 pregnancies in the metropolitan Toronto area for maternal autoantibodies, as an example. Since the fall of 2008, the University of Alberta Fetal & Neonatal Cardiology Program has nearly quadrupled the number of pregnancies evaluated for fetal cardiovascular disease and has established a formal neonatal echo service within the Royal Alexandra Hospital. This has provided an opportunity to develop several clinical research initiatives and foster translational research initiatives in fetal and neonatal cardiology that include the following:

1) investigation of the role of first trimester fetal echocardiography in defining normal early fetal cardiovascular structure and function (6-14 weeks) and predicting pregnancy outcome (PI: L Hornberger);

2) investigation of the role of maternal and placental disease in fetal cardiovascular programming with a specific current interest in the role of fetal hypoxia, correlating clinical observations with an experimental rat model of fetal hypoxia (PI: L Hornberger/S Davidge);

3) investigation of the pathogenic mechanisms responsible for twin-twin transfusion syndrome and their relevance to the evolution of congenital heart disease: Although this was initially only a clinical study, we have now embarked on an investigation examining the role of placental vasoactive peptide expression (ET-1) on fetal heart function and development using a mouse model. This work is in conjunction with Dr Denise Hemmings

4) evaluation of the anatomical and functional prenatal predictors of fetal lung hypoplasia

severity correlating clinical observations with parallel in vivo and in vitro investigations in an experimental rat model (PI: L Hornberger, B Thebaud);
5) elucidation of the pathogenic mechanisms and pathophysiology of fetal heart failure with incorporation of newer noninvasive imaging modalities, vector velocity (VVI), tissue Doppler and STIC 3-dimensional imaging (PI:L Hornberger);
6) investigation of myocardial functional adaptations/maladaptations of the neonate which has been clinically focused on the preterm infant and more recently has involved the use of a neonatal piglet model to explore using invasive and novel noninvasive echo-based modalities the evolution of myocardial function in early life and noninvasive measures that could be translated to the bedside delivery (Co-PI: L Hornberger, N Khoo, E Fortin-Pellerin, P-Y Cheung, Y Coe);
7) examining the role of industrial air-born emissions in the evolution of congenital heart disease in Alberta using GIS mapping techniques (LHornberger and A Osornio-Vargas)
8) multicenter investigation examining the etiology of maternal autoimmune-mediated fetal AV block –this is a part of a CIHR Network grant (PI:Robert Hamilton, UToronto, site PI: LHornberger)
9) multicenter randomized control trial exploring treatment strategies for fetal supraventricular tachyarrhythmias-CIHR funded investigation (PI:EJaeggi, site PI and co-investigator: LHornberger)
10) multicenter prospective study examining the utility of hand-held Doppler devices in surveillance of fetal arrhythmias both in diagnosis and in examining treatment success (PI: Bettina Cuneo, UColorado, site PI: L Hornberger)