

Supplemental materials for

Leiva R, DiRienzo L. Combination of home-based hormonal and mobile technology for virtual monitoring of menstrual cycles. *Ann Fam Med*. 2021;19(2):180.

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References

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2. Leiva R, McNamara-Kilian M, Niezgodá H, Ecochard R, Bouchard T. Pilot observational prospective cohort study on the use of a novel home-based urinary pregnanediol 3-glucuronide (PDG) test to confirm ovulation when used as adjunct to fertility awareness methods (FAMs) stage 1. *BMJ Open*. 2019;9(5):e028496.

Supplemental Appendix 1

Links to FAM (or Natural Family Planning) methods:

- Billings Method (mucus-based) <https://billings.life/en/>
- Creighton Method (mucus-based) <https://www.creightonmodel.com>
- Marquette Model of NFP (mucus- and urinary hormone-based) <https://www.marquette.edu/nursing/natural-family-planning-model>
- Example of online Charting for users of Natural Family Planning <https://www.nfpcharting.com/> (smartphone app available)."

"Ovulation Predictor and/or Confirmatory Kits:

- Easy@Home: Qualitative predictor test. Can be used with an App. Av www.amazon.ca or <https://premom.com/> .
- Proov at Home Progesterone Test Kit: An ovulation confirmatory test by Health Canada). Sold in the USA <https://proovtest.com/> ."

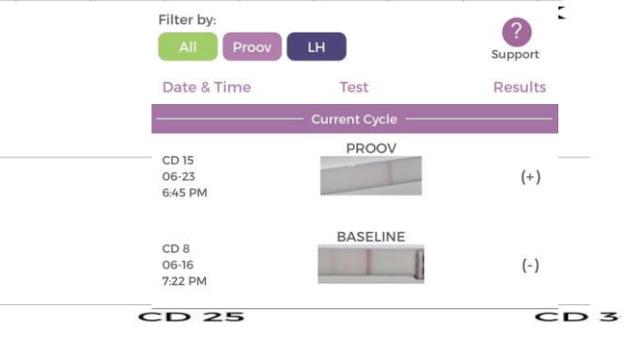
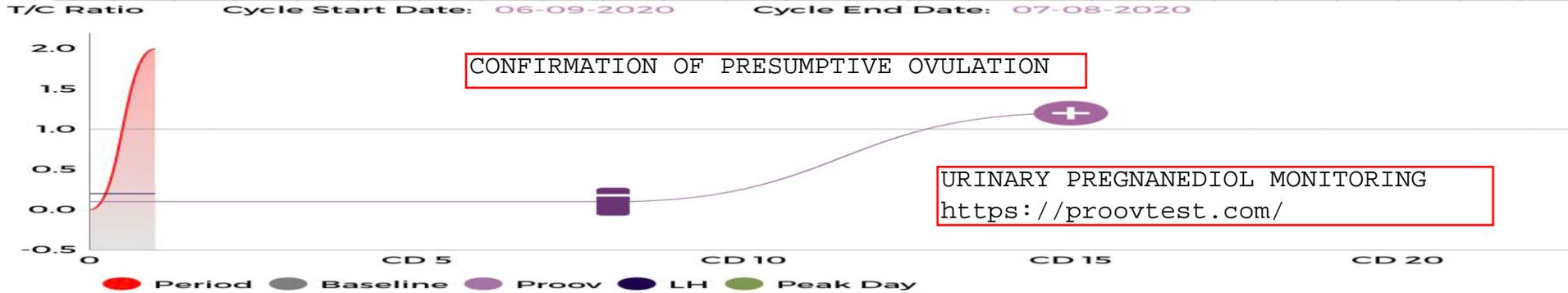
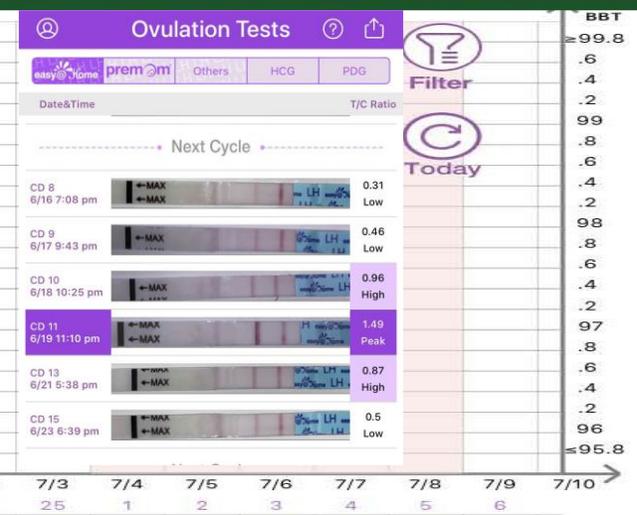
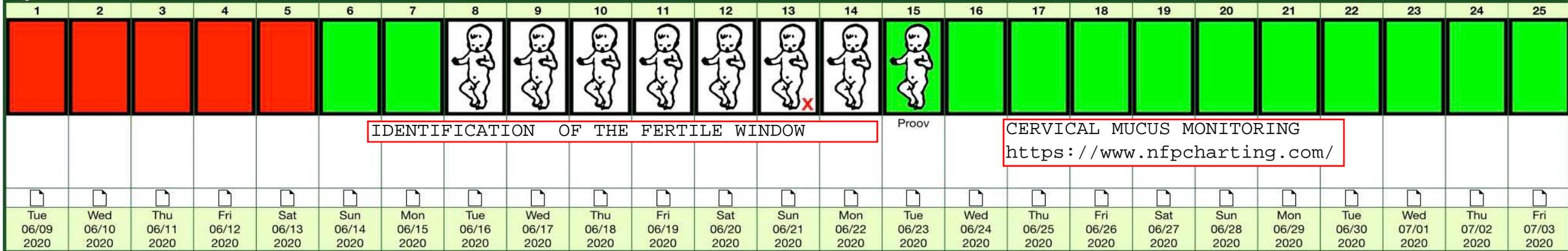


Figure 1. Composite screenshot images of three smart phone application results used concomitantly during the same menstrual cycle: Cervical mucus (top), urinary LH (middle) and urinary Pregnanediol daily monitoring (bottom)

Supplemental Appendix 2.

Use of Serum Progesterone to Confirm the Luteal Phase

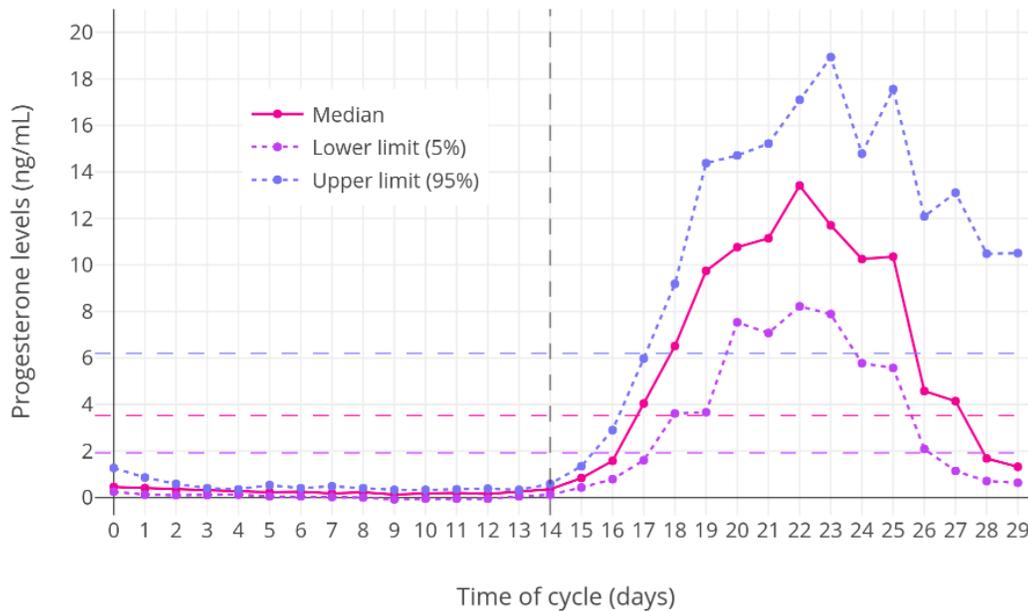
It is important that you talk to a doctor to discuss the information provided in this sheet. It is not intended to substitute for consultations with a doctor, nor medical advice specific to your health condition.

What does Luteal-Phase mean?

The luteal phase is the second part of your menstrual cycle that begins after you ovulate and ends when you begin your next period. This is considered to be the infertile phase of your menstrual cycle.

What is Luteal-Phase confirmation Progesterone?

This is a blood test that checks for a hormone called progesterone. The hormone is released mostly by the ovaries in high concentration only after ovulation. Thus, it may confirm that ovulation has occurred. The original idea to check progesterone for this purpose was proposed by a doctor named Dr. Thomas Hilgers



1.

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Why use this test?

Any woman may want to know whether she might have ovulated or not. It can also be used for patients having difficulty with Fertility Awareness Methods (FAM) monitoring such as with irregular cycles or patients with infertility problems.

How does this test work?

A progesterone level of 5 nanograms per milliliter (15.9 nanomoles per liter or 15.9 ng/L) or greater in your blood implies that ovulation has occurred². Research shows that this level of progesterone can confirm ovulation with very good certainty (98%)³. Therefore, any woman who has a level of 16 nmol/L or above can confidently know that she has arrived at her infertile luteal phase.

For those wanting to avoid pregnancy, you will need to abstain from any genital contact starting the first day of your period until the day after the progesterone test confirms that you are in the luteal phase. You can then be intimate with your partner anytime during the luteal phase until the first day of your next period.

When should this test be done?

The test can be done anytime during the menstrual cycle. However, to increase your chance that the level will be 16 nmol/L or above, it should be taken:

- •_anytime right after Peak day for those using mucus-based FAM⁴ or
- •_after a positive LH test (also called an ovulation predictor test)⁵ or
- •_both of the above ⁶ or
- •_while using electronic monitors with the Marquette Method, especially during the breastfeeding period^{7,8}.

Does this test confirm ovulation with 100% certainty?

No. The gold standard for confirming ovulation is follicular tracking with ultrasound⁹. Also, in about 12% of cycles among regularly menstruating women, the ovarian follicles fail to ovulate and keep growing. This event is known as Luteinized unruptured follicle (LUF). When this happens, the test does not confirm ovulation, but that luteinization has occurred. Luteinization is when the follicle cells change to luteal cells and progesterone is released. Once luteinization has occurred, the cycle is infertile¹⁰.

Is there a urinary test for Progesterone?

Yes. There is a urinary test that detects Pregnanediol, which is a form of progesterone found in urine. There have been a couple of promising recent clinical studies for this test, but more research must be done to confirm how effective it is^{11,12}. This test has not been approved by Health Canada yet. It is sold in the United States.

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