

Ovulation & Basal Body Temperature Chart

Introduction

Disorders of ovulation account for approximately 15% of all infertility problems (1). Normal ovulation, the process of development and release of an egg, is driven by three pituitary hormones: gonadotropin-releasing hormone (GnRH) follicle stimulating hormone (FSH), and lutenizing hormone (LH). A fourth hormone, progesterone is produced by the corpus luteum and is critical to post ovulation. Also, a fifth hormone, estrogen, is required for appropriate stimulation of the hypothalamus and pituitary. The cascade of the 5 identified hormones allows for ovulation, fertilization and implantation.

GnRh is produced and released from a portion of the brain known as the hypothalamus. The hypothalamus is critical in managing ovulation and the menstrual cycle. A neuro-endocrine loop between the hypothalamus and pituitary leads to the development of the follicle. More specifically, in the presence of GnRH, the pituitary gland in the brain produces follicle-stimulating hormone (FSH). As increasing levels of FSH are generated, immature follicles in the ovary begin a maturation process. Generally only one follicle matures. A sudden burst of LH from the pituitary gland now causes the mature follicle (Graafian) to rupture, releasing the egg 28 to 32 hours later and leading to the formation of the corpus luteum and progesterone production. Unless fertilization occurs, the corpus luteum declines 14 days after ovulation and a period begins. Concurrent to the above events, the uterus is primed by two hormones, estrogen and progesterone. The lining of the uterus, the endometrium, is stimulated to grow by estrogens that are produced by the ovary during follicle stimulation and maturation. Estrogen concentrations are at a maximum at the time of the LH surge. At this point in the cycle, the endometrium is approximately 6mm to 7mm thick. As the corpus luteum develops, progesterone is secreted. Progesterone secretions reach a maximum at eight days following the LH surge. The fixed life span of the corpus luteum is modified with pregnancy. Here production of choronic gonadotropin (HCG) "rescues" the corpus luteum from its degenerative process.

The length of a menstrual cycle varies between 28 and 35 days. Only one-sixth of an average woman's cycles are 28 days in duration (2). Such variability in normal cycle duration results in numerous inaccuracies in predicting ovum release. (If an ovum is released from the ovarian surface and if the fallopian tube is not occluded or limited in its movement (due to adhesions), the egg drops into one of the tubes where fertilization may occur within the next 1-3 days) Despite normal ovulation and normal pelvic anatomy, conception occurs in 15-20% of women in any one month.

To assist couples in predicting ovulation, only two options are generally available to family planning providers.

- a) Basal body temperature charts (BBT)
- b) LH surge predictor kits

Basal Body Temperature Charts

The basal body temperature (BBT) charts were first described in 1904 (3), and the interpretation of individual charts are frequently disputed by physicians. Yet, they provide useful guidance for the woman and her physician.

Ovulation & Basal Body Temperature Chart

Basal body temperature is the body temperature at rest. Daily measurement and charting provides a graph that provides an appreciation of the hormonal function throughout a 28-35 day period. Women with regular ovulation have distinctive charting patterns. Studying charting patterns assist in:

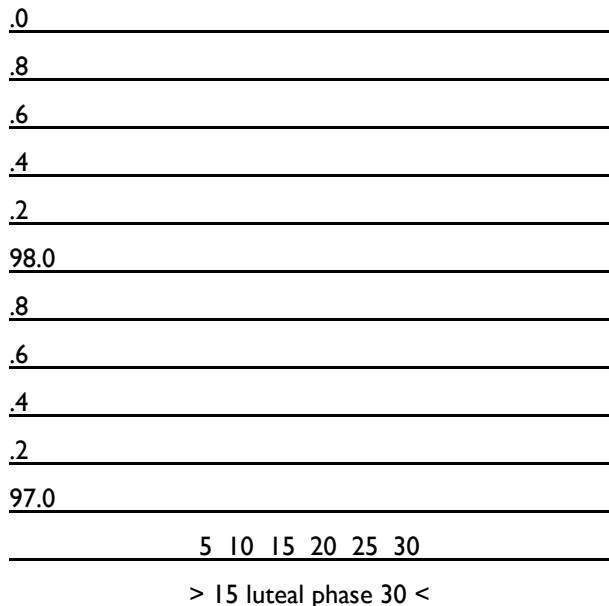
1. Evaluating the likelihood that ovulation occurred and when.
2. May assist in timing of intercourse.

The temperature is taken with a special BBT thermometer after awaking, before moving out of bed and hopefully the same time each day. Such movement increases BBT. Temperature readings should be recorded on graph paper or a BBT chart that is usually included with purchase of a BBT thermometer. The cost is approximately \$13.00. This type of thermometer has 1/10 of a degree graduations from 94 degrees to 100 degrees Fahrenheit (F). It is common for women to have a body temperature lower than the usual 98.6° F (37°c). Temperature can be taken by mouth, vaginally or rectally but the same method must be used daily.

In the first 10 days of a cycle, beginning with the first day of bleeding, temperatures will have 0.2 degree shifts up or down. Approximately around 10-12 of a 28-day cycle, a temperature decrease by at least ½ or 0.5 degrees may be observed. It is always important to remember that not all women have detectable changes. This decrease is followed in 24 to 48 hours by a significant temperature increase. This temperature increase is a result of the LH surge and an increase in progesterone production by the corpus luteum. This temperature rise should be sustained for approximately 14 days. See sample chart below.

A common temperature pattern

Basal temp



Points to consider in an initial review of the chart:

1. Did the woman understand the requirement for charting?
2. During the charting period, has the woman experienced an illness, insomnia, fatigue, anxiety, use of heating blanket, alcohol or drug use?

Points to consider on closer examination:

In reviewing BBT charts it is helpful to have 2 or more charts to examine. Additional BBT charts allows for a better assessment of an irregular cycle against a backdrop of several months.

This checklist can assist you on closer examination of the chart.

- a) When did the woman begin her menses?

Is it noted on chart?

- b) When did the woman begin charting her temperature, is it correctly recorded on the BBT graph?

On what day of the cycle did the woman have her lowest temperature?

Day of cycle _____ temp _____

- d) What was the temperature reading the day prior to lowest reading?

Day prior to lowest reading _____ temp _____

Is there a .4 and greater temperature difference ___yes ___no

- e) Following the lowest reading is there a increase greater than .6 degrees up to a full degree over the next 48 hours ___yes ___no

- f) Does the increased temperature continue to increase or hold over a 10 to 14 day period ___yes ___no If no, compare the drops in temperature to lowest recording recorded above.

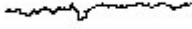
In using this checklist the graph will be described as one of two patterns:

- 1) biphasic - the chart displays a mid-cycle drop and then significant temperature rise that is maintained for almost 14 days.



Ovulation & Basal Body Temperature Chart

2) monophasic - the chart identifies little or no fluctuations throughout the chart period.



A chart that appears to be biphasic is suggestive of ovulation. In charts with other temperature changes, monophasic, requires further clinical evaluation. It is important to remember a monophasic chart does not exclude to possibility of ovulation.

Other diagnostic considerations

a) Luteal phase

In charts that appear to have a biphasic pattern what is the length of the luteal phase (the post ovulation period). It is generally agreed that from probable ovulation a minimum of 12 to 14 days need to be available to assure endometrium growth and implantation of fertilization occurs. Shorter than 12 luteal phase is clinically significant.

Some women have significant dips in their temperature during this luteal phase. Frequently, the temperature dips are associated with spotting. Such a finding raises concerns about the adequacy of the corpus luteum. If either of these BBT patterns are found, further evaluation is indicated.

b) Short duration of follicle growth

In some women the early phase of the cycle shows a biphasic pattern less than 10 days following the onset of menses. It is appropriate to raise the question about follicle maturation. Additional charting may assist in determining the frequency of such irregularity. If it is a consistent pattern, referral is indicated.

c) A delayed onset of menses

Menses may be delayed if there is little or no clear-cut temperature rise. In some BBT charts one can observe a very lengthy luteal phases beyond 16 to 18 days from the LH surge. Almost the only cause of prolonged temperature rise is pregnancy.

Assessment Guide

This grid may assist you in your final review of 2 or more BBT graphs.

	<u>Likely</u>	<u>Less likely</u>
Ovulation defect		
Is the pattern biphasic?	yes	no
Is the pattern monophasic?	yes	no
Is there a shortened luteal phase?	yes	no
Is there a shortened follicle	yes	no

Ovulation & Basal Body Temperature Chart

For those women with possible ovulatory concerns, the following options are available for Level I facilities:

1. Educate the woman and her partner about the pattern that raises your concern.
2. If there is some question to the consistency of the BBT pattern, encourage additional BBT graphs to confirm.
3. Refer women for further evaluation and treatment.

In clinical settings with a Level I and Level II infertility evaluation protocol, further ovulation irregularities can be confirmed through:

- 1) LH surge testing lists
- 2) Timed endometrial biopsies
- 3) Thyroid testing
- 4) FSH, progesterone blood analysis

Treatment options may include use of clomiphene citrate (clomid) for up to 6 months. Referral to specialist is indicated if initial treatment is unsuccessful.

Bibliography

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