RESCUE OF THE CORPUS LUTEUM IN THE CYCLE OF CONCEPTION

In a cycle of conception, the human corpus luteum is rescued from luteolysis by the appearance of trophoblast-derived hCG. In the corpus luteum of late pregnancy, hCG suppresses apoptosis, with a lesser effect on autophagy, allowing structural maintenance of the gland and sustaining expression of the STAR gene. The progressively rising concentrations of this luteotropin, first detectable in peripheral blood 8 days after ovulation, both stimulates steroidogenesis and prevents structural involution of the gland, which is the major source of progesterone for the first 10 weeks of gestation. The corpus luteum doubles in volume during the first 6 weeks of gestation as a result of hypertrophy of the luteinized granulosa and theca cells and accumulation of connective tissue and nonsteroidogenic cells, particularly endothelial cells. Experimentally, a protocol of ever-increasing doses of hCG rescues both the human and monkey corpus luteum. Recent observations suggest that hCG stimulates luteal 11β-hydroxysteroid dehydrogenase type 1 expression, resulting in increased intraluteal generation of cortisol, which is proposed to act through the lutein cell glucocorticoid receptor to promote corpus luteum survival in the cycle of conception.

The corpus luteum is essential for the first few weeks of pregnancy, and luteectomy results in miscarriage if performed before 7 weeks of gestation. Its secretory function, however, is not sustained at high levels throughout gestation, despite the presence of hCG. This characteristic has been documented by monitoring levels of 17α-hydroxyprogesterone, a steroid that is not produced by the placenta and therefore largely reflects corpus luteum function. Levels of 17α-hydroxyprogesterone rise to peak concentrations at 6 weeks of pregnancy and then decline. Part of the decline in steroidogenic activity is due to the fact that the early hypertrophy of the corpus luteum is later followed by shrinkage. The biochemical changes underlying the functional and structural changes in the corpus luteum of pregnancy have not been elucidated.

The corpus luteum of pregnancy also secretes protein hormones, including inhibin A and relaxin. Relaxin may function to promote the decidualization of the endometrium and suppress uterine smooth muscle contractile activity.