



**Does IMSI Respond to  
Expectations?**

- **Should IMSI replace ICSI ?**

**Yes.**

IMSI respond to expectations.

- We have introduced a new method of motile sperm organelle morphology examination (MSOME).

## Breakthroughs in Andrology

### Real-Time Fine Morphology of Motile Human Sperm Cells is Associated With IVF-ICSI Outcome

BENJAMIN BARTOOV,\* ARIE BERKOVITZ,† FINA ELTES,\* AVRAHAM KOGOSOWSKI,‡ YVES MENEZO,§ AND YONA BARAK‡

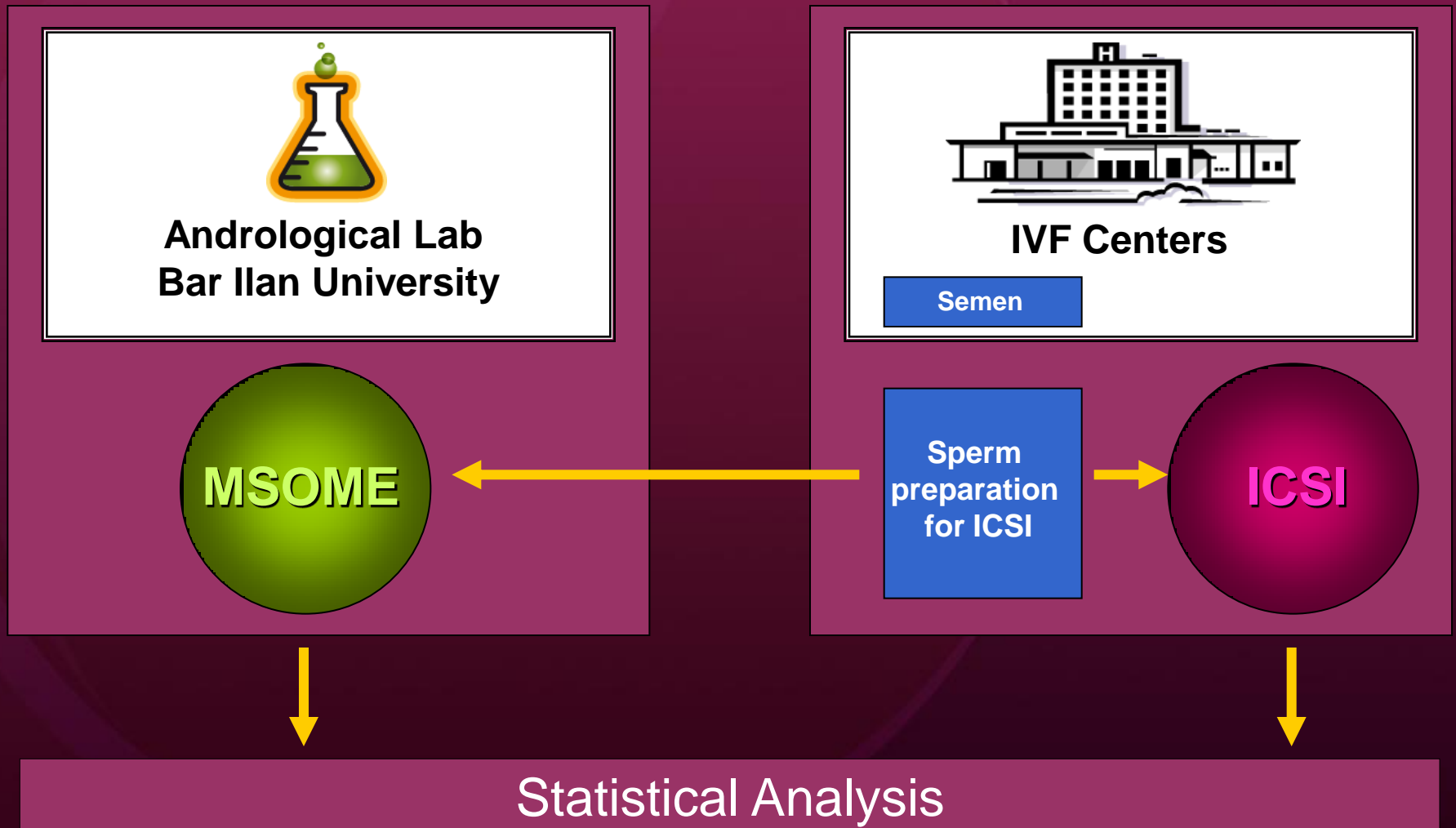
*From the \*Male Fertility Laboratory, Faculty of Life Sciences, Bar-Ilan University, Ramat Gan, Israel; †IVF Unit, Department of Obstetrics and Gynecology, Rabin Medical Center, Petah Tikva, Israel; ‡IVF Unit, Herzliya Medical Center, Herzliya-on-the-Sea, Israel; and §Laboratoire Marcel Merieux, Bron, France.*

# Sperm Functional Morphology

- Is based on:
  - ✧ High power light microscopy
  - ✧ Real time observation
  - ✧ Motile sperm examination
  - ✧ Fine organellar Morphology

- **MSOME** is aimed to define the morphological state of six subcellular organelles:
  - ✧ Acrosome
  - ✧ Postacrosomal lamina
  - ✧ Neck
  - ✧ Mitochondria
  - ✧ Tail and nucleus

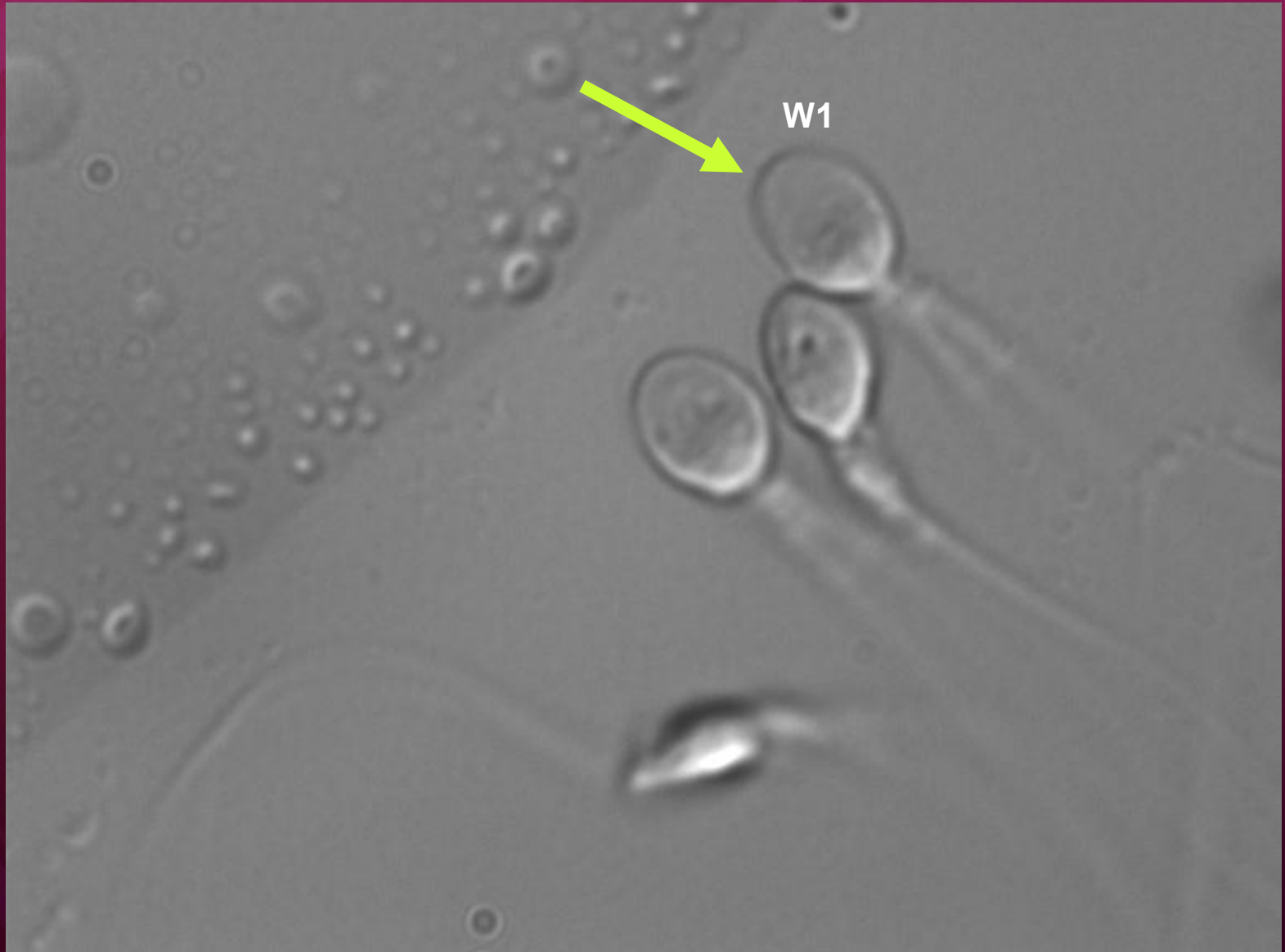
# Study Design the left over sperm from the same fraction



# Criteria for Morphologically Normal Nucleus

## Smooth, symmetric, and oval configuration

- Shape
  - ✦ **Average length**  $4.75 \pm 0.28 \mu\text{m}$   
**Long**  $> 5.31 \mu\text{m}$  | **Short**  $< 4.19 \mu\text{m}$
  - ✦ **Average width**  $3.28 \pm 0.20 \mu\text{m}$   
**Narrow**  $< 2.88 \mu\text{m}$  | **Wide**  $> 3.68 \mu\text{m}$
- Content
  - ✦ No extrusion or invagination of the nuclear chromatin mass
  - ✦ No vacuoles with diameter greater than  $0.78 \pm 0.18 \mu\text{m}$





# MSOME

- **Normalcy of the sperm NUCLEUS** was found to be a *significant* factor in pregnancy occurrence by ICSI procedure.

# IMSI

- Based on MSOME results we introduced the IMSI procedure.

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## **Pregnancy rates are higher with intracytoplasmic morphologically selected sperm injection than with conventional intracytoplasmic injection**

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Avraham Kogosovsky, M.D.,<sup>c</sup> Arie Yagoda, M.D.,<sup>d</sup> Hanna Lederman, M.Sc.,<sup>a</sup>  
Shira Artzi, M.Sc.,<sup>c</sup> Moshe Gross, M.D.,<sup>d</sup> and Yona Barak, Ph.D.<sup>c</sup>*

*Male Fertility Laboratory, Faculty of Life Sciences, Bar Ilan University, Ramat Gan, and IVF Unit, Herzliya Medical Center, Herzliya-on-the-Sea, Israel*

- **IMSI** =

Intracytoplasmic **M**orphologically  
**S**electd sperm **I**njection

In this procedure we perform a selection of individual spermatozoon strictly defined normal nucleus for injection to the ova.

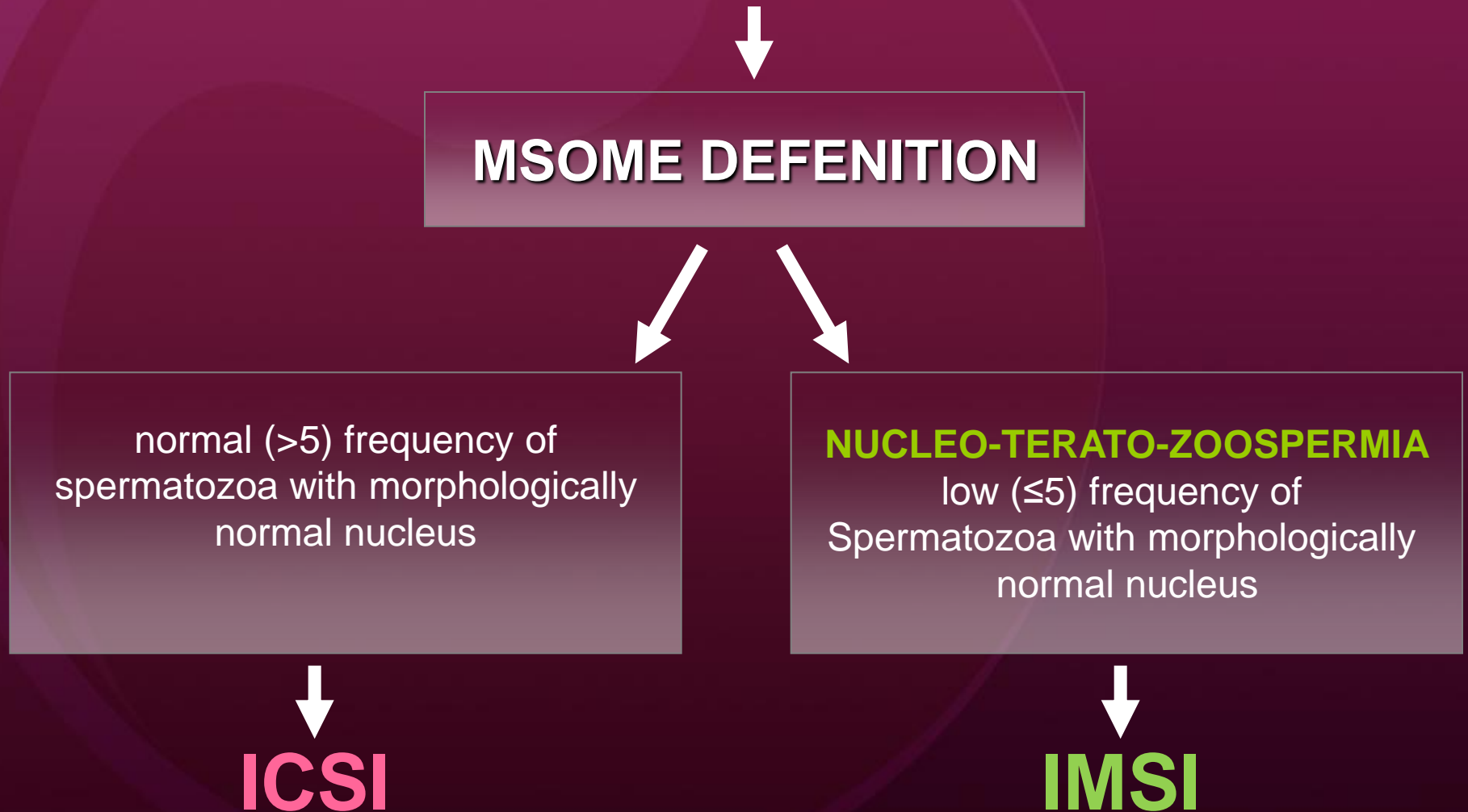
# IMSI is based on

- High power light microscopy
- Real time observation
- Motile sperm examination
- Fine organellar Morphology

# IMSI and ICSI

- Sperm retrieval in **ICSI** is performed under **low magnification** (x 400) while **IMSI** is based on an **6000** magnification and uses **strict criteria of nuclear morphology.**

# Routine semen analysis -Male Factor



# MSOME

- **Normalcy** of the sperm **NUCLEUS** was found to be a **significant factor** in pregnancy occurrence by ICSI procedure.
- **Abnormal** sperm nucleus - will **not** create existing pregnancy by ICSI procedure.



# Results

- Comparison between the *BEST* and *SECOND BEST* study groups in **IVF-IMSI Outcome Parameters.**

	<b>BEST (n=70)</b>	<b>SECOND BEST (n=70)</b>
<b>Continuous variables</b>	<b>M±SD</b>	<b>M±SD</b>
Retrieved ova	12.3±4.8	13.0±5.9
Injected ova	9.5±4.1	8.9±3.9
Fertilization rate (%)	74.1±20.5	62.3±24.3 *
Top embryos (%)	26.7±20.5	16.2±26.0 *
Transferred embryos	3.3±1.3	3.2±1.4
Implantation rate (%)	26.1±26.8	8.3±15.1 *
<b>Discrete variables</b>	<b>%</b>	<b>%</b>
<b>Delivery rate</b>	52.8	<b>17.1*</b>
<b>Pregnancy rate</b>	58.6	<b>25.7*</b>
<b>Abortion rate</b>	9.8	<b>33.3*</b>

\* Significantly different from “best” group (p ≤ 0.05)



# 2006 - 2010

- **Observational study, longitudinal prospective study**
- **2639 cycles** - ICSI (**2015**) IMSI (**624**)
- Patient request - criteria for IMSI ver ICSI

# THE RESULTS...



# First Cycle n=1377

	IMSI	ICSI	P value
<b>N</b>	292	1085	
Age	32 ± 5	33 ± 6	0.66
Pregnancy	141 (48.3)	525(48.3)	.987
Delivery	80 (27.4)	241 (22.2)	.062

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# Second Cycle after failed ICSI

	IMSI n=122	ICSI n=315	P value
Pregnancy	<b>58 (48%)</b>	<b>125(40%)</b>	<b>0.135</b>
Delivery	<b>27 (22%)</b>	<b>49(16%)</b>	<b>0.104</b>

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# Table 2

	IMSI no n=151		ICSI no n=560		P value
	Only IMSI	ICSI	Only ICSI	IMSI	
<b>N</b>	75	76	437	124	
Age	33 ± 5	34 ± 6	35±6	32±5	<0.001
Treatments	1.4±0.7	<b>3.7</b> ±2.2	1.9±1.2	<b>3.1</b> ±1.2	<0.001
Pregnancy	10 <b>(13.3)</b>	43 <b>(56.6)</b>	121 <b>(27.8)</b>	83 <b>(66.9)</b>	≤ 0.01
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	IMSI no		ICSI no	
	Only IMSI - 4	ICSI - 3	Only ICSI - 1	IMSI - 2
Rate (%)	10 (13.3)	43 (56.6)	121 (27.8)	83 (66.9)
Unadjusted pregnancy OR (95% C.I)	0.40 (0.20-0.81)	3.39 (2.06-5.59)	1.0	5.27 (3.43-8.09)
Adjusted *pregnancy OR (95% C.I)	0.48 (0.23-1.02)	1.02 (0.55-1.90)	1.0	<b>2.20</b> (1.35-3.60)
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# Should IMSI replace ICSI?

- **First Cycle - NO**
- **Second Cycle - Maybe**
- **ICSI FAILURE -  
IMSI should replace ICSI!**



# THANK YOU

For more information

**Arie Berkovitz M.D**

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