



## Factsheet: Temperature

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## Basal Body Temperature - an outline

### Why is Basal Body Temperature (BBT) used as a fertility indicator?

Both Dr W. Squire, London in 1868, and Dr Mary Putnam Jacobi, Philadelphia independently in 1878 noted that the early morning temperature, (basal body temperature, see below), in women of child-bearing age was higher during part of the menstrual cycle but they did not know the reason for this. In 1904, Van de Velde in Holland noted that the rise in temperature ('thermal shift') is due to ovulation, (release of an egg), and in 1928 he pointed out that the rise in BBT is due to progesterone secretion from the corpus luteum in the ovary, (see below).

The rise in basal body temperature (BBT), called the 'thermal shift' is the sign of ovulation. When the woman takes and records her temperature every day during the cycle and if she has ovulated in that cycle, the record shows that the temperature is low in the first part of the cycle before ovulation, and high in the second part of the cycle after ovulation. This temperature pattern showing a phase when the temperature is low followed by a phase when the temperature is higher is called a biphasic temperature pattern and is the pattern typically seen in the menstrual cycle when ovulation has occurred.

### Does the thermal shift confirm that ovulation has occurred?

The 'thermal shift' or rise in basal body temperature is the only fertility indicator that confirms ovulation (release of an egg). This means that the 'thermal shift' is the most useful fertility indicator to confirm the end of the fertile phase.

### How does the 'thermal shift' indicate the end of the fertile phase?

The ovum (egg) lives for just 24 hours after ovulation, therefore 24 hours after ovulation the ovum is dead and no further ovulation will occur in that cycle. For this reason the phase of the cycle after ovulation is called the definitely infertile phase.

### When does the woman know that the definitely infertile phase of the cycle has begun?

When the woman observes a sustained rise in temperature as defined by the Rules of the 'syntothermal double-check method' of natural family planning she knows that the definitely infertile phase of the cycle has begun.

### What causes the rise in temperature after ovulation??

After the ovum (egg) is released from the ovary (i.e. ovulation), the cells lining the ruptured ovarian follicle remaining in the ovary become a small gland called the corpus luteum which secretes the hormone progesterone. The rise in basal body temperature is due to progesterone and therefore the 'thermal shift' as defined by the NFP Rules indicates ovulation has occurred as progesterone is present only after ovulation.

### What is the Basal Body Temperature (BBT)?

The basal body temperature is the temperature taken immediately on waking, before getting out of bed, and after a minimum of 3 hours continuous sleep. No food or drink should be taken before the temperature is taken. The temperature must be taken at the same time every morning as normal body temperature varies during the day because of the circadian rhythm. The temperature difference between the lower-phase temperature and the higher-phase temperature may be quite small and as taking the temperature an hour later or earlier than usual will give a higher or a lower reading, this emphasises the importance of recording the temperature at the same time every day.

## Definition of a Thermal Shift

A thermal shift is defined by the Rules of the ‘Symptothermal Double-Check Method’ of natural family planning and these Rules must be taught to the woman by a qualified NFP teacher.

## Planning pregnancy - is Temperature any help?

The Temperature (BBT) chart can give three pieces of information which are of use to the couple planning pregnancy:

1. The Temperature Chart can confirm ovulation.
  2. The Temperature Chart can confirm ovulation did not occur.
  3. The Temperature Chart can confirm pregnancy (Fig. 12-3)

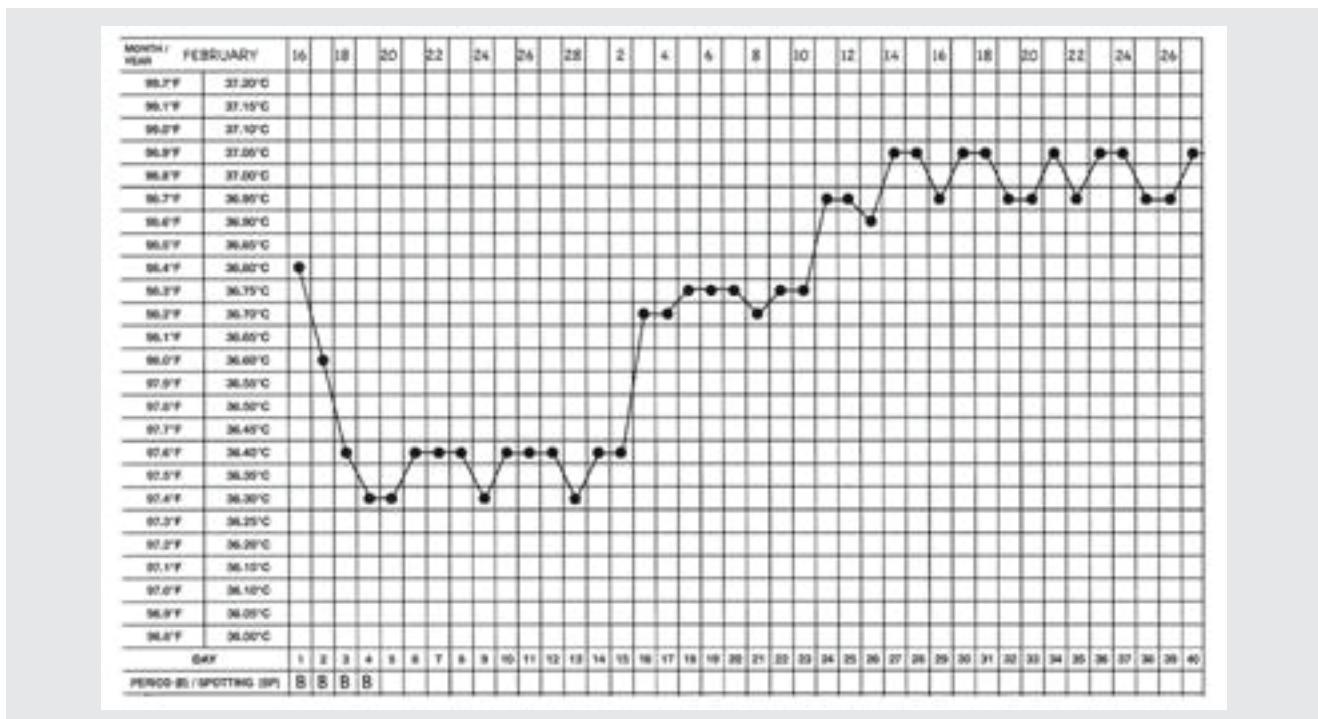
(1) Temperature Chart (thermal shift) can confirm ovulation:

The rise in the basal body temperature (BBT) tells the woman that ovulation has occurred, (LINK to 12a for Fig. 12-1), and although this information is reassuring to the couple, from the point of view of achieving conception it is of little use because once the thermal shift occurs the possibility of pregnancy decreases almost immediately as the ovum lives for just 24 hours and the fertilizable life of the ovum within that 24 hour period is from 8 to 12 hours. (ref 1, World Health Organisation study).

The cervical mucus indicator defines the fertile phase of the cycle before the thermal shift occurs. Therefore to achieve pregnancy sexual intercourse should occur on those potentially fertile days leading up to ovulation when oestrogenic fertile-type mucus is present and in which sperm can survive for up to five days.<sup>2</sup>

**(2)** Temperature Chart can confirm ovulation did not occur. This information is also of use to the couple. Occasionally an anovular cycle may occur. However if anovular cycles are recurring the woman should consult her doctor.

(3) Temperature Chart can confirm pregnancy (Fig. 12-3).



The temperature chart can confirm pregnancy, Fig. 12-3 : Day 1 of the cycle marked on the bottom of the chart is the first day of the period (B). On Day 16 there is a rise in temperature and it remains elevated until Day 40 which is the last day shown on this chart. A higher-phase temperature that persists for 21 days or more indicates pregnancy. There is a further rise in temperature at the time of implantation on Day 24 due to the increase in progesterone secretion from the corpus luteum. The conceptus implanting in the endometrium starts secreting human chorionic gonadotrophic hormone (hCG) which prevents the demise of the corpus luteum.<sup>3</sup> Progesterone from the corpus luteum supports the pregnancy for 8 weeks after conception after which the embryo is capable of synthesizing all steroid hormones required for its development. Ovulation occurred sometime between Day 15 and Day 16.

**IMPORTANT:** The RULES of the ‘syntothermal double-check method’ of natural family planning regarding thermal shift interpretation, must be taught to the woman by a trained natural family planning teacher.

## References:

1. World Health Organization: WHO Task force on methods for the determination of the fertile period; temporal relationship between ovulation and defined changes in the concentration of plasma estradiol-17b, LH, FSH, and progesterone. Special Programme of Research, Development and Training in Human Reproduction. Am J Obstet Gynecol 1980; 138:383-390B
2. Klaus H; ‘Natural family planning - Is it scientific? Is it effective?’ page 4; Newman Lecture Series 1-May 21, 2000. (internet if you google ‘natural family planning, Dr Hanna Klaus’).
3. Manassiev Nikolai, Whitehead, Malcolm; ‘Female Reproductive Health’; 2004, ISBN 1-85070-491-0
4. Griffin James E, Ojeda, Sergio R; ‘Textbook of Endocrine Physiology’; 1996, p226-228; ISBN 0-19-510755-1(pbk)

## Is every rise in temperature indicative of a thermal shift ?

Not every rise in temperature indicates a thermal shift. A temperature disturbance is a False temperature rise due to causes other than ovulation. Factors that can disturb the temperature should always be noted in the chart and a disturbed temperature is marked with a circle and discounted when interpreting the temperature chart.

### Causes of a disturbance of the Temperature (Basal Body Temperature, BBT):

- Taking the temperature at a different time than usual.
- Taking the temperature in a different orifice than usual.
- Using a different thermometer.
- Alcohol intake the night before.
- A Disturbed night.
- Sleeplessness
- Fever due to illness.
- Travel/ Holidays
- Stress
- Emotional upsets
- Medication
- Heavy meal before sleeping

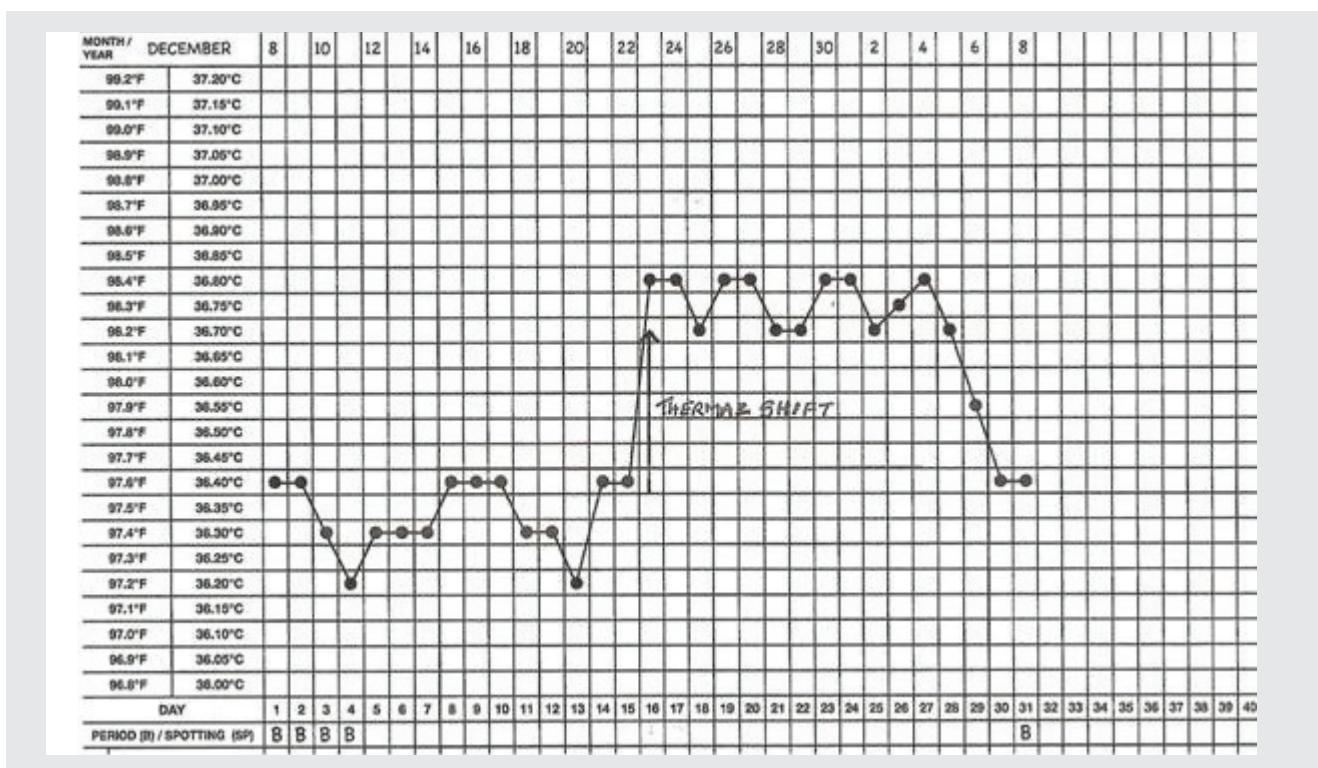
**To be most effective, the woman must be taught the Syntothermal Double-Check Method of Natural Family Planning by a qualified natural family planning teacher.**

## **What information is got from the Temperature (BBT) Chart?**

The basal body temperature (BBT) graph can give three pieces of information:

1. That ovulation has occurred.
  2. That ovulation has not occurred.
  3. It can confirm pregnancy.

(1) Temperature Chart can confirm that ovulation has occurred: Ovulation, (the release of an ovum), occurs just once during the menstrual cycle and the ovum lives for 24 hours. If a second ovum is released as in the case of twins, then both are released in the same 24 hour period. "By taking her basal body temperature (BBT) each day and marking it on a chart the woman can tell that the ovum has been released. When the ovum is released, the temperature rises above its previous level. It stays at this higher level for about fourteen days, and if the woman does not become pregnant it falls to the original lower level when the next menstrual period begins. It is the change of temperature from the lower to the higher level which shows that the ovum has been released". The rise in temperature is due to progesterone secreted by the corpus luteum in the ovary after ovulation. (Fig. 12-1). The rise in temperature is known as the thermal shift and the rules regarding the definition of a thermal shift must be taught by a trained natural family planning teacher.

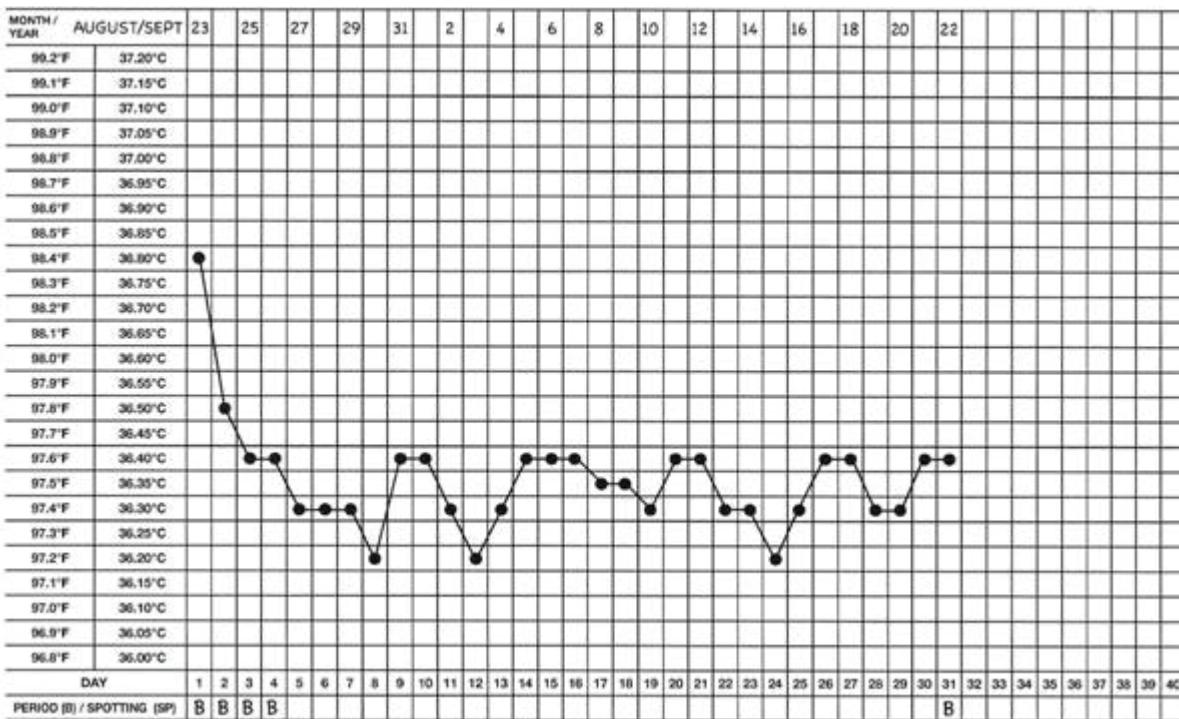


## Biphasic Temperature Chart

**Biphasic Temperature Chart (Fig. 12-1):** This temperature chart is annotated for both Centigrade and Fahrenheit thermometers. Each square on the Centigrade scale is equal to  $0.05^{\circ}\text{C}$ , and each square on the Fahrenheit scale is equal to  $0.1^{\circ}\text{F}$ . Day 1 of the cycle, marked on the bottom of the chart, is the first day of menstruation, (marked B). The last day of the cycle (Day 30) is the day before the next menstruation begins which is on Day 31 (marked

B). The woman takes her temperature every morning at the same time and records it in the middle of the square. On Day 15 there is a rise in temperature and it remains elevated until Day 30 due to the action of progesterone. Ovulation occurred sometime between Day 15 and Day 16. Progesterone maintains the endometrium and as pregnancy did not occur in this cycle the corpus luteum atrophies causing a drop in progesterone. The endometrium is no longer maintained and is shed as the menstrual period. The luteal phase from Day 16 to Day 30 is usually constant in length (on average about 14 days), and reflects the level of progesterone in the blood and the life-span of the corpus luteum. Day 31 is the first day of menstruation of the next cycle and is Day 1 of the new cycle.

(2) Temperature Chart can confirm that ovulation has not occurred: A temperature chart showing a lower phase followed by a higher phase is known as a biphasic temperature chart, and indicates an ovulatory cycle. The point at which the temperature chart rises to a higher level (i.e. becomes biphasic) is called the thermal shift. (Fig. 12-1) A temperature chart that shows no rise in temperature is called a monophasic temperature chart and indicates that ovulation did not occur in that cycle. (Fig. 12-2)



## Monophasic Temperature Chart

Monophasic Temperature Chart (Fig. 12-2): Day 1 of the cycle marked at the bottom of the chart is the first day of menstruation (B). The last day of the cycle (Day 30), is the day before the next menstruation on Day 31 (marked B). After Day 3 the temperature varies between 36.40°C and 36.20°C. However there is no sustained rise in temperature on this chart, and such a chart is called a monophasic chart.

Why is there no temperature rise?: No rise in temperature occurred because no corpus luteum was formed and therefore no progesterone, (which causes the temperature rise), was secreted. No corpus luteum was formed because ovulation did not occur, in other words, this is an anovulatory cycle. The bleeding that occurs on Day 31 which would be Day 1 of the new cycle is not a true menstruation but a withdrawal bleed due to the drop in hormone levels.

(3) Temperature chart can help confirm pregnancy: If the woman does conceive in that cycle the higher phase temperature will remain elevated; a higher-phase temperature that persists for 21 days or more indicates pregnancy. The woman may also note a further rise in

temperature at the time of implantation, due to the increase in progesterone.

### **How is the Temperature Chart used to define the beginning of the Infertile Phase after ovulation (i.e. the ‘second infertile phase’/ ‘definitely infertile phase’ of the cycle):**

The sustained rise in basal body temperature after the thermal shift is due to progesterone from the corpus luteum after ovulation, and confirms that ovulation has occurred. After ovulation the ovum lives for 24 hours and when the ovum dies the woman is infertile. The second infertile phase of the cycle after ovulation is called the definitely infertile phase as the woman cannot get pregnant in this phase as the ovum is dead and no further ovulation will occur in that cycle. According to the RULES of the symptothermal double-check method of Natural Family Planning (NFP), two fertility indicators, BBT and the mucus symptom whichever comes last, are used to define the onset of the definitely infertile phase. The woman must be taught these Rules by a qualified NFP teacher. The definitely infertile phase ends on the day before the next menstrual period, as the first day of the period is ‘Day 1’ of a new cycle.

**To be most effective, the woman must be taught the Symptothermal Double-Check Method of Natural Family Planning by a qualified natural family planning teacher.**

