



Cycle diagnostic and therapy monitoring when attempting to conceive via OvulaRing, cyclofertilogram (CFG) and CFG-Score

Henry Alexander, Anne Alexander, Bettina Brammer

With the continuous circadian and circamensual measurement of body-core temperature with a vaginal biosensor and the evaluation of the data collected via a web-based software, it is now possible for the first time to record the course of the female cycle in the form of a cyclofertilogram (CFG).¹⁻³ For the first time, the CFG enables an objective, graphic illustration of the female cycle, without the influence of the woman or the doctor, allowing a

representation of individual cycle health to be obtained, thereby forming a basis for personalised conception treatment by the respective gynaecologist. To enable the concise classification of the cycle status a so-called CFG-Score has been developed, which contains the duration of the hyperthermal phase, the time point of ovulation and the length of the cycle, permitting an objective evaluation of the individual cycle status.

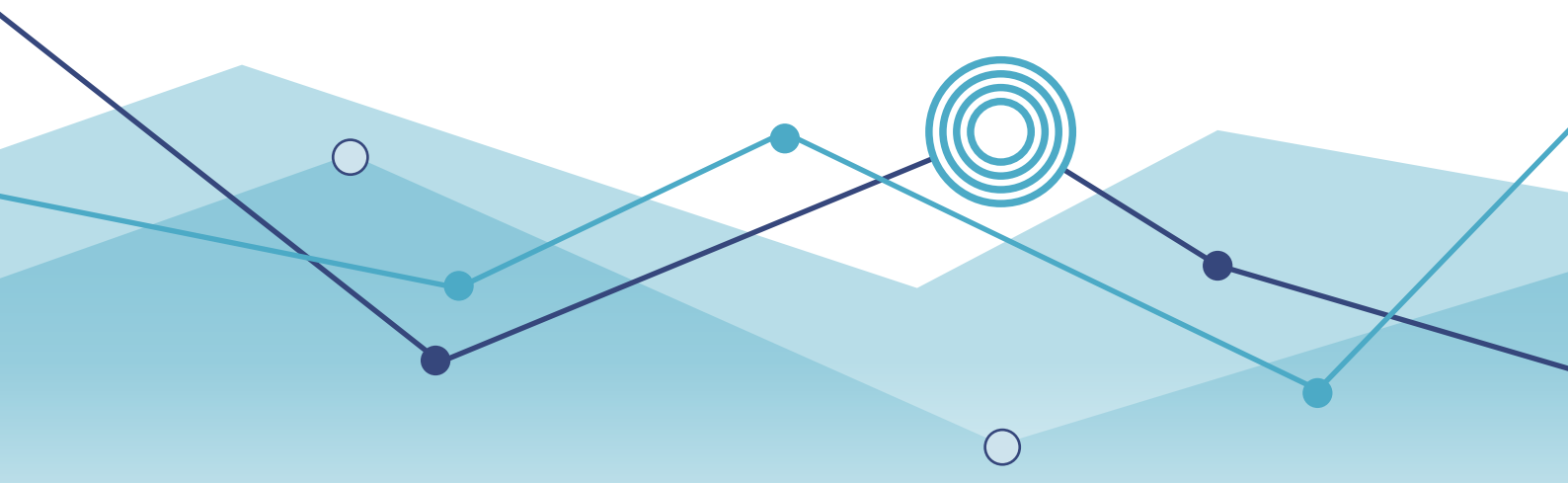
Cyclofertilography with OvulaRing

OvulaRing is a method that has been medically tested in numerous instances and that serves the purpose of cycle and fertility diagnostics at the interface between doctor and patient, enabling the female menstrual cycle to be illustrated and evaluated in full for the first time. The patented medical device is approved throughout Europe, amongst other features it has a biosensor that the woman inserts into her vagina, where it continually records the body temperature every 5 minutes. The data recorded are evaluated with a web-based software using patented, medical algorithms and subsequently displayed in a cyclofertilogram (CFG). The CFG contains information regarding cycle length, length of the individual cycle phases, the time of ovulation as well as the fertile window. After entering her identification (username, password) the woman can view her CFG herself. In addition, with the

approval of the woman the CFG can also be passed on to the doctor treating her. The woman should be instructed to note her vaginal intercourse in the system. This makes it possible to see if the intercourse has occurred during the period of the fertile window.¹⁻³

Cyclofertilography with OvulaRing, that is the continuous (circadian, circamensual) measurement of body-core temperature, replaces the single point measurement (e.g. basal temperature) of different parameters in the cycle as used thus far. This enables a clear statement to be made regarding the cycle health of the woman.²

With the OvulaRing method an objective cycle and fertility diagnosis is possible for the first time, with this capable of being illustrated in the form of a CFG and assessed with



the CFG-Score. The score is based on the status of the hyperthermal phase, the day of ovulation, the duration of the cycle and the frequency of sexual intercourse in the fertile window. With these details each of the woman's cycles can be clearly classified and a good intraindividual as well as interindividual evaluation of the cycle proceedings can be undertaken. Incorporating vaginal intercourse, it is also possible to see for each cycle if a conception could have occurred. It should be noted here that the likelihood of conception also depends on

which days sexual intercourse occurred.⁴ In the event of a pregnancy the woman can recognise this at an early stage and consult her gynaecologist. In addition, the system also includes immediate calculation of the expected date of birth. This detail is of particular importance to women with delayed ovulation. The exact date enables corrections to be made and avoids premature admission to the clinic with attempts to induce labour that may subsequently end in a caesarean.

CFG-Score

The CFG-Score was developed for simplified diagnostics. It categorises the various cycle types using the length of the hyperthermal phase and delivers a compressed representation of important parameters of a menstrual cycle. With the aid of the CFG-Score a cycle can be medically recorded at a glance, or multiple cycles of a patient compared with one another.



The CFG-Score comprises **4 indications**:

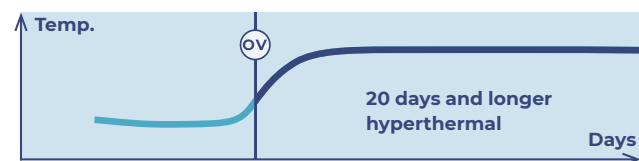
1. Cycle category (A to E) using the hyperthermal phase (see explanation below)
2. Day of ovulation in the respective cycle
3. Length of cycle in days
4. Frequency of sexual intercourse in the fertile window

Cycle category A

- Very long hyperthermal phase (>20d)
- Pregnancy highly likely

Curve:

The temperature rises evenly for around 3-5 days after ovulation and the hyperthermal phase extends longer than 20 days. The woman is highly likely to be pregnant.



Summary and recommendation:

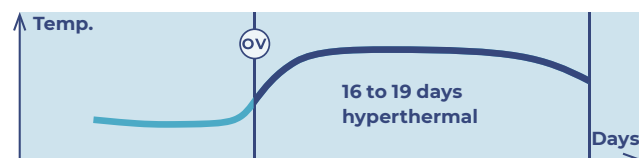
An algorithm in the OvulaRing software recognises the likelihood that the woman is pregnant. She will subsequently be advised to visit her gynaecologist as soon as possible. The gynaecologist can confirm the pregnancy via a hormone test or sonography.

Cycle category B

- Long hyperthermal phase
- Possible disrupted early pregnancy or ovarian cyst

Curve:

The temperature rises evenly for around 3-5 days after ovulation. The temperature peak lasts a number of days before falling after the 16th to 19th day of the cycle.



Summary and recommendation:

It is not yet clear if this cycle category should be assessed as pathological. Patients with a desire to conceive who have a repeated occurrence of this cycle category should visit their gynaecologist to clarify whether there are indications of a further diagnosis. Disrupted early pregnancy or ovarian cysts should be ruled out.

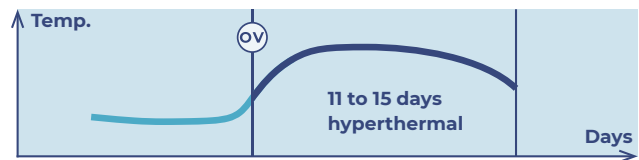
Cycle category C

- Normal length hyperthermal phase
- Ideal, typical cycle progression

This cycle category is the ideal curve of a woman with a healthy cycle. This is characterised by a length of 28 days +/- 7d and ovulation with a hyperthermal phase of >12 to <16 days.

Curve:

Following ovulation the temperature curve rises constantly for around 3-5 days, falling again at the end of the cycle.



Summary and recommendation:

The patient is healthy, has an ovulation and a sufficiently long hyperthermal phase. No treatment is required. After 6 months an examination of fallopian tube clearance and sperm quality should be carried out.

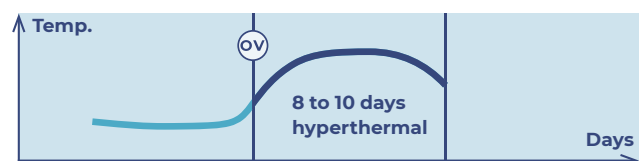
Cycle category D

- Shortened hyperthermal phase

This cycle category is characterised by an ovulation, accompanied by a shortened hyperthermal phase. There are 2 definitions: In some studies a hyperthermal phase with <12 days, in others a hyperthermal phase of <10 days are assessed as indicative of corpus luteum deficiency. Although the patient has ovulated, a desired pregnancy may fail to occur, as a progesterone deficiency means that the endometrium fails to be established to a sufficient extent. As a consequence, the nesting of a fertilised ovum may be made difficult.

Curve:

The temperature curve rises relatively steeply after ovulation and subsequently falls again abruptly.



Summary and recommendation:

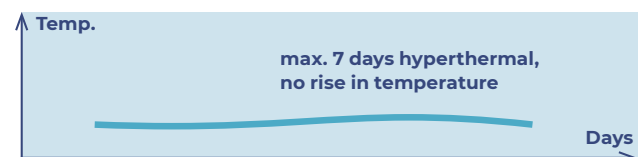
If this curve occurs regularly (over 3 months), a patient desiring to conceive should consult her gynaecologist, as a corpus luteum deficiency may be present. Comprehensive diagnostics are advised. Progesterone substitution may have a positive effect on the cycle health of the woman and ensure the occurrence and retention of a pregnancy. It is important here that the progesterone is administered after ovulation. Cycle monitoring with OvulaRing is recommended for better timing of progesterone substitution. Only after a conclusively recognised temperature increase of at least 3 days should progesterone therapy be commenced. The administering of a retroprogesterone (dydrogesterone) is also recommended in cases of lacking temperature effectiveness.

Cycle category E

- Ultra-short hyperthermal phase <7d respectively no rise in temperature
- Monophasic cycle

Curve:

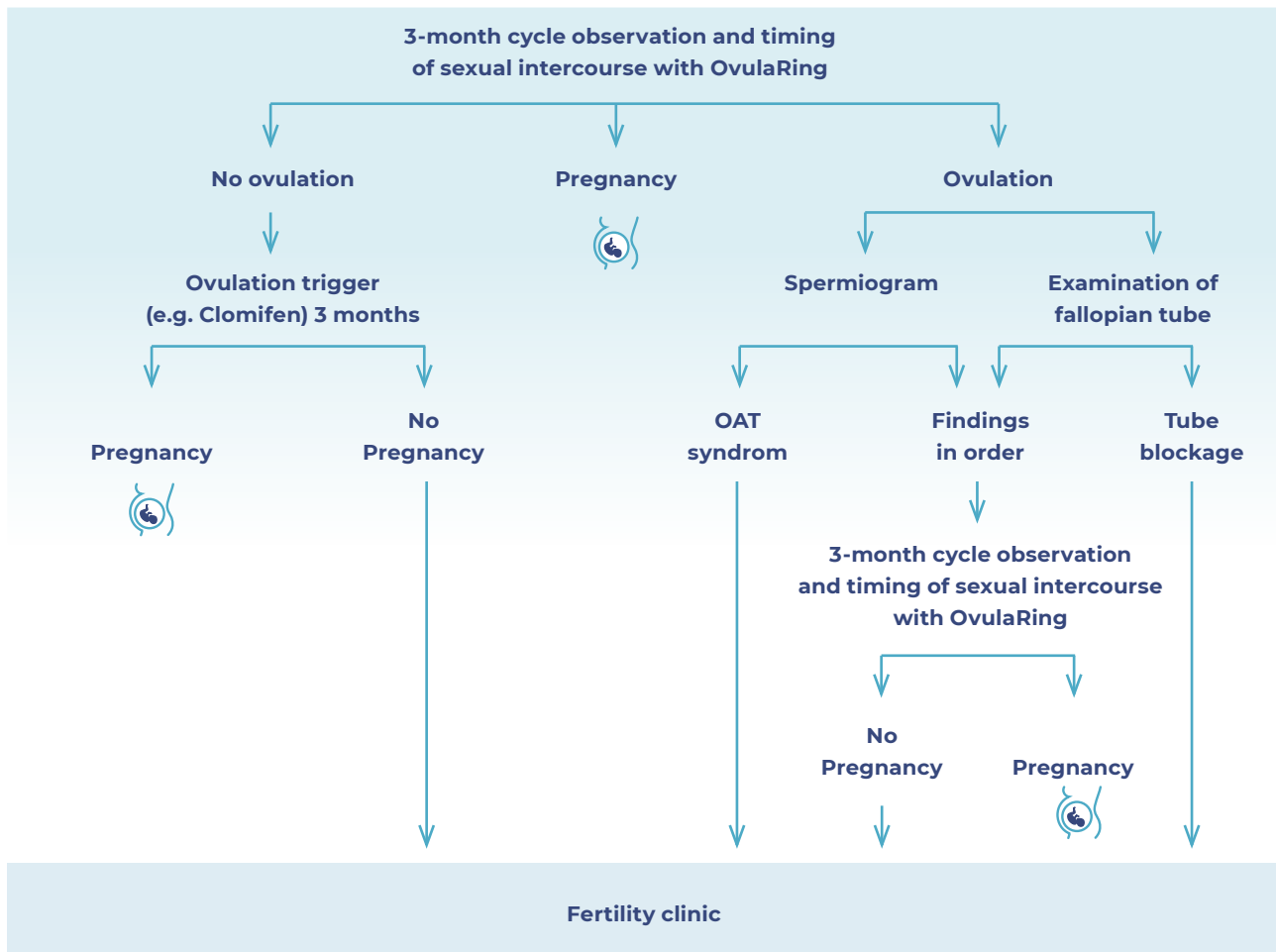
There is no (anovulation) or only a very brief or very slight rise in temperature (LUF syndrome) discernible.



Summary and recommendation:

The temperature curve indicates anovulation. If this occurs repeatedly (3 months), further diagnosis with the gynaecologist is necessary. In addition, focus should also be placed on the woman's lifestyle (too much stress, sport, shift work, travel etc.). In the event of persistent anovulation a ovulation induction or referral to a fertility clinic should be undertaken.

Incorporation of OvulaRing in conception treatment



Summary

The OvulaRing method enables a new and objective representation and evaluation of the female menstrual cycle for the first time, resulting in improved cycle diagnostics and therapy monitoring in gynaecological practice where there is a desire to conceive. Unnecessary examinations or premature therapy in a fertility centre

and the associated costs and side effects can therefore be avoided. In addition, the OvulaRing method in combination with the CFG-Score enables a personalised sterility therapy on the basis of the individual cycle biology of the woman for the first time.

1 | Regidor PA, Kaczmarczyk M, Schiweck E, Goeckenjan-Festag M, and Alexander H (2018) Identification and prediction of the fertile window with a new web-based medical device using a vaginal biosensor for measuring the circadian and circamensual core body temperature. *Gynecol Endocrinol* 34, 256-260.

2 | Alexander H, Kaczmarek MA, Schiweck E, and Goeckenjan-Festag M (2015) OvulaRing - Das Cyclofertilogramm (CFG) zur exakten Zyklus- und Fertilitätsdiagnostik. In *Sächsisches Ärztenlatt* 539-542.

3 | Feldmann, U. (2014) Zeitpunkt der Ovulation - Die fortlaufende Messung der Körperkerntemperatur gewährleistet zuverlässige Aufschlüsse. *Der Privatarzt Gynäkologie* 5, 18-19.

4 | Wilcox AJ, Weinberg CR, Baird DD. (1995). Timing of sexual intercourse in relation to ovulation. Effects on the probability of conception, survival of the pregnancy, and sex of the baby. *N Engl J Med* 333, 1517- 1521.