

Preventive Powers of Ovulation and Progesterone

Detection of Ovulation

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I believe that ovulation with a normal luteal phase length – and normal amounts of progesterone to counterbalance and complement estrogen – is of key importance for women's bone, breast and heart health (see [Ovulatory Disturbances - They Do Matter](#) [PDF]).

In the last issue we discussed how you, personally, can tell that you are ovulating using the Molimina Question, recording and analyzing your basal temperature using quantitative methods (called QBT), and possibly using the over-the-counter fertility test detecting the mid-cycle luteinizing hormone (LH) peak. We will now look at the medical methods for diagnosis of ovulation.

How can a doctor tell if I am ovulating?

For some physicians, especially those who specialize in fertility management, all methods for detecting ovulation (short of doing an operation and [observing the egg actually squirting out of the ovary](#)-see figure) are indirect and therefore considered inferior.

There are three different, indirect medical methods that are commonly used to diagnose ovulation and normal progesterone action: 1) a series of ultrasounds of the ovary across the mid-cycle; 2) a biopsy of the uterine lining about a week after expected ovulation to see if the cells show evidence for progesterone action; and 3) taking one or several measurements of estrogen and progesterone in blood or urine to see if they show the expected ovulatory levels and pattern. We will discuss and critique each of these in turn.

Note (for each of the following ovulation methods to be sensitive and specific, a woman must provide accurate information about the date of day one of her tested cycle and the date of the start of the next flow. Therefore, the start of the ovulation detection process using any method requires that you keep track of your own cycle (most easily done by keeping the daily [Menstrual Cycle Diary](#)).

Detecting ovulation using ovarian ultrasound

When sound waves are passed through the lower abdomen and a full bladder to observe the ovary (called abdominal ultrasound) or through the vagina (vaginal

ultrasound) the ovaries shows up as small elliptical masses on each side of the pelvis (1). To determine if ovulation is occurring, usually the test is scheduled every day from about cycle day 10 (meaning the 10th day after the first day of flow) until ovulation is detected. What tells about ovulation is that one, of possibly several, small round fluid-filled bodies (called cysts), will gradually grow until it is about the size of a thumbnail (18 mm) (2). This is then called a "dominant follicle" because it is the one that is likely to release an egg. After seeing the growing dominant follicle, one day it will have vanished. This sudden loss of the dominant follicle cyst is presumed evidence that it ruptured thus releasing the egg into the pelvis. The ultrasonographer would declare that the woman ovulated.

This method for ovulation detection is expensive (more than \$100 for each scan), takes specialized equipment, requires a woman to travel to a medical centre, and is uncomfortable (especially holding a sufficiently full bladder), or the vaginal exam can be embarrassing as well as time consuming. Finally, there are potentially other reasons for "losing" sight of the dominant follicle besides ovulation.

Detecting ovulation using tissue from the uterine lining

This test (called an endometrial biopsy) involves going to a doctor's office or centre about three weeks after the last period, having a pelvic exam followed by the insertion of a small probe through the vagina and into the uterus. This probe is equipped to scrape or bite off a small bit of the lining of the uterus. The cells are then prepared, stained and viewed under a microscope. If the uterine lining is proliferative and only under the influence of estrogen it is thick but without small glands. If ovulation has occurred, and the lining is changing, as it should, under the influence of progesterone, the lining has many glands. The endometrium has a fairly typical pattern each successive day of the cycle. The pathologist who is specially trained to read these slides, can compare this standard with the biopsy taken from a given woman. The biopsy is said to be showing proliferation (meaning the effects of estrogen alone), proliferation with atypical changes (a risk factor for endometrial cancer), "secretory" which means evidence for progesterone action and that ovulation has taken place, and finally, whether or not the biopsy is "in phase" or appropriate for the day of the cycle (3).

Although this endometrial biopsy is more directly observing the actions of progesterone on the uterine lining, there is a lot of normal variability. It takes several days after ovulation and the rise of progesterone before clear changes occur and ovulation can be diagnosed (just as it takes a few days for the basal temperature to rise after the LH peak) (4). The biopsy is considered abnormal if it is two or more days out of phase. However, the test is only reliable within two to three days. Therefore it is not a very specific test for ovulation.

Besides its lack of specificity, endometrial biopsies are time consuming for the woman (who must be free and get an appointment on the right day of her cycle), difficult for the doctor whose schedule must be flexible, and a very specialized task for the pathologist who reads the slides. Most importantly, an endometrial biopsy hurts – when the probe enters the uterus there is cramping that can be intense. Often, also, there is spotting after the biopsy, which confuses everyone about which day the next flow starts (and this knowledge is an important part of the timing of the test).

Test of progesterone levels to decide on ovulation

The third and final way that doctors commonly diagnose ovulation or anovulation is to take a single or a series of measurements of progesterone. Progesterone can be measured in blood or urine, although some research and alternate care providers are also measuring it in saliva.

Blood tests for progesterone should be obtained about day 21 of the cycle (or three weeks after the first day of flow) for a woman with a regular, approximately 28-day (4-week) cycle (5;6). Often three blood tests are taken approximately every other day during what should be the middle of the luteal phase. The three levels added together should equal at least 65 nmol/L (or 21 ng/ml). If only one blood test is taken, the levels must be over 18 nmol/L (normal range 18 to 90 nmol/L). There is a gray zone between the usual low level of about 2 during the follicular phase and the level of 18 that is diagnostic (6). The ideal progesterone level at the middle of the luteal phase is 45 nmol/L or higher.

Blood tests are momentarily uncomfortable, sometimes cause bruising, usually require travel to a laboratory, and must be timed within the menstrual cycle. Each blood test costs from \$40-50.00. And you can see from the various normal ranges described above, that coming to a clear conclusion is sometimes not possible. Often doctors will prefer to measure estrogen as well as progesterone and judge ovulation by the changing relationships of the two hormones. This means twice as much blood must be taken and that the cost doubles. It is also not possible to accurately detect the length of the luteal phase unless daily blood tests are performed.

Urine tests for ovulation (like we used in the Menstruation and Ovulation Study – MOS) measure pregnanediol glucuronide (PdG), a breakdown product of progesterone that is excreted into the urine. Although there is a close relationship between the blood level of progesterone today and the PdG tomorrow (7), the actual level is highly variable both within and between women. The reason that women's PdG levels differ is probably because of different genetics and thus differences in the enzyme activity that breaks progesterone down to make PdG. Therefore, for urine, no threshold level can be used to diagnose ovulation. Instead,

the low level of PdG during the first two weeks or so of the cycle must be averaged – to diagnose ovulation, at least two or three levels must be more than three times that follicular phase level value [\(8\)](#).

The disadvantages of urine tests for ovulation are that multiple urine samples are needed, and that urine collection can be awkward. Certainly carrying a jug about is difficult/embarrassing. As we used in MOS, “whiz pops” that only require peeing on a sponge in the lid of a small vial, solve most of the urine collection problems. Another disadvantage is that the guidelines for deciding on ovulation require some calculations and the right number of appropriately timed tests. Finally, although this testing is easier for women, many standard labs do not do the urine PdG test. The research cost for a series of tests is at least \$60.00 and may be over \$100.00.

Summary – measurement of ovulation in the real world

I believe that ovulation is important for women’s health. This means we need accurate, convenient and inexpensive ways to detect ovulation. Because ovulation is variable from cycle to cycle within a given woman, we need methods that can be used over several cycles. In the last newsletter I described several ways that women, themselves, can determine about whether or not they are ovulating. I continue to believe that the easiest, most accurate, and least expensive method is Quantitative Basal Temperature (QBT) testing. This newsletter’s discussion has shown that the ultrasound, endometrial biopsy and progesterone measurements that physicians use for detecting ovulation are often uncomfortable, expensive or inconclusive. QBT has been shown to be valid related to the midcycle LH peak. Dr. Susan Barr, Jen Bedford PhD student, and Drs. Chris Hitchcock and myself (of CeMCOR) have also studied QBT compared with urine PdG and are expecting that work to be published soon. QBT has the advantage that it tells us about luteal phase length (something we care about because it relates to bone change) which many other methods cannot. Finally, QBT is inexpensive, accessible to all through the CeMCOR website [<link to the instructions>](#), and is easy for most women to do.

In the next newsletter we will start exploring to the key issues for ovulation and women’s health by discussing the importance of ovulation for bone health.

Stay tuned!

Reference List for "Is Ovulation (and are normal Progesterone levels) Important for the Health of Women?"

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