

Timing of urinary estrone-3-glucuronide tests

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Background

- The onset of a woman's fertile phase can be identified by an increase in concentration of urinary metabolites of estradiol, including E1-3G (estrone-3-glucuronide).
- Home ovulation tests typically detect the lutenising hormone (LH) surge, which identifies the day before and day of ovulation.
- Some tests also measure E1-3G to identify the user's wider fertile phase.
- Such tests require users to test the first morning void.
- The consequences of testing at different times of the day are not known.

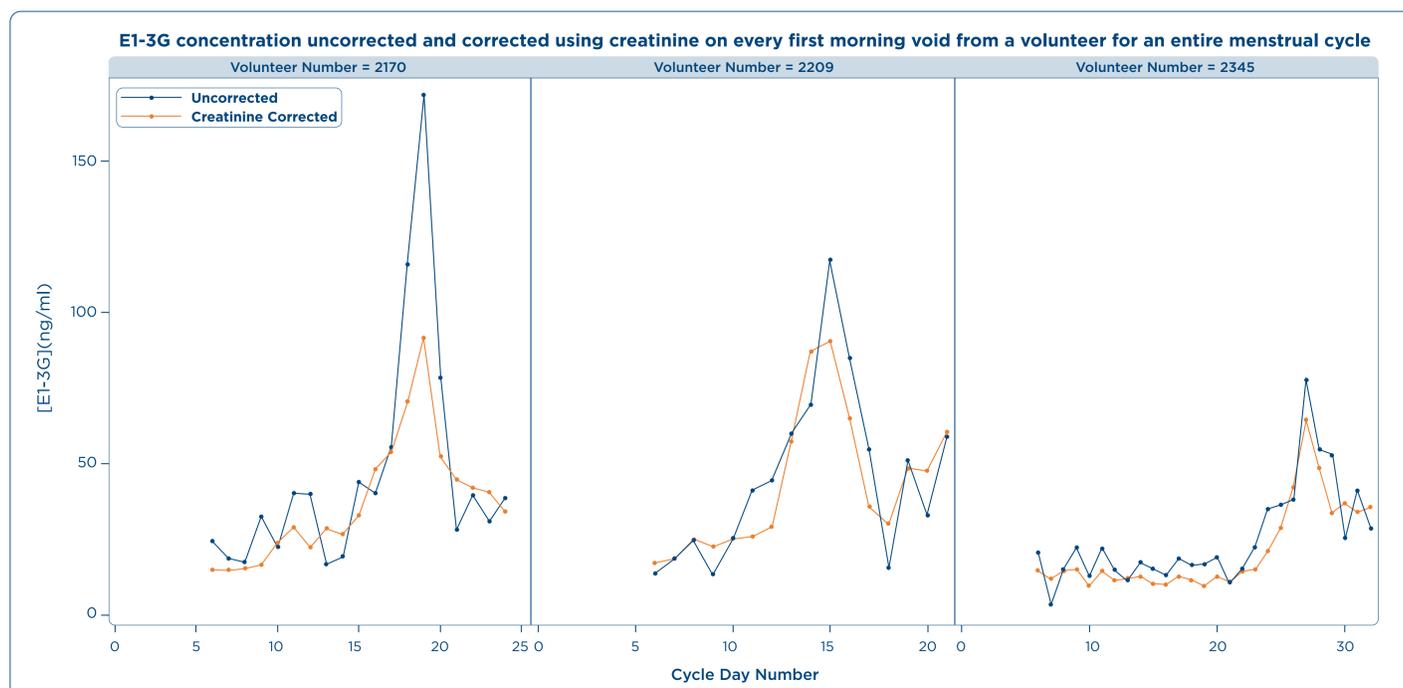
Methods

- Women aged 18-45 with natural menstrual cycles (n=19) were required to collect and measure volume of every single void of urine for one entire menstrual cycle.
- Creatinine (Cobas Miras™) and E1-3G and LH (AutoDELFIA™) were measured on all 1732 samples.
- Trial registration number NCT:01577147.

Results

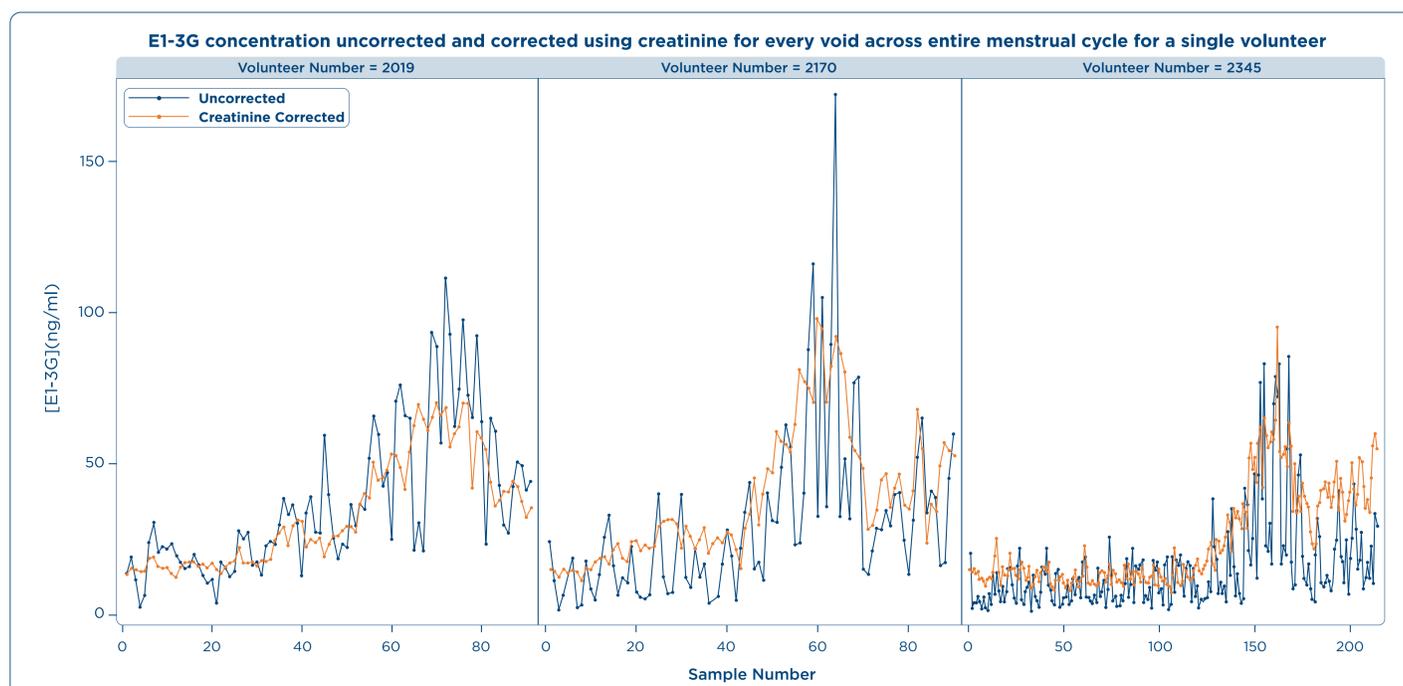
- Women voided a median of 6 urine samples per day (min to max; 2-12).
- LH surge day ranged from day 10-25 (mean 13.9).
- When considering only first morning void urine, the E1-3G rise was a mean of 1.94 days in advance of the LH surge.
- Creatinine correction had minimal impact, with the mean time from E1-3G rise to LH surge being 2.28 days. Figure 1 shows the effect of creatinine correction on E1-3G profile of first morning urine samples from 3 volunteers.

Figure 1: E1-3G profiles from 3 volunteers, uncorrected and corrected using creatinine concentration for early morning urine samples across an entire menstrual cycle.



- This was not surprising as creatinine concentration was very consistent within a volunteer when examining only first morning void.
- Considering all first morning void samples, median creatinine level was 13110 $\mu\text{mol/L}$; 5th-95th centile range 5588 to 22299).
- Creatinine concentration was more variable when examining all samples across the day (median 8657 $\mu\text{mol/L}$, 5th-95th centile range 2131 to 20754).
- When all urine voids were tracked, the E1-3G rise was much more difficult to assign. If selecting daily samples from a different time of day for analysis, it was not possible to accurately identify the E1-3G rise in uncorrected urine samples.
- Figure 2 shows effect of creatinine correction on E1-3G profile of all samples from 3 volunteers.

Figure 2: E1-3G profiles from 3 volunteers, uncorrected and corrected using creatinine concentration for every single urine void across an entire menstrual cycle.



Conclusion

- E1-3G rise was consistently identifiable in first morning urine, with or without urine concentration correction.
- Correction is needed if using voids later in the day.
- Home ovulation tests that measure E1-3G can identify a wider fertile phase than LH only tests, providing users with more options for timing of intercourse. (Roos (2015) ECRHC; 20:438)
- However, users should adhere to instructions of using first morning void.

Declaration of interest

All authors are employees of SPD Development Company Ltd., a fully owned subsidiary of SPD Swiss Precision Diagnostics GmbH; the manufacturer of Clearblue™ Pregnancy and Ovulation Tests.