

# MAMMARY MORPHOLOGICAL AND FUNCTIONAL CHANGES DURING PREGNANCY IN WOMEN

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## INTRODUCTION

During pregnancy the mammary gland undergoes extensive lobular-alveolar growth (mammogenesis). At some time during this growth, the epithelial cells differentiate and initiate the secretion of milk constituents albeit at a low rate (lactogenesis I). Lactose synthesized by these newly-differentiated alveolar epithelial cells is reabsorbed into the blood and excreted in the urine. We have measured changes in breast volume and urinary lactose during pregnancy, to determine the relationship between mammogenesis and lactogenesis I.

## METHODS

In this ongoing study of five women, we have measured breast volume during pregnancy, using the Computerized Breast Measurement (CBM) System (1) and the 24-h output of lactose in urine, using a spectrophotometric assay (2).

## RESULTS AND DISCUSSION

The timing and magnitude of the increase in the output of lactose in urine during gestation was similar in volunteers 1-3, with volunteers 4 and 5 showing low lactose excretion during the early stages of pregnancy (Figure 1).

Changes in breast volume are shown in Figure 2 with a computer generated breast reconstruction for volunteer 3 shown in Figure 3. Although there was close agreement in the changes in breast volume between right and left breasts of the individual volunteers, considerable variation was observed between the volunteers throughout pregnancy (Figure 2). In addition, the relative volumes of the right and left breasts of volunteer 1 were considerably different. The preconception breast volume of volunteer 5 (indicated by asterisk), is likely to be elevated as a consequence of her breastfeeding a previous infant at the time of measurement, who was weaned 4 weeks prior to conception (Figure 2).

Assuming that the 24-h urinary lactose is a qualitative measure of the amount of lactose synthesized, these observations suggest that lactogenesis I begins during mid-gestation in women. However, the growth of the breast during pregnancy, measured by the increase in breast volume, showed considerable differences between the women. These differences may be explained by variation in the extent to which breast adipose tissue was replaced with lobular-alveolar tissue. We conclude from these preliminary studies that the measurement of changes in the output of lactose in urine and in the volume of the breasts during pregnancy may offer a non-invasive means of relating the endocrinology of pregnancy to mammogenesis and lactogenesis I in women.

## REFERENCES

- 1) Daly, S.E.J. *et al.* (1992) *Exp. Physiol.* **77**:79-87
- 2) Arthur, P.G. *et al.* (1989) *Anal. Biochem.* **176**:449-456

ACKNOWLEDGEMENTS -- NH&MRC

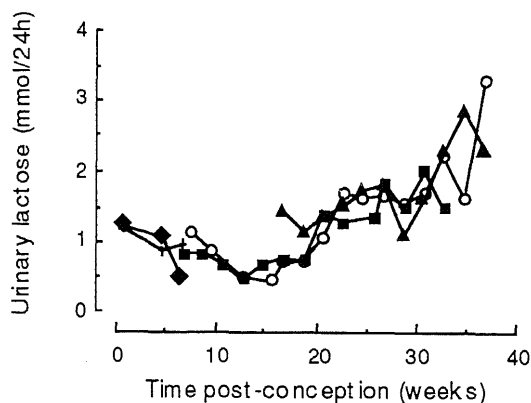


Figure 1. Excretion of lactose in the urine during pregnancy. Volunteer 1  $\circ$ , 2  $\blacktriangle$ , 3  $\blacksquare$ , 4  $\blacklozenge$ , 5  $\circ$ .

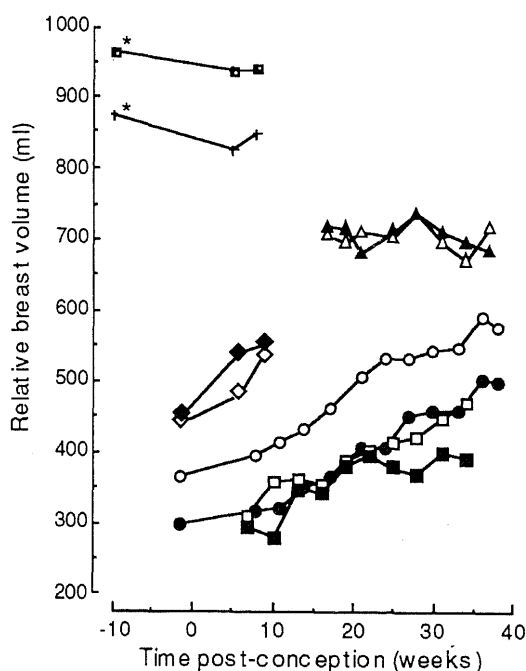
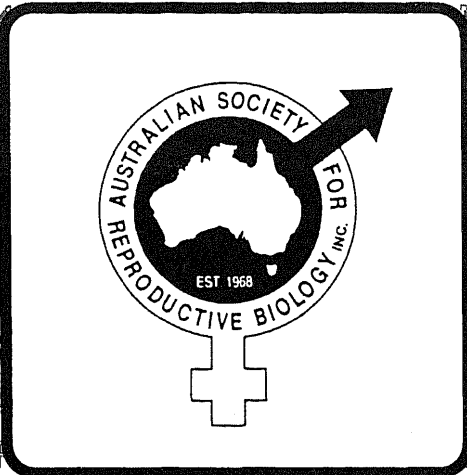


Figure 2. Breast volume changes during pregnancy, Open symbols, Right breast, closed symbols, Left breast. Volunteer 1  $\bullet$ , 2  $\blacktriangle$ , 3  $\blacksquare$ , 4  $\blacklozenge$ , 5  $\circ$ .



Figure 3. CBM generated reconstructions of left breast shape during trimesters 1, 2 and 3, for volunteer 3.

J. Thompson.



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### Session 5 :

### GODING LECTURE

Professor I. Huhtaniemi

*Molecular aspects of the ontogeny of the mammalian pituitary-gonadal axis*

Chairman: Prof. Alan Trounson

Time: 1200 - 1300

Venue: Ballroom A

### Session 6 :

### SERONO-ASRB JUNIOR SCIENTIST AWARD

Chairman: Assoc. Professor Bob Seamark

Time: 1400 - 1530

Venue: Ballroom A

- 48 Hotzel,M.J., Martin,G.B., Walkden-Brown,S.W. and Fisher,J.S.  
*Nutritional effects on testicular growth and LH and FSH secretion in Suffolk and Merino rams in the breeding and non-breeding seasons*