28 year old woman with amenorrhea

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Endorama
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28 yo Indian woman referred for secondary amenorrhea
- Menarche at age 10
- Regular menses
- OCP from age 21-27
- No menses in past 6 months
Past Medical History

- Exercise History:
  - High school: cheerleading
  - Current (last 5 years): runs 26 miles per week
- No history of eating disorders
- Lost 8 lbs over the past 5 years
Past Medical History

- Medical Problems:
  - None

- Medications:
  - None

- Allergies:
  - None

Social History:

- Married.
- No children.
- No history of tobacco use.
- 1-2 glasses of wine per week
Past Medical History

- Family History:
  - Sister with PCOS.
  - Maternal grandparents with diabetes.
Physical Exam

- Height: 4’10”
- Weight: 89 lbs
- BMI: 18.6
- Pulse: 55
- Blood pressure: 96/54
- No hirsutism.
- No acanthosis nigricans.
Labs

142 102 16
4.5 27 0.9
86

Total protein 7, Albumin 4.8
AST 20, ALT 66
Alk phos 66, Total bili 0.2

- TSH 5.65
- A1c 5.2%
- PRL 5.4 ng/mL
- FSH 5.5 mIU/mL
- LH 3.2 mIU/mL
- Estradiol 43 pg/mL
- Total test 23 ng/dL
- Free test 0.8 pg/mL
- DHEA-S 119 uG/dL
- 17OH progesterone: 15 ng/dL
- AMH: 13.38 ng/mL
Follicular Ultrasound

- **Left ovary:**
  - 5 follicles 4-5 mm
  - >10 follicles <10 mm
  - Length: 34.3 mm
  - Volume: 7.69 cc
  - Height: 19.1 mm
  - Width: 22.4 mm

- **Right ovary:**
  - 5 follicles 4-5 mm
  - >10 follicles <10 mm
  - Length: 33.3 mm
  - Volume: 8.92 cc
  - Height: 23.6 mm
  - Width: 21.7 mm

Rotterdam 2004 criteria:
≥20 follicles measuring 2-9 mm in diameter or ovarian volume >10 cc
Assessment & Plan

- **PCOS**
  - Ultrasound results
  - Elevated AMH
  - Rec. Clomid or metformin

- **Hypothalamic amenorrhea**
  - Recommended cutting back on running
My Questions:

- What is AMH?
- What are normal levels of AMH?
- How is AMH used in the PCOS population?
- What are other causes of elevated AMH?
Anti-Mullerian Hormone

- Glycoprotein member of TGF-β family
- Only produced by granulosa cells in the ovary.
  - From primary follicular stage until early antral stage.
  - No further expression once the follicle 8-10 mm.
- Reflects ovarian reserve
  - >1 ng/mL reflects good ovarian reserve
  - <0.1 ng/mL suggests poor response to ovulation induction

AMH levels in healthy females

AMH and PCOS

- **Diagnosis:**
  - AUC 0.81
  - AMH >48 pmol/l:
    - sensitivity 60%
    - specificity 98.2%

AMH and PCOS

- AMH correlated with presence of polycystic ovary, free testosterone, testosterone response to DAST, and 17OHP response to GnRH agonist.
- Very high AMH levels are specific but insensitive for PCOS.
- In the absence of hyperandrogenic anovulation, moderate AMH elevation in a woman with a polycystic ovary implies an increased oocyte pool size and suggests an increased reproductive lifespan, not PCOS.

AMH and PCOS

- Pathogenesis: AMH inhibits FSH action, which leads to failure of follicle development
- Diagnosis: elevated AMH levels are specific but insensitive for PCOS
- Prognosis: elevated in proportion to clinical severity
- Treatment:
  - May need lower starting doses of FSH to avoid overstimulation.
  - Have not been found to help predict success of IVF.

AMH and Hypothalamic Amenorrhea

- Controls (n=219): PCOM in 15% and 72%
- FHA (n=58): PCOM in 17, 70, and 100%

AMH and Hypothalamic Amenorrhea

- PCO-L in normal adult women does not seem to translate to the development of PCOS.
- Conclude that the incidental finding of PCO-L in an amenorrheic woman with FHA should not lead to qualifying her for the diagnosis of PCOS.
  - A minority of patients with FHA seem susceptible to evolving into PCOS at the time of recovery, when serum LH and insulin levels return to normal.
  - AMH >90

Current status

- Decreased to 2-2.5 miles per day from 1 month.
- Had a menses following that month.
- Increased back to 3-4 miles/day.
- No further menses.
- Now considering metformin.
Take Home Points

- AMH indicates ovarian reserve.
- AMH is elevated in PCOS as well as PCOM.
- Elevated AMH levels or PCOM in normal women does not always translate to PCOS.
References