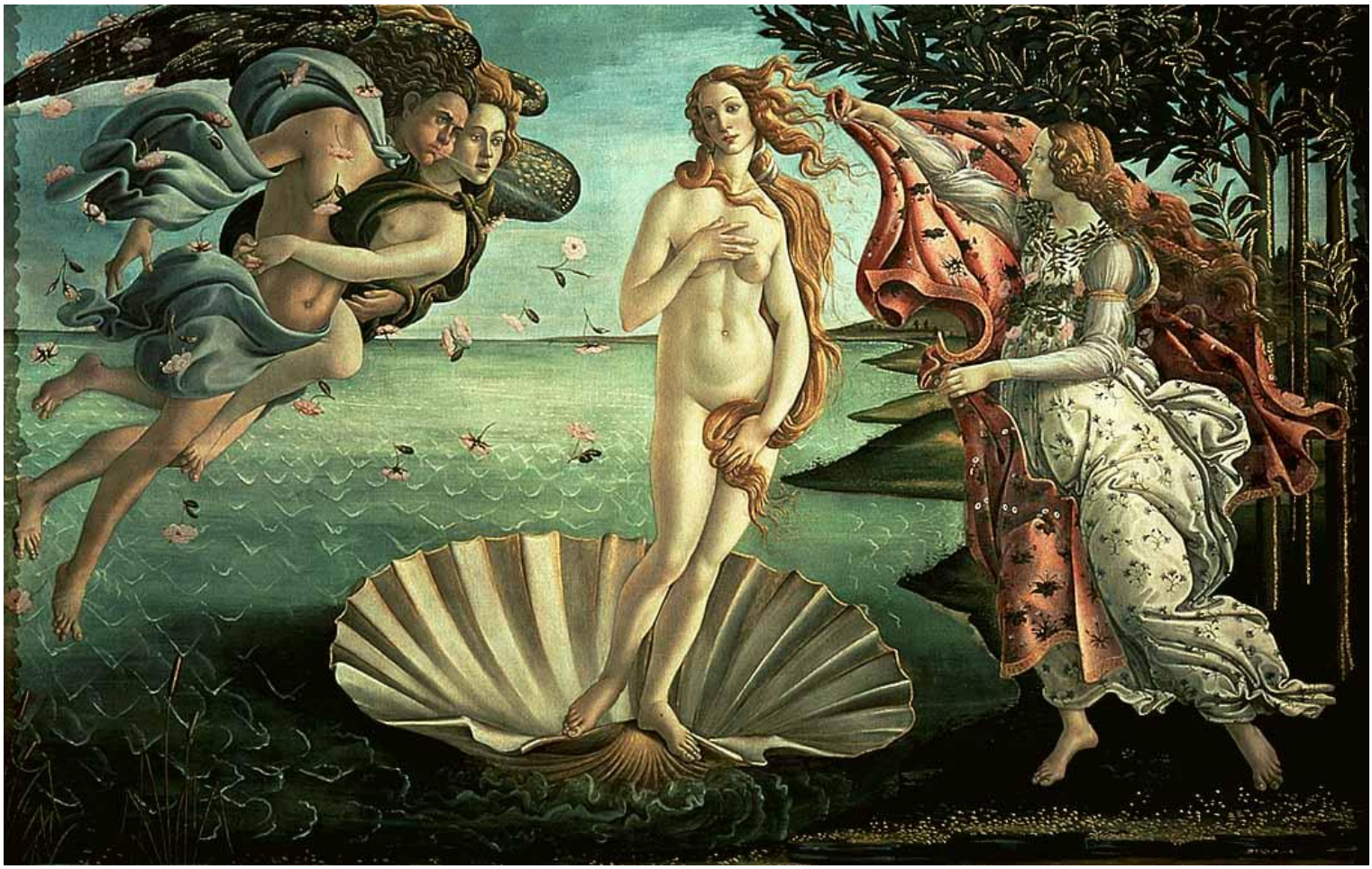
THE NORTHERN HOSPITAL

BETA HCG



"The Birth of Venus", Tempera on canvas, Sandro Boticelli, c. 1485. Galleria degli Uffizi, Florence.

Introduction

Human chorionic gonadotropin (HCG) maintains the corpus luteum so that it continues producing progesterone when conception occurs.

It consists of alpha and beta subunits. The alpha subunit is common to some other hormones (including, LH and TSH), hence it is the beta subunit, which is assayed when looking for pregnancy.

BHCG in Pregnancy

1. Production begins the day of implantation.

2. It can be detected in the serum or urine as early as 10 days after fertilization.

3. Doubling time is *initially* every 2 days

4. Levels peak at around 8-12 weeks.

5. After this, levels begin to fall and level at 100-130 days, (3-4 months)

Laboratory testing for Beta HCG

Beta HCG can be detected in both urine and serum.

The serum test is more sensitive than the urine test.

Types of BHCG testing:

A **quantitative** test refers to an actual level of the hormone in the blood stream.

A **qualitative** test refers merely to the presence or absence of the hormone, rather than its actual level.

Serum Concentrations Range of BHCG levels in pregnancy:

Note that here can be wide variation in the normal values for beta HCG levels at various lengths of gestation.

The figures quoted below are the average values:

Gestational Age	**Expected HCG (IU/L)**
0.2-1 week	5-50
1-2 weeks	50-500
2-3 weeks	100 -5000
3-4 weeks	500 - 10,000
4-5 weeks	1000-50,000
5-6 weeks	10,000-100,000
6-8 weeks	15,000-200,000

2-3 months	10,000-100,000

After 2-3 months levels remain elevated but at a somewhat lesser level than those seen at the 8-11 weeks level.

The doubling time for beta HCG during the first weeks of pregnancy is about 2 days.

If the doubling time is greater than 3 days, (ie **slower** than expected), an ectopic pregnancy or spontaneous abortion should be considered.

Correlation of Serum BHCG with Ultrasound Scanning:

When the BHCG level is above **6,500**, a fetal sac can be seen on a **transabdominal** ultrasound scan.

When the BHCG level is above **1,500**, a fetal sac can be seen on a **transvaginal** ultrasound scan.

Fetal heart likely to be detectable on **transvaginal** ultrasound scan when BHCG > **10,000** IU/L

Interpretation of a Serum BHCG value

1. When the bHCG value is less than:

   - 1500 IU / L and there is an empty uterus on vaginal ultrasound.
   - 6,500 IU / L and there is an empty uterus on transabdominal ultrasound,

   No definitive statement can be made about the pregnancy.

2. While a positive assay for serum BHCG can confirm a pregnancy as early as 8-10 days after fertilization, a uterine gestational sac cannot be reliably identified on ultrasound until 28 days (about 4 weeks) after conception.

   During this time frame, the woman may abort, continue her pregnancy normally, develop evidence of an ectopic pregnancy or have a molar pregnancy.

Beta HCG level	Interpretation	Notes
< 10	Negative	Early pregnancy of less than 1week may give a negative response and retesting in 2 - 3 days time may be appropriate if clinically indicated.

10 -25	Equivocal	Suggest repeat test in 2 -3 days.
> 25	Positive	Consistent with pregnancy

Causes of a Beta HCG higher than expected:

1. Incorrect gestational dates.
2. Multiple pregnancy
3. Molar pregnancy/ Choriocarcinoma
4. Heterophile antibodies.
5. Beta HCG producing malignancy, (rare).
   - In men it can be a tumor marker for some types of testicular carcinomas.

If uncertain of the meaning of a result discuss it with the laboratory.

Causes of a Beta HCG lower than expected:

1. Incorrect gestational dates.
2. Failing (or failed) pregnancy.

   Features suggestive of an **ectopic** pregnancy can include:

   - A plateauing or slow rising bHCG
   - A slow falling bHCG
   - A fluctuating level of bHCG

   While a more rapid and sustained fall suggests miscarriage this does not rule out ectopic pregnancy.

Pregnancy Testing in the ED

A pregnancy test must be considered in all women of childbearing age presenting with abdominal pain.

All beta HCG testing in the ED is currently done by blood testing, (as opposed to urine testing which is less accurate)

When a blood result is required urgently a rapid “qualitative” test can be done. The pathology department should be contacted by phone if a result is required urgently.

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