Abnormal development of gametes (sperm and eggs) and embryos is a leading cause of birth defects and poor pregnancy outcomes. Clinically important, tangible examples include common errors in chromosomal number such as Down's syndrome, infertility, recurrent miscarriage and serious pregnancy complications such as pre-eclampsia, intrauterine fetal growth restriction, and pre-term delivery. In the Center for Reproductive Sciences (Department of Obstetrics, Gynecology and Reproductive Sciences), we have built a premier program to investigate fundamental aspects of human reproduction and development. Our goal is to help couples have healthier pregnancies and healthier babies, either by natural conception or by assisted reproductive technologies.

As to approach, we are using human embryonic stem cells (hESCs) to gain insights into reproductive processes and to explore the early stages of human development.
We are employing a combination of genetic, proteomic, cell biological, molecular and biochemical methods to address fundamental questions that must be answered before scientific discoveries can be translated into advances in clinical care. For example, which cells of the embryo give rise to hESCs? What are the methodological advances that will enable somatic cell nuclear transfer (SCNT)? What are the fundamental mechanisms that drive hESC differentiation into organs (e.g., placenta, brain, heart and pancreas) and tissues (e.g., blood)? How do these normal processes go awry in cases of infertility, poor pregnancy outcome and human diseases whose causes can be traced to the peri-natal period? Answering these questions will provide key answers to fundamental questions regarding human reproduction and fertility. In the process, we will use the knowledge we gain to generate new and improved hESC lines and advance methods for SCNT.

The Reproduction and Fertility pipeline is directed by **Drs. Linda Giudice** and **Marcelle Cedars**.

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