

Preterm Birth: Diagnosis and Treatment

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Preterm birth remains the biggest unsolved obstetrical problem. As much as 70% of perinatal mortality is attributed to premature birth, and many of the surviving preterm infants suffer serious lifelong morbidity, including cerebral palsy, blindness, hearing loss, learning disabilities, and other chronic conditions. Preterm birth is a tremendous worldwide health problem. About 10% of babies are born prematurely (15 million babies) in the world out of a total of about 15 million births per year. The solutions for solving preterm births are directly related to the ability to diagnose preterm birth or preterm labor (the largest contributor to preterm birth) and treatment strategies. Treatments also depend upon the ability to predict when women will deliver prematurely to accurately estimate if treatments are effective. Term and preterm labor and birth are dependent upon two critical functions: increased uterine contractility and softening/dilation of the cervix (cervical ripening). Thus, our studies (many available free at Robert E Garfield on Google Scholar, <http://scholar.google.com/> or Researchgate, <https://www.researchgate.net/>) in animals and humans have focused on tracking uterine and cervical changes in pregnancy in efforts to determine the normal and abnormal function of the uterus and cervix during term and preterm birth. To study uterine contractility we have measured uterine electromyographic activity (EMG) recorded from animals during gestation and noninvasively registered from abdominal electrodes in pregnant humans. Contractility of the uterus, like the heart, is controlled by electrical events in the myometrium, but uterine EMG activity is configured differently that of heart muscle. These studies show that EMG recordings can be used to diagnose term and preterm labor and birth. These studies also demonstrate that EMG studies can be used to define appropriate therapies not only for preterm labor/birth but for treatments that can be used to stimulate labor.

Most common interventions recommended to prevent preterm birth, such as bed rest, tocolytics, antibiotics and cervical cerclage have been proven to have little or no benefit. Once preterm labor is established, the goal of treatment is merely to delay delivery in order to allow for the transfer of the pregnant patient to the most appropriate hospital and for administration of corticosteroids. None of the currently available treatments for preterm labor can prolong pregnancy sufficiently to allow further intrauterine growth and maturation of the fetus. There is experimental support from animal and in vitro studies, and also empirical evidence from large randomized placebo-controlled clinical trials, that treatment with progestins may reduce the risk of preterm birth in both high-risk asymptomatic patients and in those presenting with signs and symptoms of preterm labor. Progestins are a group of steroid hormones that include natural progesterone and its analogues, such as 17 alpha hydroxyprogesterone caproate (17P). However, our studies using a sensitive bioassay of the action of progesterone and 17P show that present therapies with vaginal progesterone and injections of 17P are probably not effective. Progesterone needs to be formulated differently to increase the effectiveness and 17P is a very weak progestin that may not be optimal for preterm birth treatment [1-4].

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