

**Serum Anti-mullerian Hormone, Serum Inhibin B and
Antral Follicle Count for Prediction of ovarian Reserve
in Patients Undergoing Intracytoplasmic
Sperm Injection**

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

لسببائك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

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List of Abbreviations

<i>Abbr.</i>	<i>Full-term</i>
AFC	Antral Follicular Count
AMH	anti-Müllerian hormone
ART	Assisted Reproductive Technique
ASRM	American Society For Reproductive Medicine
AUC	Area Under the Curve
AUROC	Area Under the Receiver Operating Characteristics curve
BMI	Body Mass Index
Camp	Cyclic AMP
CC	Clomiphene Citrate
CCCT	Clomiphene Citrate Challenge Test
CEA	Cost-Effectiveness Analysis
CGH	Comparative Genomic Hybridization
CI	Confidence Interval
CO₂	Carbon Dioxide
COH	Controlled Ovarian Hyperstimulation
COS	Controlled Ovarian Stimulation
CP	Clinical Pregnancy
CTET	Clinical Touch Embryo Transfer
CV	Coefficient of Variation
DET	Double Embryo Transfer
DHEAS	Dehydroepiandrosterone Sulfate
DOR	Diminished Ovarian Reserve
E₂	Estradiol
EFFORT	Exogenous FSH Ovarian Reserve Test
ELISA	Enzyme Linked Immunosorbent Assays
ESHRE	European Society of Human Reproduction and Embryology
ET	Embryo Transfer
FDA	Food and Drug Administration
FET	Frozen-Thawed Embryo Transfer

FISH	fluorescent in situ hybridization
FSH	Follicle-Stimulating Hormone
FSHR	Follicle-Stimulating Hormone Receptor
GAST	Gonadotropin Analogue Stimulation Test
GH	Growth Hormone
GIFT	Gamete Intrafallopian Transfer
GnRH	Gonadotropin-Releasing Hormone
GnRH_a	Gonadotropin-Releasing Hormone Agonist
GV	Germinal Vesicle
Hcg	Human Chorionic Gonadotropin
HIV	Human Immunodeficiency Virus
HMG	Human Menopausal Gonadotropin
HR	High Ovarian Response
ICSI	Intracytoplasmic Sperm Injection
IGFBP-1	Insulin-Like Growth Factor-Binding Protein-1
IL	Interleukin
IM	Intramuscular Injection
IMSI	Intracytoplasmic Morphologically Selected Sperm Injection
IQC	Internal Quality Control
IR	Implantation Rate
IV	Intravenous Injection
IVF	In Vitro Fertilization
LBR	Live Birth Rate
LH	Luteinizing hormone
MESA	Microsurgical Epididymal Sperm Aspiration
MI	First Mitotic Division
MIF	Mullerian Inhibiting Factor
MIH	Mullerian Inhibiting Hormone
MIS	Mullerian Inhibiting Substance
MOV	Mean Ovarian Volume
MII	Second Mitotic Division
NC	Naturally Conceived
NT	Nuchal Translucency
OB/GYN	Obstetrics and Gynecology
OBF	Ovarian Blood Flow

OHSS	Ovarian Hyperstimulation Syndrome
OPU	Ovum Pick Up
OR	Ovarian Reserve
ORT	Ovarian Reserve Test
OST	Ovarian Stimulation Test
OV	Ovarian Volume
PAPP-A	Pregnancy-Associated Plasma Protein A
PB	Polar Body
PCOS	Polycystic Ovary Syndrome
PESA	Percutaneous Epididymal Sperm Aspiration
P-value	Probability of finding value
PZD	Partial zona dissection
ROC	Receiver Operating Characteristic
ROH	Greek letter of measure of rank correlation
RPM	Revolutions Per Minute
SC	Subcutaneous Injection
SD	Standard Deviation
SET	Single Embryo Transfer
SUZI	Subzonal Insemination
TESA	Testicular Sperm Aspiration
TESE	Testicular Sperm Extraction
TET	Tubal Embryo Transfer
TGF	Transforming Growth Factor
TMB	Tetramethylbenzidine
TNF	Tumor Necrosis Factor
TSH	Thyroid Stimulating Hormone
TVU	Transvaginal Ultrasound
UGET	Ultrasound Guided Embryo Transfer
US	Ultrasound
WHO	World Health Organization
ZIFT	Zygote Intrafallopian Transfer

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Abstract

Background: Intracytoplasmic sperm injection (ICSI) is an in vitro fertilization procedure in which a single sperm is injected directly into an oocyte. **Objective:** Aim of the Work: The aim of the study is to determine the value of Anti-Mullerian hormone (AMH), Inhibin-B and Antral follicle count as markers for ovarian response in patients undergoing to Intra cytoplasmic sperm injection cycles. **Methods:** This observational prospective study was conducted at Ain Shams University Maternity Hospital, at ART (Assisted Reproductive Technique) unit on a sample of 100 women aged between 25 and 35 years, was enrolled for intracytoplasmic sperm injection (ICSI). **Results:** a good correlation between inhibin B and other numerical variables. There was strong positive correlation between inhibin B and AMH (ρ , .727; p -value $<.001$) and strong negative correlation between inhibin B and both FSH (ρ , -.674; p -value $<.001$) and LH (ρ , -.608; p -value $<.001$) Inhibin B correlated moderately negatively with age (ρ , -.449; p -value $<.001$) and moderately positively with AFC (ρ , .407; p -value $<.001$), number of collected oocytes (ρ , .444; p -value $<.001$) and number of sacs (ρ , .514; p -value $<.001$). Inhibin B correlated positively with the number of fertilized oocytes (ρ , .385; p -value $<.001$) and number of grade 1 embryos (ρ , .355; p -value $<.001$). As regard pregnancy rate in the present study, the good-response group had significantly higher chemical and clinical pregnancy rates (76% versus 0%, p -value $<.001$ and 71% versus 0%, p -value $<.001$, respectively), as there was no chemical or clinical pregnancy had occurred in poor responders. **Conclusion:** AFC, AMH and Inhibin B are effective in predicting the ovarian reserve as well as the response to induction, and both AMH and AFC are accurate for the assessment of ovarian reserve. **Recommendations:** A Larger scale studies including higher number of patients over longer periods of time are needed to verify the validity of this parameter as a marker of ovarian reserve in patients undergoing ICSI.

Key words: anti-Mullerian hormone, serum inhibin B, antral follicle count, ovarian reserve, ICSI

Introduction

Infertility is a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse (*Zegers et al., 2009*).

In vitro fertilization is the technique of letting fertilization of the male and female gametes (sperm and egg) occur outside the female body (*Van Voorhis et al., 2007*).

Intracytoplasmic sperm injection (ICSI) is an in vitro fertilization procedure in which a single sperm is injected directly into an oocyte. This procedure is most commonly used to overcome male infertility problems, although it may also be used where eggs cannot easily be penetrated by sperm and occasionally in addition to sperm donation (*Boulet et al., 2015*).

The determination of ovarian reserve is important in the assessment and treatment of infertility. Ovarian reserve also refers to the number and quality of oocytes available to produce a dominant follicle late in the follicular phase of the menstrual cycle at any given age. The prediction of IVF success is possible after better estimation of ovarian reserve (*Freour et al., 2006*).