

HISTOCHEMICAL STUDY OF CORPUS LUTEUM DURING PREGNANCY AND PUERPERIUM

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Introduction

Human corpus luteum of pregnancy has been extensively investigated. Work of Gillmen and Stein (1941) and White *et al* (1951) are valuable contributions in the study of the corpus luteum.

Material and Methods

Histochemical methods for glycogen (McManus and Nowry, 1960), lipids (Baker, sudan Black B, 1945 and Nile Blue A, Casselman, 1959), alkaline phosphatase (Burstone, 1958), acid phosphatase (Burstone, 1958), succinate dehydrogenase (Pearse, 1961), lipase (Gomori, Pearse, 1961), beta glucuronidase (Ferric hydroxy quinoline method, Fishman and Baker, 1956) have been employed.

Biopsy of the ovary was obtained from 100 cases (Table I) subjected to hysterotomy, caesarean section, puerperal sterilizations and laparotomy for ectopic pregnancy. These cases were between the age of 20-35 years and 61 per cent of them were para 1 to 4.

Observations

Histochemically, the corpus luteum was rich in lipids and enzymes. The lipids were mainly phospholipids, as observed

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TABLE I
Material

Groups	No. of Cases
I. Normal Pregnancy group:	
(a) Early pregnancy	8
(b) Term pregnancy	54
II. Puerperal group	34
III. Miscellaneous group:	
(a) Ectopic pregnancy	4
Total	100

on Nile Blue A staining. Red granules (Burstone, 1958) of alkaline phosphatase were more towards the plasma membrane. Most of the cells were loaded with it. Blood vessels were rich in the enzyme and were clearly demarcated. The granules of acid phosphatase were perinuclear.

With advancing gestation the amount of glycogen and lipids of granulosa lutein cells increased. There was no change in the phosphatases, succinate dehydrogenase and lipase, whereas there was a marked increase in the beta glucuronidase.

During puerperium, the enzymes like lipase, succinate dehydrogenase and beta-glucuronidase (Fig 1) were found to have decreased. No such change was noticed in the concentration of glycogen, lipids or phosphatases.

The granulosa lutein cells had moderate to good amount of lipids. Their

glycogen content was minimal. Colloid droplets were rich in carbohydrate-protein complex.

Alkaline phosphatase was highly concentrated in this tissue. Granulosa lutein cells showed good activity of alkaline phosphatase, acid phosphatase, succinate dehydrogenase and beta-glucuronidase. Activity of lipase was moderate to intense.

Discussion

Histochemical study of the ovary has been primarily directed to understand the functional status of the corpus luteum during pregnancy and puerperium.

The following are the summarized results:

- (1) With advancing gestation:
 - (a) glycogen and lipid increased.
 - (b) no change in phosphatases.
 - (c) no change in lipase and succinate dehydrogenase.
 - (d) marked increase in beta-glucuronidase.
- (2) During puerperium:
 - (a) no alteration in glycogen and lipid content.
 - (b) phosphatases same as during pregnancy.
 - (c) decrease activity of lipase, succinate dehydrogenase and beta-glucuronidase.

The granulosa lutein cells were found to be rich in lipids with very little of glycogen. Stromal cells had minimal amount of glycogen and blood vessels were rich in carbohydrate-protein complex. In support of this study is the work of McKay *et al* (1961) who also observed similar findings. Marcotty (1914) demonstrated lipid in the theca interna cells of the corpus luteum. Later on, workers like Gillman and Stein

(1941) found lipids in the granulosa lutein cells as well as in the theca lutein cells.

Glycogen forms an integral component of all cells undergoing growth or differentiation. Presence of lipid is thought to be either a sign of highly active corpus luteum (Gillman and Stein 1941) or degeneration (Brewer 1942). In 1961, Mc Kay *et al* attributed the lipid containing cells as steroid secretors.

The biological function of alkaline phosphatase is not well understood. Cohen *et al* (1954) related it to transport mechanisms, growth and differentiation, formation of fibrous proteins or to the sites of steroid production.

Mc Kay *et al* (1961) observed alkaline phosphatase in the theca lutein cells and the endothelial cells of the ingrowing capillaries. In the degenerating corpus luteum they observed a ribbon-like pattern involving the granulosa lutein cells near the central coagulum. In the present study, the sensitive method of Burstone (1958) was adopted and we could demonstrate fairly good amount of alkaline phosphatase in the granulosa lutein cells. The enzyme in the theca lutein cells was comparatively much less.

Acid phosphatase is now well known for its proteolytic and hydrolytic activity and also for its function of intracellular catabolism, detoxification and autolysis. Moreover, the function of the enzyme is under the influence of steroids. Lobel *et al* (1962) and Novikoff *et al* (1961) stated that acid phosphatase occurs mainly in lysosomes. Cohen (1964) has also assigned another function that is the enzyme is suggestive of site of steroid production.

In the corpus luteum of this series the acid phosphatase activity was intense.

McKay *et al* (1961) and Deane *et al* (1962) observed that acid phosphatase activity was high in all of the corpora lutea of pregnancy. In the 6 week specimen, activity occurred predominantly in the lutein cells, generally as small perinuclear granules, but it also existed in some phagocytes. By 12 weeks, parenchymal reactions were greater and occurred in large cytoplasmic clumps, reactive phagocytes appeared numerous. Thereafter, the reaction became intense throughout, although postpartum the over-all activity of the corpora lutea of pregnancy appeared somewhat reduced, as more and more groups of lutein cells were replaced by connective tissue. Corpus as studied was rich in succinate dehydrogenase, lipase and beta-glucuronidase.

Succinate dehydrogenase is correlated with the function and growth of the corpus. Meyer and McShan (1950) believed that the finding of large amount of the enzyme in lutein cells during pregnancy was concerned with the synthesis and secretion of ketosteroids by these cells.

Lipase acts on long chained fatty acids and probably they help in breakdown of fat at those sites. Beta-glucuronidase is considered to play a role in the utilization of polysaccharide moieties for tissue reorganisation and growth (Kerr *et al* 1949).

From the foregoing discussion it can be inferred that corpus luteum of the ovary is active throughout the pregnancy. It is probably under the effect of the placental steroids as the activity of the corpus luteum diminishes after parturition.

Summary

One hundred ovarian biopsy specimens were studied. The tissue was subjected to detailed histochemical study.

The results were suggestive of an active corpus luteum throughout gestation. Presence of lipids, alkaline phosphatase, acid phosphatase, succinate dehydrogenase or beta glucuronidase in the corpus leuteum, were in favour of steroid production. Placental hormones influence the intrinsic metabolic functions of the ovary.

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