

## Ovarian Reserve and Assisted Reproduction

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### Abstract

Treatment success in IVF-ICSI is mainly limited by female age, but differences in ovarian reserve (OR; the remaining pool of oocytes and their quality) between individuals modify treatment prerequisites among women of similar age. OR may be assessed by OR tests (ORTs). The main aims of this work were to study menstrual cycle length (MCL), basal levels of circulating gonadotrophins, antral follicle count (AFC) and serum Anti-Müllerian hormone (AMH) levels and their associations with and prognostic capacities regarding IVF-ICSI outcome in large cohorts of unselected women.

Age-adjusted MCL was positively and linearly associated with pregnancy rates (PRs), live-birth rates (LBRs) and ovarian response to controlled ovarian hyperstimulation. An MCL of >34 days almost doubled the LBR compared with an MCL of <26 days.

The grouped variable 'combined FSH and LH levels' was superior to both individual gonadotrophin levels and the LH:FSH ratio. The highest mean PR was seen in connection with a combination of FSH <6.7 U/l with LH >4.9 U/l; PRs were lowest when FSH-LH levels were opposite to this (high-low) and intermediate when FSH-LH levels were low-low or high-high. Associations with LBR and ovarian response were similar as those for PR.

AFCs and serum AMH levels were positively and log-linearly associated with PR, LBR and ovarian response. Success rates levelled out above AFC 30 or AMH 5 ng/ml. Treatment outcome was superior among women with polycystic ovaries.

Among the studied ORTs, logAFC and logAMH concentration correlated most strongly. After multivariate testing, entering all studied ORTs, AMH and female age remained independently associated with LBR. AMH + AFC + age predicted both poor and excessive ovarian responses with high accuracy.

Adjusting for age and oocyte yield, all ORTs remained significant for LBR, implying that ORTs also capture information on oocyte quality.

In conclusion, measures of OR are strongly associated with PR, LBR and ovarian response in a log-linear fashion, and partly reflect oocyte quality. The OR spectrum is continuous, from small 'oligofollicular' ovaries (the low extreme) to polycystic ovaries (the high extreme). Among the studied ORTs, AMH together with age provide the most powerful basal estimate for IVF/ICSI outcome.

**Keywords:** AFC, AMH, anti-Müllerian hormone, antral follicle count, follicle-stimulating hormone, FSH, ICSI, infertility, intracytoplasmic sperm injection, in vitro fertilization, IVF, LH, live birth, luteinising hormone, menstrual cycle, menstrual cycle length, ovarian reserve, pregnancy, reproductive endocrinology, reproductive technology

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