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Age related nomogram of serum Anti-Mullerian hormone (AMH) and its prediction of ovarian response in female cynomolgus monkeys undergoing assisted reproductive technology treatment

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Context – Anti-Mullerian hormone (AMH) is regarded as a promising predictor for ovarian reserve in humans and non-human primate, and widely used in human medicine. Nonhuman primate is the most important model for human reproduction and endocrinology research. However, large data set on the range of AMH levels in nonhuman primates is still scarce, which limited its applications largely.
Objective – To assess anti-Mullerian hormone (AMH) in female cynomolgus monkeys and evaluate the value of AMH in prediction of ovarian response to gonadotrophin.
Methods –The serum AMH concentration was measured using an enzyme-linked immunosorbent assay (ELISA).
Participant(s) – 529 female cynomolgus monkeys ranging from infancy to adult were included in nomogram. 388 adult female cynomolgus monkeys were included in evaluating the value of AMH in prediction of ovarian response to gonadotropin.
Intervention(s) – Participants received assisted reproductive technology treatment and recombinant human FSH or HMG were used for ovarian stimulation according to conventional regimens.
Main Outcome Measure(s) – Serum AMH levels and the number of retrieved oocytes.
Result(s) – Age-related AMH nomogram of female cynomolgus monkeys was produced. Serum AMH levels maintained stable from 1 to 3 yr, and showed a positive correlation with age (r=0.156, P=0.001) from 4 to 11 yr, the prime fertility period, while were negatively correlated with age (r=?0.521, P<0.001) from 12 yr onward, implying the declined ovarian reserve. In 388 ovarian stimulation cycles, the correlation between serum AMH levels and the number of retrieved oocytes were significant positive (r=0.151, p=0.002). The area under the curve (ROCAUC) of AMH is 0.739 for low response (95% CL: 0.661 to 0.817) and 0.696 for high response (95% CL: 0.608 to 0.783) respectively, indicating a useful potential for prediction low and high ovarian response (p=0.000 and p=0.001). The optimal AMH cut-off value was 10.68 ng/ml (sensitivity: 53.2%, specificity: 83.3%) for low ovarian response prediction, and 16.12 ng/ml (sensitivity: 84.0%, specificity: 52.2%) for high ovarian response prediction.
Conclusions – Serum AMH levels were dynamic through childhood, adulthood and old age in cynomolgus monkeys, indicating the ovarian reserve and reproductive potential. Serum AMH levels can be used as a biomarker to predict ovarian response in cynomolgus monkeys undergoing assisted reproductive technology treatment.

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