

A commercially available, direct to consumer, FDA-registered device called the Mira Fertility Tracker (“Mira”), measures quantitative urinary hormone levels via immunofluorescence for ovulation monitoring with a comparable accuracy to clinical immunoanalyzers. While Mira is marketed for use in physiological cycles, the ability to quantify estrone 3-glucuronide (E3G), the urinary metabolite of estradiol (E2), may provide an alternative to serum E2 measurements during IVF.

Methods:

A prospective, observational pilot study of patients undergoing superovulation for IVF or oocyte cryopreservation was performed. Inclusion criteria required an AMH of 1-3.5 ng/ml and use of an antagonist protocol. Patients were provided with the Mira device and test wands and were asked to test their first morning urine each day of stimulation. Management decisions during were based solely on routine clinical parameters, not uE3G results. Typically, the first serum E2 was assessed on day 6 of stimulation, with subsequent blood samples and ultrasounds performed as necessary.

Analysis was performed with scatter plots of uE3G and E2 to examine trends during stimulation, and a joint distribution map of uE3G and E2 was created. Spearman correlation of daily uE3G and E2 was calculated.

Results:

Results for 22 patients were analyzed. Mean values for the following parameters were as follows:

Age: 37.0 years (29-43, SD 3.9)

Days of stimulation: 8.9 (8-11, SD 1.1)

uE3G samples/patient: 8.7 (5-11, SD 1.8)

E2 samples/patient: 3.1 (2-4, SD 0.7)

Scatter plots of uE3G/day and E2/day displayed a monotonically increasing pattern, as did the pairwise uE3G vs E2 scatter plot.

The resulting regression equation was as follows: $E2 = -161.85 + (6.11 * uE3G)$.

The Spearman correlation between pairwise uE3G & E2 was calculated as 0.82.

Conclusions:

The uE3G dynamics were comparable to that of serum E2 with Spearman correlation of 0.82. Thus, at-home urine monitoring of uE3G is a viable alternative to serum E2 measurements during COH that is potentially more patient friendly and convenient. Further studies are required for additional validation in the general IVF population.