NOTE

The Secretory Patterns of Relaxin and Human Chorionic Gonadotropin in Human Pregnancy

KATSUYOSHI SEKI, TADASHI UESATO, TORU TABEI* AND KOICHI KATO

Department of Obstetrics and Gynecology, National Defense Medical College, Namiki 3-2, Tokorozawa, Saitama 359, and Self Defense Forces Central Hospital*, Ikejiri 2-24, Setagaya, Tokyo 154

Abstract

Relaxin and human chorionic gonadotropin (hCG) were simultaneously determined in the same serum samples obtained from pregnant women. Although the secretory pattern of relaxin, in general, appeared to parallel that of hCG during human pregnancy, several discrepancies were discerned in the secretory patterns of the two hormones. The mean hCG concentration significantly differed between weeks 4–7 and 8–11 of pregnancy, but the mean relaxin concentration did not. The mean relaxin concentration began to decrease at weeks 16–19 whereas that of hCG did so at weeks 12–15. The mean relaxin concentration at weeks 4–7 was significantly higher than that at weeks 24–27, though there was no significant difference between the mean hCG concentrations in the two periods. These differences in the secretory pattern of relaxin from that of hCG indicate that relaxin secretion in pregnancy is not determined only by the circulating level of hCG. The responsiveness of the corpus luteum of pregnancy to hCG stimulation of relaxin secretion may vary as a function of the age of the corpus luteum, and this may partially account for the differences between the secretory pattern of relaxin and that of hCG observed in the present study.

The pattern of circulating relaxin concentrations during the course of human pregnancy has been reported by several investigators (O'Byrne et al., 1978a; Quagliarello et al., 1979; Szlachter et al., 1982). The secretory pattern of relaxin is reported to parallel that of human chorionic gonadotropin (hCG) (Quagliarello et al., 1979). However, relaxin and hCG have not heretofore been measured in the same samples obtained from pregnant women throughout pregnancy. We now report relaxin and hCG levels determined simultaneously in serially collected samples at monthly intervals from early pregnancy until term.

Materials and Methods

Twenty women with regular menstrual cycles and accurate last menstrual periods were the subjects of this study. Diagnosis of pregnancy
was confirmed by urinary hCG determination and/or ultrasonography after the first missed period. The courses of pregnancies were uneventful. Monthly serum samples were acquired in the morning hours. Immunoreactive relaxin was measured by radioimmunoassay (Sherwood et al., 1975; O'Byrne and Steinetz, 1976) with 125I-labeled polytyrosyl-relaxin and rabbit antiporcine relaxin serum R6. The antiserum was used at a final dilution of 100,000. The dose response curve of serum from a pregnant woman during the first trimester was parallel to the standard curve (Fig. 1). No cross-reaction was found with progesterone (6–100 µg/ml), estradiol (6–100 µg/ml), LH (LER 960) (0.3–5 µg/ml), FSH (LFR 1575) (0.3–5 µg/ml), TSH (5–90 mU/ml), prolactin (12.5–500 ng/ml), oxytocin (1.25–20 mIU/ml), hCG (60–1,000 IU/ml), insulin (5–100 ng/ml) and human placental lactogen (0.1–2 µg/ml). The sensitivity of the assay was 200 pg/ml. The intraassay coefficient of variation was 6.6%, and the interassay coefficient of variation was 9.3%.

hCG was measured by radioimmunoassay with the radioimmunoassay kit obtained from Commissariat à l'Energie Atomique, France. The

![Fig. 1. Dose-response curves for porcine relaxin (●) and serum from a woman during the first trimester of pregnancy (○).](image1)

![Fig. 2. Serum relaxin and hCG concentrations (mean±SE) during pregnancy.](image2)

* p<0.01 and ** p<0.001 vs weeks 24–27. *** p<0.001 vs weeks 4–7.
intra- and interassay coefficients of variation of the hCG assay were 6.8% and 8.1%, respectively. The cross-reaction of LH was 0.66%. Statistical analyses were performed using analysis of variance and least significant difference, and calculating the correlation coefficient.

Results

Concentrations of relaxin differed significantly (p<0.05) with respect to weeks of pregnancy. There was a slight increase in the mean relaxin concentration between weeks 4–7 and 12–15 of pregnancy, though there was no significant difference between the first 3 week-groups (Fig. 2). The mean relaxin level progressively decreased from weeks 16–19 to weeks 24–27 and slightly increased at weeks 28–31, levelling off thereafter (Fig. 2). Concentrations of hCG significantly (p<0.01) differed with respect to weeks of pregnancy. There was a rapid rise in the serum hCG level to a peak at weeks 8–11 (Fig. 2). Then it decreased until weeks 16–19, levelling off thereafter (Fig. 2). The mean hCG concentrations at weeks 8–11 and 12–15 were significantly higher than that at weeks 4–7 (Fig. 2). All other mean hCG concentrations were not significantly different from that at weeks 4–7 (Fig. 2). As a whole, there was a significant correlation between relaxin and hCG concentrations (r=0.3361, n=180, p<0.01).

Discussion

A porcine relaxin radioimmunoassay was used to determine immunoreactive relaxin in sera of pregnant women. The dose response curve of serum from a pregnant woman was parallel to the standard curve. There was no cross-reaction with any hormone preparation tested. Further, O'Byrne et al. (1978b), using the same radio-immunoassay system, found that relaxin-like activity determined by guinea pig symphysis palpation assay in extracts of corpora lutea from pregnant women paralleled relaxin-like immunoactivity determined by radioimmunoassay. Thus, the porcine relaxin radioimmunoassay is considered applicable to human fluids to evaluate immunoreactive relaxin levels.

In pregnant women, there was a significant correlation between relaxin and hCG concentrations. Thus, in agreement with the result of Quagliarello et al. (1979), the secretory pattern of relaxin, in general, appears to parallel that of hCG in human pregnancy. However, several discrepancies were discerned between the secretory pattern of relaxin and that of hCG in pregnancy. The hCG level significantly differed between weeks 4–7 and 8–11, but the relaxin level did not. The relaxin level began to decrease at weeks 16–19, whereas the hCG level did so at weeks 12–15. Further, the mean relaxin level at weeks 4–7 was significantly higher than that at weeks 24–27, though there was no significant difference between the hCG levels in the two periods. These differences in the secretory pattern of relaxin from that of hCG indicate that relaxin secretion in pregnancy may not be determined only by the circulating level of hCG. In addition to the level of hCG, the timing and duration of hCG stimulation may be critical to relaxin secretion. Furthermore, appropriate ovarian conditions may be necessary for relaxin secretion. The corpus luteum of pregnancy is reported to be the main source of circulating relaxin in pregnant women (Weiss et al., 1978). The responsiveness of the corpus luteum to hCG stimulation of relaxin secretion is reported to vary with the age of the corpus luteum in nonpregnant women (Quagliarello et al., 1980). If the same phenomenon takes place in pregnant women, it may partially account for the differences between the secretory pattern of relaxin and that of
hCG observed in the present study. Alternatively, there may exist other unknown factors which regulate the secretion of relaxin in human pregnancy.

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References


