THE HARTWELL FOUNDATION

2008 Individual Biomedical Research Award

Review of Proposed Research

Investigator: **Mala Mahendroo, Ph.D.**
Associate Professor
Department of Obstetrics and Gynecology

Institution: **University of Texas Southwestern Medical Center**

Proposal: **Predicting Preterm Labor: Evaluation of Second Harmonic Generation Endoscopy as a Potential Clinical Tool**

Dr. Mahendroo proposes development of a transformative laser-based imaging technology for prediction of preterm labor, which will have a significant impact on reducing infant mortality and improving children's health. In the United States, approximately 500,000 babies each year are born preterm, an escalating number that currently accounts for over 12 % of all births. Defined as delivery before 37 weeks of a normal 40-week gestation, preterm births are at increased risk for substantial health complications and lasting disabilities, including mental retardation, cerebral palsy, underdeveloped lung, gastrointestinal problems, and vision and hearing loss. Preterm births remain the major cause of neonatal mortality. While 25% of preterm births result from early induction of labor or cesarean delivery due to pregnancy complications or health problems in the mother or fetus, in a staggering 250,000 preterm births there are no predisposing risk factors and onset of premature labor is unexpected. Clearly, in order to develop effective therapies to stop preterm birth, improved methods to predict when a woman is at risk are necessary. Classical methodology for identifying impending birth relies upon physical observation, indicating a shortening of the cervix (the small cylindrical neck of the uterus that leads into the birth canal). In preparation for birth, the connective tissue of the cervix progressively changes in strength, shape and organization, leading to increased flexibility. Unfortunately, physically observable shortening of the cervix as a risk factor for preterm birth is very unreliable. To address this issue, Dr. Mahendroo proposes an exciting analytical innovation for non-invasive imaging of the cervix using second harmonic generation (SHG) laser-based imaging in combination with endoscopy. The approach is a derivative of existing high-resolution optical microscopy used to study tissue architecture, where only certain structures similar to the collagen found in load-bearing tissues like the cervix are capable of reflecting SHG light. If successful, the envisioned device would analytically demarcate the stages of pregnancy and accurately predict preterm birth, leading to improved strategies to halt preterm birth and improve postnatal outcomes.