**Can we detect a biologically relevant quantity of Anti-Mullerian Hormone (AMH) in human hair samples?**
*S. Sawarkar1, M.Á. Rodríguez2, L. Garcia-Calvo2, A. Carbajal2, B. Ring1, Y.C. Vives3, M.H. Duvison4, A. Crisci1, C.O. Marieta5, M. Jimenez6, S. Munne1, M. Bejar2
1MedAnswers Inc., Research Development & Analytics, San Pedro, U.S.A.
2Universitat Autònoma de Barcelona, Dpt. Animal Health and Anatomy Veterinary Faculty, Barcelona, Spain
3Complejo hospitalario Ruber Juan Bravo, Unidad de Reproducción Asistida, Madrid, Spain
4Ginemed, Reproduccion asistida en Clinicas, Seville, Spain
5CER Santander, Medicina de la reproducción, Cantabria, Spain
6Sinae, Research, Seville, Spain*
**Study question:**

Can we detect a biologically relevant quantity of **Anti-Mullerian Hormone (AMH)** in human hair samples?

**Summary answer:**

AMH can be detected in human hair samples, and levels of AMH in hair are correlative to maternal age.

**What is known already:**

AMH is a product of granulosa cells of the preantral and small antral follicles in women. Hence, AMH is often used as a biomarker in assessing fertility. Typically, circulating levels of AMH are tested using blood samples obtained invasively through median cubital vein punctures. Hormone concentrations in hair may serve as a comparable and possibly superior means of  assaying hormone levels accrued over longer periods of time. Detection of steroid hormones in hair has been used in psychoneuroendocrinological studies in human and companion, farm and wild animals. This study represents the first quantification of AMH levels in hair in humans.

**Study design, size, duration:**

The study design was prospective in nature. A total of **(n=152)** human female participants between the ages of **18-65 years** were included in the study over a period of 10 months (recruitment ongoing).

**Participants/materials, setting, methods:**

Sample collection was performed in a clinical setting. Blood and hair samples were collected from patients by nurses. Hair follicles are not required. A doctor or a clinical technician performed the ultrasound for measuring the antral follicle count (AFC). Biologically active AMH was extracted from hair using a proprietary method. AMH presence in hair extract was confirmed using Western Blotting. AMH was measured in plasma and serum by ELISA.

**Main results and the role of chance:**

AMH was successfully detected in samples (n=152) via western blots on denatured gel with bands at 70kDa. An average level of **9.37 pg/ml (95%CI 6.77-12)** was detected in hair and **3.68 ng/ml (95%CI 2.79-4.56)** in serum in **age-group <25 yrs.** This is in contrast to the age group **>39 years**, within which a mean of **3.02 pg/ml (95%CI 2.19-3.85)** AMH detected in hair and **0.92 ng/ml (95%CI 0.43-1.41)** in serum samples. AMH measured in hair correlated with age more strongly than plasma AMH **(p-value =1.26 x10-5 (hair), p-value 0.088 (serum)**). AMH levels in hair also strongly correlated with antral follicle count (AFC).

**Limitations, reasons for caution:**

Hair is a medium that can accumulate biomarkers over  several weeks, while serum is an acute matrix representing only current levels. Range of detection of AMH in hair was wide within individuals from a similar age cohort. AFC testing was included in the study laterally and has limited data points.

**Wider implications of the findings:**

We have a novel method of detecting AMH in a longitudinal matrix (hair) that could be a more appropriate representation of hormone levels compared to acute matrices like serum or saliva. Moreover, our method is also the only truly non-invasive method for testing fertility hormones.

**Trial registration number:**Not Applicable
**Study funding:** No
**Funding source:** Funding by commercial/corporate company(ies)