

hCG and FSH Levels During Early Pregnancy and Reproductive Aging

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Introduction

- hCG assays have high sensitivity and specificity for pregnancy¹
- Low levels of hCG are known to be co-produced with FSH during reproductive aging (during peri-menopause and menopause)²
- Age of motherhood is increasing; 126,956 women over 40 gave birth in 2018³
- Average age of menopause is 51, with most women experiencing menopause between 40 and 58, however, the peri-menopause starts several years before
- Therefore, a missed period could be indicative of pregnancy or peri-menopause for woman in later reproductive life, so understanding the reference ranges for hCG is important

Methods

Not Pregnant Cohort

Samples (first morning void) were collected from not-pregnant women aged 20-65

Pregnant Cohort

Women were recruited preconception to collect daily urine samples (first morning void) from menses to 30 days after conception (if they became pregnant). Day of LH surge was determined for each conception cycle in order to assign day of ovulation (Day following LH surge).

Analysis

hCG, FSH and LH were measured by AutoDELFLIA®. A total of 6475 pregnancy samples and 395 non pregnancy samples were examined to create reference ranges.

Results

- In not pregnant women, both hCG and FSH levels increased with age category (Table 1, Figure 1).
- In pregnancy, hCG rose exponentially with respect to pregnancy duration, whilst FSH levels remained low (Table 1, Figure 2).

Table 1: hCG and FSH levels in Not Pregnant women by age, and in Pregnant women by pregnancy duration (time since ovulation)

Not Pregnant Women				Pregnant Women				
Age - years	N	hCG - mIU/mL Median (maximum)	FSH - mIU/mL Median (maximum)	Time since ovulation - days	n	hCG - mIU/mL Median (maximum)	n	FSH - mIU/mL Median (maximum)
20-29	36	0 (0.1)	3.8 (23.5)	6-10	1371	0 (117)	1371	1.7 (18.3)
30-39	54	0 (0.6)	4.1 (25.5)	11-15	1310	61 (5741)	1310	0.5 (10.1)
40-49	93	0.1 (4.8)	20.3 (234)	16-20	1281	617 (67706)	669	0.2 (10.4)
50-59	178	0.7 (6.5)	45.3 (297)	21-25	1284	3216 (97326)	19	0.1 (0.6)
60+	34	1.0 (2.8)	21.9 (115)	26-30	1229	9930 (120760)	7	0.1 (0.1)

Figure 1: hCG and FSH levels in Not Pregnant women by age

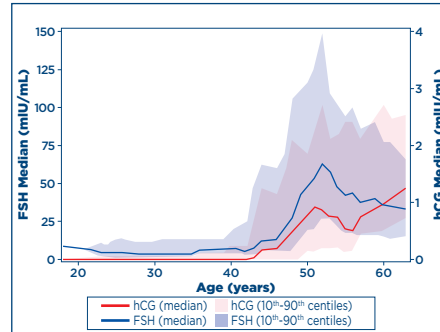
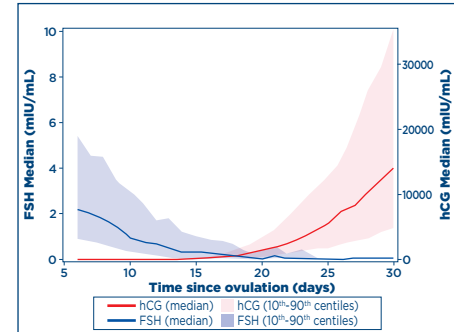


Figure 2: hCG and FSH levels in Pregnant women by pregnancy duration (time since ovulation)



Conclusion

- FSH remains very low throughout early pregnancy, with hCG rising exponentially.
- Detectable levels of hCG were seen in some women of peri- and post- menopausal age, with FSH levels showing significant elevation.
- Therefore, to rule out pregnancy in a peri-menopausal woman with low hCG levels, FSH could be examined.

Declaration of interest

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References

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