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Prostate-Specific Antigen in Amniotic Fluid of Normal and Abnormal Pregnancies

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Objective: To examine if prostate-specific antigen (PSA) is present in amniotic fluid or maternal serum during pregnancy and if its presence is associated with fetal abnormalities.
Methods: Samples tested included amniotic fluids from 853 pregnant women for whom amniocentesis was performed; 312 nonpregnant women who donated blood; 259 pregnant women who donated blood at various gestational ages. Amniotic fluid or serum PSA was measured with an ultrasensitive time-resolved immunofluorometric procedure. 372 pregnancies were studied for the presence of genotypic or phenotypic fetal abnormalities.
Results: PSA was present in most amniotic fluids; the median PSA concentration increased from gestational week 11 to 22 and stabilized thereafter until delivery. The most prominent PSA concentration change occurred during gestational weeks 13–14. Pregnant women had significantly higher serum PSA concentrations than nonpregnant women; the pattern of serum PSA concentration change during pregnancy was similar to that of amniotic fluid; however, serum PSA concentrations were lower by a factor of 20–40. No association existed between amniotic fluid PSA and maternal age, gender of fetus, or length of abstinence of mother from sexual intercourse. After gestational week 15, fetuses with trisomy 21 or 18, anencephaly, or renal disorders were associated with low amniotic fluid PSA levels.
Conclusion: Our data suggest that PSA may play a role in fetal development, especially at gestational ages between 13–20 weeks. The diagnostic usefulness of PSA in identifying fetal abnormalities remains to be determined.

KEY WORDS: prostate-specific antigen; amniotic fluid; serum constituents; fetal development; fetal abnormalities; growth factor regulator.

Introduction

Prostate-specific antigen (PSA), a 33 kDa serine protease present at high levels in seminal fluid was, until recently, considered a highly specific biochemical marker of prostatic epithelial cells (1,2). We have recently reported that PSA is present in 30% of female breast tumors and provided evidence that this marker may be a new favorable prognostic indicator for breast cancer (3). *In vitro* stimulation of breast cancer cell lines with various steroids, primarily progestins, androgens, and glucocorticosteroids, induced the production of PSA (4). Expression of PSA in the healthy female breast was also demonstrated in women receiving oral contraceptives (5). Recent findings suggest that the presence of PSA in breast tumors is closely associated with steroid hormone receptor-positive cells (6).

The association of the placenta with increased production of steroid hormones during pregnancy (7), has prompted us to search and detect PSA in pregnancy-associated fluids, such as amniotic fluid (8) and milk of lactating women (9). Our findings of PSA in various tumors, stimulated normal breast, amniotic fluid, breast milk, and data presented by others for normal endometrium (10), suggest that PSA may not simply represent another fetoplacental tumor marker. PSA may be involved as a growth factor or as a growth-factor regulator in normal and malignant tissue growth and development.

The purpose of this study was to correlate amniotic fluid PSA levels with pregnancies characterized by either normal or abnormal outcome. We were also interested in confirming and characterizing PSA presence in maternal serum.

Materials and methods

Methodology

PSA determinations were performed using a highly sensitive and specific immunofluorometric procedure described in detail elsewhere (11). All assays were run in duplicate.

Samples

The ultrasensitive PSA immunofluorometric procedure was used to assay 1424 samples in total. Of

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