

Anti-Mullerian Hormone

ENZYME-LINKED IMMUNOSORBENT ASSAY (ELISA) FOR ANTI-MULLERIAN HORMONE IN SERUM

Clinical Background

- Anti-mullerian hormone (AMH) is produced by Sertoli cells in the fetal testis and induces the regression of the Mullerian ducts, which would otherwise develop into the female reproductive tract. In males, serum levels of AMH peak during the first few months of life and remain high until puberty. In females, AMH is undetectable in serum at birth and remains low or undetectable during childhood. Reference intervals for boys and girls do not overlap. In boys with nonpalpable testes, serum levels of AMH differentiate between cryptorchidism and anorchia.
- The primary function of the female ovary is to produce a mature oocyte for fertilization. Ovarian follicles continuously undergo differentiation and maturation from the primordial stage to the antral stage until the primordial follicle pool is depleted at menopause. Most antral follicles undergo atretic degeneration, but a few are selected during the menstrual cycle by follicle stimulating hormone (FSH) and further develop into preovulatory follicles. During each menstrual cycle, one dominant preovulatory follicle ovulates to produce a fertilizable oocyte.
- The ovarian reserve (OR) refers to the number and quality of follicles capable of producing a fertilizable oocyte. The ovarian reserve declines with age until it is exhausted at menopause. Failure to conceive a child within 12 months increases from 5 percent for women in their early 20s to 30 percent for women 35 years and older. Techniques that estimate OR are useful in predicting the likely outcome of in vitro fertilization (IVF) and other assisted reproductive technologies (ART).
- AMH is expressed by preantral and small antral follicles but is not expressed by primordial follicles or antral follicles once they have been selected by FSH. Serum levels of AMH reflect the number of preantral and antral follicles. Several studies have shown AMH to be the best marker for OR since it is independent of the menstrual cycle. Beginning at about age 30, AMH levels decline linearly with age and become undetectable at postmenopause when the OR is exhausted.
- In polycystic ovarian syndrome (PCOS), folliculogenesis is arrested at the FSH-selection stage, and preantral and small antral follicles accumulate. Serum levels of AMH are two to three times higher in women with PCOS and reflect the increased number of follicles expressing AMH.

Epidemiology

- In the United States, 11.8 percent of women age 15–44 have impaired ability to have children. Infertility affects 15–20 percent of reproductive-age couples.
- PCOS is the most common cause of female infertility.
- In 2006, the Centers for Disease Control estimated that assisted reproductive techniques (ART) accounted for slightly more than 1 percent of live births. Most women (61 percent) using ART were 35 years of age and older.

Indications for Ordering

- AMH is a useful marker for predicting OR and the likelihood of success of IVF and other ART.
- AMH is useful for differentiating between cryptorchidism and anorchia in boys with nonpalpable testes.
- AMH levels above the reference interval are indicative of PCOS.

Interpretation

- Results should be compared to reference intervals for age and sex.
- AMH levels above the reference interval for newborn females indicate the presence of testicular tissue.
- AMH levels above the reference interval (in women) are indicative of PCOS.

Limitations

- AMH levels may vary considerably from one individual to another.

Methodology

- This test is an enzymatically amplified two-site immunoassay.
- AMH is captured by an antibody attached to 96-well microtiter plates and detected with a biotinylated second antibody and streptavidin-horseradish peroxidase.

Related Tests

- The following are also used to estimate ovarian reserve on day three of the menstrual cycle:
 - [Follicle Stimulating Hormone, Serum \(0070055\)](#)
 - [Estradiol, Adult Premenopausal Female, Serum or Plasma \(0070045\)](#)

References

1. Broekmans FJ, et al. Anti-Mullerian hormone and ovarian dysfunction. *Trends Endocrinol Metab* 2008;19:340–7.
2. Lee M, et al. Mullerian inhibiting substance in humans: normal levels from infancy to adulthood. *J Clin Endocrinol Metab* 1996;81:571–6.
3. McGee EA and Hsueh AJ. Initial and cyclic recruitment of ovarian follicles. *Endocr Rev* 2000;21:200–14.
4. Roudebush WE, Kivens WJ, Mattke JM. Biomarkers of ovarian reserve. *Biomarker Insights* 2008;3:259–68.
5. Centers for Disease Prevention. Assisted Reproductive Technology (ART) 2007. Section 1. Overview. <http://www.cdc.gov/art/ART2007/section1.htm> (accessed on July 7, 2010).

Test Information

2002656 **Anti-Mullerian Hormone**

For specific collection, transport, and testing information, refer to the ARUP website at www.aruplab.com.

For information on test selection, ordering, and interpretation, refer to ARUP Consult® at www.arupconsult.com.