AMH User Information

Description

AMH performs various physiological functions. AMH is secreted by the Sertoli cells in males and is responsible for Müllerian duct regression during embryonic development. AMH continues to be produced by the testes until puberty and then decreases slowly to residual post-puberty values.

In females, AMH plays an important role in ovarian folliculogenesis. Serum levels are low at birth, increasing to peak levels after puberty. Levels decrease progressively thereafter with age, becoming undetectable at menopause.

Clinical indications

AMH has a wide range of potential uses in reproductive medicine, particularly assessing ovarian reserve and predicting response to IVF treatment. Levels of AMH are known to be higher in women with polycystic ovarian syndrome (PCOS).

In paediatrics, the measurement of AMH may be of value in the diagnosis of disorders of sex development (DSD) and investigation of ambiguous genitalia. AMH may also be used as a tumour marker in the follow up of patients with granulosa cell tumours.

AMH Plus assay

The laboratory launched the AMH Plus assay on 26/09/17.

The AMH Plus assay is identical to the AMH assay with regards to analytical performance, formulation, production and standardisation. The assay was launched in EU to replace the Roche AMH assay, following the European Medicines Agency approval for dose determination of follitropin delta of Ferring (human recombinant follicle stimulating hormone).

The AMH Plus assay has an additional intended use for of 'the establishment of the individual daily dose of follitropin delta of Ferring' in controlled ovarian stimulation in women undergoing an assisted reproductive technology program. The use of follitropin delta requires an individualised dosing algorithm based on the AMH Plus result and patient body weight.

Turnaround Time

1 day

Specimen Type

Serum preferred though lithium heparin plasma is also acceptable. Grossly haemolysed/lipaemic/icteric samples are not suitable.

The assay is unaffected by icterus (bilirubin ≤1129 µmol/L or ≤ 66 mg/dL), haemolysis (Hb ≤ 0.621 mmol/L or ≤ 1.0 g/dL), lipaemia (Intralipid ≤1000 mg/dL), biotin (≤123 nmol/L

or ≤30 ng/mL), IgG ≤2.5 g/dL, IgA≤1.8 g/dL and IgM ≤0.5 g/dL. No interference was observed from rheumatoid factors up to a

concentration of 1000 IU/mL.

Volume required

250 µL

Specimen Transport to Lab (External Samples)

Frozen – depending on time to ship (see Sample Handling)

Sample Handling and Storage Conditions

Allow serum samples to clot completely before centrifugation. Centrifuge samples for 10 minutes at 3000 rpm and aliquot cell-free serum/plasma into a 5 mL tube (LP4 or LP5) or Roche false bottomed tube if available.

Cell-free serum/plasma is stable for 3 days at 20-25 °C, 5 days at 2-8 °C and 6 months at -20 °C. For sample shipment, samples should be stored frozen. Repeated freezing and thawing of samples should be avoided (freeze only once).

Contact Names

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Address

Send samples to:

Viapath

Central Specimen Reception - Special Processing Unit

5th Floor, North Wing

St Thomas' Hospital

Westminster Bridge Road

London SE1 7EH

UKAS Reference Number

8710

Method

Roche COBAS e Immunoassay (sandwich)

EQA

UKNEQAS Peptide Hormones, monthly distribution

Lower reporting limit (limit of quantitation)

0.2 pmol/L

Reference Ranges

Healthy women, pmol/L, 2.5th – 97.5th percentile

20 – 24 years 8.7 – 83.6
25 – 29 years 6.4 – 70.3
30 – 34 years 4.1 – 58.0
35 – 39 years 1.1 – 53.5
40 – 44 years 0.2 – 39.1
45 – 50 years 0.1 – 19.3

Healthy men, pmol/L, 2.5th – 97.5th percentile

Adult 5.5 – 103.0

Source: Roche AMH Plus Product Information 2019-09 V2.0.

For Paediatrics the following ranges may be used for guidance:

	Male (pmol/L)	**Female (pmol/L)**
Up to 3 months	570 – 1468	4.2 – 23.2
3 – 12 months	301 - 1062	3.1 - 15.2
Childhood	301 - 1015	2.3 - 44.2

Paediatric ranges have been calculated from correlation data against the previous assay (Beckman Gen II). The Beckman Gen II cut-offs were presented at ESHRE 2009, a joint publication between Beckman Coulter and the Glasgow Centre for Reproductive Medicine.

Additional Information / Post-examination Interpretation

Percentile information on Roche AMH Plus assay

AMH, pmol/L	2.5th percentile (95% CI)	Median (95% CI)	97.5th percentile (95% CI)
Healthy men (n=148)			
	5.5 (1.2 – 11.3)	34.2 (31.1 – 38.2)	103.0 (78.1 – 125.0)

AMH, pmol/L	2.5th percentile (95% CI)	Median (95% CI)	97.5th percentile (95% CI)
Healthy women (n=)			
20 – 24 years (150)	8.7 (3.4 – 11.9)	28.6 (25.7 – 31.7)	83.6 (65.0 – 112.0)
25 – 29 years (150)	6.4 (3.5 – 8.6)	23.6 (21.4 – 27.8)	70.3 (63.6 – 81.0)
30 – 34 years (138)	4.1 (1.8 – 6.8)	20.0 (16.8 – 24.8)	58.0 (51.9 – 69.4)
35 – 39 years (138)	1.1 (0.4 – 3.4)	14.2 (12.4 – 16.9)	53.5 (46.3 – 77.9)
40 – 44 years (142)	0.2 (0.1 – 0.5)	6.3 (5.2 – 8.1)	39.1 (28.0 – 48.3)
45 – 50 years (169)	0.1 (0.1 – 0.1)	1.4 (1.0 – 1.9)	19.3 (12.8 – 29.7)
PCOS women, identified using Rotterdam criteria (n=149)			
	13.3 (11.0 – 17.8)	48.6 (45.0 – 53.0)	135.0 (114.0 – 151.0)

Source: Source: Roche AMH Plus Product Information 2017-03 V1.0: A study in a Caucasian population with the Elecsys AMH assay on samples from apparently healthy adults (148 males, 887 females not taking contraceptives) and 149 women with Polycystic Ovary Syndrome (Roche study No. RD001727).

Correlation of Roche AMH Plus assay with antral follicle count (AFC)

AMH (pmol/L)	n=	AFC 0 – 7	AFC 8 – 15	AFC >15
<4.9	68	63.2%	32.4%	4.4%
4.9 – 16.2	167	12.0%	56.9%	31.1%
>16.2	216	1.4%	24.1%	74.5%

Source: Roche AMH Plus Product Information 2017-03 V1.0: Anderson et *al*, Fertil Steril 2015. Three AFC groups were defined (AFC 0-7, 8-15, > 15). According to the prevalences within these groups (15 %, 37 %, 48 %), quantiles on AMH were computed (c1 = 4.9 pmol/L, c2 = 16.2 pmol/L) to define three groups. Agreement is presented in percentages per AMH group.

E.g. for a patient with AMH <4.9 pmol/L, the probability of having a low AFC (0-7) is 63%; the probability to be in the middle AFC group (8 – 15) is 32%, and only 4.4% for having an AFC >15.

Use of AMH for prediction of hyper-response to controlled ovarian stimulation (COS)

AMH was determined in a study in 149 women undergoing an antagonist treatment protocol in the course of their first cycle of COS for IVF. All women received a standard FSH stimulation dose of 150 IU/day. Blood was drawn before start of FSH stimulation for *post hoc* analysis of AMH after completion of the treatment cycle. Hyper-response was defined as >15 oocytes retrieved; or cancellation of stimulation cycle where >20 follicles were >12mm and oestradiol >11700 pmol/L; or when >30 follicles >12 mm were observed.

The AMH cut-off for predicting hyper-response was 15.0 pmol/L; with a sensitivity of 81.3%, specificity 64.7%, PPV 21.7%, NPV 96.6%.

Source: Roche AMH Plus Product Information 2017-03 V1.0: Clinical evaluation of the Elecsys AMH assay for the prediction of response to controlled ovarian stimulation (Roche study No. RD001695).

Guide to interpretation of serum AMH in DSD

Serum AMH	Testicular tissue	Interpretation
Undetectable or very low	Absent	46,XX CAH Complete gonadal dysgenesis PMDS due to AMH gene defect Congenital anorchia
Within female age-related reference range	Usually absent	46,XX CAH Complete gonadal dysgenesis Dysgenetic testes or ovotestes
Below male or above female age-related reference range	Present	Dysgenetic testes Ovotestes
Within male age-related reference range	Usually normal	Non-specific XY,DSD Hypogonadotrophic hypogonadism PMDS due to AMH-R defect 46,XX testicular DSD Ovotestes
Above male age-related reference range	Present	AIS esp. CAIS 5α-reductase deficiency Testosterone biosynthetic defect Leydig cell hypoplasia

Source: Society for Endocrinology 2015: UK guidance on the initial evaluation of an infant or an adolescent with a suspected disorder of sex development (revised 2015).