Do Anti-Müllerian Hormone (AMH) Levels Predict Outcomes for IVF Patients Undergoing Pre-Implantation Genetic Screening (PGS)?

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Introduction

Anti-Müllerian Hormone (AMH) levels have been shown to be inversely correlated with the quantitative response to controlled ovarian hyperstimulation1. Low levels of AMH (<1.0) are associated with lower numbers of eggs recovered, lower numbers of good quality embryos and lower implantation and clinical pregnancy rates2.

Studies correlating AMH levels with pre-implantation genetic screening outcomes are more limited. Gleicher et al3 published a study reporting lower AMH levels to be associated with fewer embryos to biopsy and subsequent lower implantation rates with euploid embryos.

To date, there have not been any published studies correlating AMH levels with live birth rates following IVF with PGS. With that in mind, we asked the question, is there a significant difference in cycle and live birth outcomes and numbers of euploid embryos in women undergoing IVF/PGS with their own eggs depending on pre-cycle serum AMH levels?

Participants, Materials, Settings, Methods, Statistics

This study was a retrospective review of 288 IVF/PGS cycles between June 201 and July 2013 for which AMH levels were available. The setting is a private U.S. IVF clinic using an electronic database (eIVF, Irving, TX, USA). Embryos underwent trophectoderm biopsy on Day 5 and Day 6 and were vitrified pending SNP Microarray analysis (Natera, Redwood City, CA, USA) for all 24 chromosomes.

122 cycles were undertaken in women with an AMH <1.0 ng/mL (low AMH group) and 166 in women with an AMH >1.0 (high AMH group). Data on clinical pregnancy rate (CPR) and live birth rate (LBR) are provided for those cycles and patient that have thus far undergone a subsequent frozen embryo transfer.

Two-tailed Fischer’s exact test was used for statistical analysis of these outcomes.

Results

| AMH (ng/mL) | Patient Age (y) | Average AMH (±SEM) | # Patients Canceled | # Eggs Retrieved (ER) | # Embryos Biopsied % of ER | # Biopsied embryos % of total | # Euploid embryos % of biopsied | # Cycles with at least one euploid embryo % of cycles | LBR/ET | LBR/Cycle Start | LBR/Cycle End | CPR/ET | CPR/Cycle Start | CPR/Cycle End | # Clinical pregnancies
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<tbody>
<tr>
<td>AMH &lt;1.0</td>
<td>39.4±0.4</td>
<td>0.48 (±0.06-0.98)</td>
<td>122</td>
<td>952±11</td>
<td>0.41 (±0.3-0.6)</td>
<td>2.7 (±1.0-3.8)</td>
<td>73 (±4.3-14.0)</td>
<td>93 (±6.9-0.9)</td>
<td>39 (±4.3-0.9)</td>
<td>39 (±4.3-0.9)</td>
<td>19%</td>
<td>14%</td>
<td>30.1%</td>
<td>14%</td>
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<td>AMH &gt;1.0</td>
<td>37.8±0.4</td>
<td>0.91 (±0.06-1.5)</td>
<td>157</td>
<td>100±0.1</td>
<td>0.56 (±0.3-0.8)</td>
<td>12.6 (±1.1-0.8)</td>
<td>31.3 (±5.2-0.3)</td>
<td>18 (±14.0-0.0)</td>
<td>15(±15.0-0.0)</td>
<td>20 (±15.0-0.0)</td>
<td>31%</td>
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Clinical pregnancies were defined as a gestational sac on transvaginal ultrasound performed at 6-8 weeks gestation.

Mean ages of the patients in the two groups was somewhat higher in the low AMH group, as might be expected, but this difference did not achieve statistical significance in this size of study.

Cycle cancellation rates were significantly higher in the low AMH group vs. high AMH group (18% vs. 5.4%, p=0.004). The number of euploid embryos was significantly lower in the low AMH group (37.9%) vs. the high AMH group (52.6%), p=0.036.

CPR/ET was similar in the low AMH group vs. the high AMH group (55.8% vs. 66.3%, p=0.74). However, CPR/retrospectively was significantly lower in the low AMH group: 19% and 35% in the low and high AMH groups respectively (p=0.04). CPR/cycle start was also significantly lower (15.6% vs. 30.1%, p=0.011) in the low AMH group.

Limitations, Reasons for Caution

This was a retrospective review so AMH levels could have been a factor in the decision to cancel a cycle.

Not all patients have undergone subsequent FET so some of the data is incomplete. This includes 6 patients in the low AMH group and 9 patients in the high AMH group that have at least one euploid embryo still frozen.

AMH assays were performed in different laboratories.

Conclusions/Wider Implications

As an independent variable, AMH levels greater than 1.0 ng/mL predict a lower cycle cancellation rates, more embryos to biopsy and more normal embryos available to transfer, as well as higher CPRs and LBRs per egg retrieval and per cycle start as well as low rates of pregnancy loss. This confirms earlier data about higher implantation rates and adds data on a substantial number of live births as well.

References