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****Green Center researchers look
at the mechanisms of labor

DALLAS -- Uncovering the mystery of the mechanisms of labor has been a major research effort in the Cecil H. and Ida Green Center for Reproductive Biology Sciences since its founding in 1965. The Green Center was made possible primarily through a major gift from the Greens for research in the area of reproductive biology.

Since its beginning, a great deal of research in this specialized center has involved a better understanding of the mechanics of parturition, or childbirth, and the complicated communication system between mother and fetus that is thought to be involved in its initiation. Researchers say that these understandings are important in preventing a condition that often leads to death or serious disability of an infant with underdeveloped lungs.

Prematurity may well be the major health hazard in the United States, said Dr. Paul MacDonald, director of the Green Center and one of the pioneer researchers in this field. The costs of cancer or cardiovascular disease seem small compared with the astronomical costs caused by prematurity, not to mention the cost in suffering to the injured children and the families. Prematurity is the greatest cause of morbidity and mortality in newborns. The child who is greatly damaged through premature birth and survives may face 70 or more years of living with a serious and costly disability such as brain damage or cerebral palsy, he further explained.

Respiratory distress syndrome, or hyaline membrane disease as it used to be called, is the major cause of these deaths and disabilities. The lungs are the last major organs to develop in the fetus. Therefore, if the birth is premature, the lung system may not be developed enough to function normally. A substance called surfactant is manufactured by the body to coat the inside surface of the fetus's lungs and reduce the surface tension so they will not collapse on themselves.

Much of the work done by MacDonald and his associates, including Dr. John Porter, has been aimed at defining the biomolecular processes that cause the onset of normal labor. It is theorized that the fetus itself "calls" for labor to begin through an organ communication system between the mother and the fetus. Over the years the research director has been looking at the role of the prostaglandins, fatty acids that stimulate contractions in the uterus and are thought to play a part in the initiation of labor.

Amniotic fluid has long been suspected of containing substances that play roles in the initiation of labor. Recent findings by Dr. Jack Johnston, professor of biochemistry and obstetrics and gynecology, and his associates in the Green Center have looked at the role of platelet activating factor (PAF) in the initiation of labor. Johnston said it has earlier been reported that PAF appears in human amniotic fluid in association with labor and that contractions in animals have been observed in response to PAF at concentrations similar to those present in amniotic fluid. PAF, which plays a major role in blood clotting, has been found in increased concentration in the amniotic fluid of women nearing childbirth in a form not produced in the kidneys.

Johnston agrees with MacDonald that it is of major importance to find ways of protecting the too young infant from death or developmental danger by finding ways to see that its lungs are protected until they can function normally. With this in mind, researchers around the world are looking at ways to delay the onset of labor since "the uterus is the best incubator in which to let the lung mature," to provide the lung with artificial surfactant or to stimulate the newborn to produce more surfactant itself and delay the initiation of parturition.

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Johnston said that the Green Center is concentrating on finding ways to delay the onset of parturition and initiation of the fetal production of surfactant. Johnston's work with Dr. John Bleasdale in the center has concentrated on discovering and studying enzymes involved in the production of surfactant. It is known that the ratio of two of these, phosphatidylglycerol and phosphatidylcholine, serves as a reliable indicator of the level of the maturity of the fetal lung.

Also new in the Green Center is the work being done by Dr. Carole Mendelson, assistant professor of biochemistry and OB/Gyn, and Dr. Jeanne Snyder, assistant professor of cell biology and OB/Gyn. These researchers are interested in the effects of hormones on fetal lung development. The two have also studied fetal lung development in organ culture and looked at the early stages of surfactant development.

All these research projects -- as well as others -- are aimed at solving the mystery of the mechanisms involved in labor, said Johnston. But why is it so difficult? "Perhaps this complicated mechanism is a protective device in the evolution of the species," he said. "Maybe that's why the process is so elusive."

Johnston said that one of the greatest strengths of the ongoing research program in the Green Center for Reproductive Biology Sciences is that all the work is done on a team basis, bringing together various disciplines to attack the problems at hand. Researchers there come from a variety of disciplines including obstetrics and gynecology, cell biology, biochemistry, reproductive biology, lipid biochemistry, physiology and endocrinology.

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NOTE: The University of Texas Health Science Center at Dallas comprises Southwestern Medical School, Southwestern Graduate School of Biomedical Sciences and the School of Allied Health Sciences.