Dynamic Fertility Series
Providing the Best of East and Western Medicine

Healing by creating families™
Paul C Magarelli, M.D., Ph.D.
Board Certified
Reproductive Endocrinologist & Infertility Specialist
What questions can I answer for you?
What can we do to help you create a baby?

- Tell you what’s wrong
  - Lab Tests
  - Physical Exam and Ultrasound
- Give you choices and what each choice will entail
  - Treatment Consult
- Tell you the FULL costs
  - Financial Consult
- Help you with financials
  - Payment plans (only practice still doing this!)
  - Discounts for Military
  - Coupons worth 100’s of dollars
  - Education seminars worth $1,000 dollars
Sex, then more sex, then timed sex, then more sex, then resentful sex, then planned sex, then concerned sex, then worried sex, then call friends, then more sex, then call MOM, then really worried sex, then begrudged sex, then call the doctor!
Embrace the Journey!

Our job is to point the way!

Our job is to help you avoid dead ends!
Causes of Infertility

- **Male**
  - Sperm Shape
  - Sperm Motility
  - Sperm Count
  - Sperm Function
  - Infection of Prostate
  - Varicose veins in Testicles
  - Genetics

- **Female**
  - Eggs
  - Uterus
  - Fallopian Tubes
  - Hormones
  - Infections
  - Genetics

**Causes of Infertility**

- Male: 40%
- Female: 40%
- Couple: 20%
What are your chances of getting pregnant by intercourse alone at age:

- Age 15
  - 20% per month
- Age 30
  - 10% per month
- Age 40
  - 3% per month
- Age 45
  - << 1% per month

Not as high as you thought, huh?
After 12 months of “trying”!!
Question:

How many sperm must be ejaculated to have “enough” to fertilize an egg?
Of about 100 million sperm that are ejaculated, only around 500 to 1,000 remain by the time they reach the egg at the outer end of the fallopian tube.
Why is it so hard to create a family?
Answer: Female Eggs, a limited resource!

7,000,000 eggs
Before delivery

2,000,000 eggs
Newborn

400,000 eggs
at Puberty

600,000/mo

10,000/mo
We lose 1000 eggs per month of each menstrual cycle, whether you ovulate or not or even if you are pregnant or on birth control pills!!

We only have 400 ovulations in our lives!

400,000 eggs at Puberty 13 yo

Zero (0) eggs at Menopause 50 yo
Impact of Loss of Eggs

Pregnancy Odds each month

FSH 3 - 4

Age of Female Partner in Years
The Four Questions
Initial Infertility Workup
Four Simple Questions

- **Q1:**
  - Are there sperm?
- **Q2:**
  - Are there eggs?
- **Q3:**
  - Can the sperm and egg meet?
- **Q4:**
  - Is there a safe place to grow a baby?
Q1: Are there sperm?

- **Semen Analysis**
  - How was it designed?
    - All fertile men in one room
    - All *infertile* men in another
    - Check sperm
    - Divide them into Fertile and Infertile
      - If the man did not fall into the Fertile group he is designated as **Infertile**
• **Count**
  - Need minimum of 20,000,000 sperm for each cc or ml of ejaculate
    - *If 19,999,999*  the male is **INFERTILE**

• **Motility**
  - Need minimum of 50% “swimmers”
    - *If 49%*  the male is **INFERTILE**!

• **Morphology**
  - Need minimum of 15% “normal” shaped sperm
    - *If 14%*  the male is **INFERTILE**!
What about Sperm Function?

- Sperm DNA Fragmentation Assay (SDFA)
  - Can my sperm work using sexual intercourse?
  - Can my sperm work using IUI or Artificial Insemination?
Day 3 FSH, Estradiol and LH serum levels

- **If FSH < 7 mIU/ml**
  - normal ovarian reserve of eggs
- **If 7 to 10**
  - reduced ovarian reserve
- **If > 10**
  - marked reduced ovarian reserve
- **If > 15**
  - very poor ovarian reserve, increased risk of miscarriages, blighted ovum
- **If > 18**
  - unlikely to have eggs that will result in live birth
Ovarian Assessment Report

SPECIMEN #: 001244
PATIENT: Ms. Jane Doe
DATE OF BIRTH: 05/07/76

COLLECTED: 10/08/08
RECEIVED: 10/09/08
EST. TIME: 9 am
EST. TIME: 10 am

PATIENT VALUES:
- AMH: 0.3 ng/ml
- Inhibin B: 30 pg/ml

PHYSICIAN: Mr. Mohamed Menabawey
ADDRESS: The London Bridge Fertility, Gynaecology and Genetics Centre
One St Thomas Street, London Bridge
London SE1 9RY United Kingdom
PHONE: +44 (020) 7403 3363
FAX: +44 (020) 7403 8552

FSH: <10 IU/L LOW
LH: 2.2 IU/L NORMAL
 Estradiol: <10 pg/ml LOW
<12 pg/ml NORMAL
>12 pg/ml HIGH

MENSTRUAL CYCLE: DEPENDENT UPON CHOSEN CLINICAL OUTCOME
DAY 3 RANGES:
- <10 INSUFFICIENT
- 10-12 LOW
- >12 HIGH

RESULTS

Egg Retrieval Score™

- 5: Reduced
- 6 to 10: Fair
- 11 to 15: Good
- 16 to 20: Excellent

Chance of Successful Retrieval

CONTRIBUTION: The Egg Retrieval Score indicates that this patient has a reduced chance of retrieving 5 or more eggs through ovarian stimulation. Compared to others in this patient’s age group, the Egg Retrieval Score is below average. Ovarian reserve testing alone should not be used as the sole determinant for treatment recommendations.

COMMENTS: The Egg Retrieval Score indicates that this patient has a reduced chance of retrieving 5 or more eggs through ovarian stimulation. Compared to others in this patient’s age group, the Egg Retrieval Score is below average. Ovarian reserve testing alone should not be used as the sole determinant for treatment recommendations.

Outcomes of 454 Egg Retrievals

- Eggs retrieved: 0-4: 27%
- 5-11: 31%
- 12+: 42%

Egg Retrieval Score

31 to 35 Years Old Egg Retrieval Score

Egg Retrieval Scores in Patient’s Age Group

- Lower (15%): Reduced
- Middle (70%): Fair
- Upper (15%): Good

Egg Retrieval Score

Displayed in the graph above is a plot of the frequency (x-axis) of each Egg Retrieval Score (y-axis) in women of similar age to the patient receiving evaluation at a fertility clinic. The frequency distribution is divided into three sections by dotted lines to indicate below average (the lower 15%), average (middle 70%), and above average (upper 15%).

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Ovarian Assessment Report

**Interpretation of the ERS™**

The Ovarian Assessment Report™ provides the most advanced testing system available today using a single blood sample for assessing the available egg supply for retrieval through ovarian stimulation (“ovulatory egg supply”). The ERS™ takes complex information from multiple factors related to ovulatory egg supply and combines them into a single score.

The ERS™ has been calibrated using research involving hundreds of women undergoing multiple egg retrievals. The score allows patients and clinicians to better understand the chances of a successful egg retrieval which most fertility experts defined as yielding at least five eggs. However, this still does not mean that the eggs will be of sufficient quality to produce a healthy baby. Currently, age alone is the strongest single predictor of egg quality. How your age is related to chance of having good quality eggs is presented on the previous page of this report using a color bar.

<table>
<thead>
<tr>
<th>ERS™</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5</td>
<td>Reduced</td>
</tr>
<tr>
<td>6 to 10</td>
<td>Fair</td>
</tr>
<tr>
<td>11 to 15</td>
<td>Good</td>
</tr>
<tr>
<td>16 to 20</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

The ERS™ ranges from 1 to 20 with chances of good egg supply increasing with higher scores. Above are ERS ranges divided into categories representing the chance of good egg supply.

**Gold Standard Clinical Research**

**Outcomes of 454 Egg Retrievals**

In the graph above, the number of eggs obtained per retrieval from 283 women undergoing 454 egg retrievals is displayed in categories defined by the associated Egg Retrieval Score (ERS): reduced, fair, good, and excellent. Within each category, the column height represents the percent of retrievals resulting in 0 to 4 eggs, 5 to 11 eggs, or 12 or more eggs.

**Your Egg Retrieval Score™ (ERS) Compared to Others**

The graph to the left shows your ERS relative to other women being treated at fertility centers. Bars show two standard deviations above and below a rolling 5 year average ERS. Data is currently available for ages 22 through 42 years of age. Chance of good egg supply is indicated by color based upon the ERS: ERS 0 to 5 is red, ERS 6 to 10 is yellow, ERS 11 to 15 is light green, and ERS 16 to 20 is green.
Q3: Can the sperm and egg meet?

$600,000$ to $1,000,000$
Q4: Is there a safe place for the baby to grow?

Abnormal

Normal
Hysterosalpingogram (HSG) "Dye Study"
Infertility Treatments & Outcomes

IUI (intrauterine insemination).

For most IVF and ICSI techniques, the woman’s eggs are collected through the vagina using an ultrasound scanner to guide a needle into the follicles and draw off the fluid and eggs.
Treatments for Infertility

1. Timed Intercourse
2. Clomid therapy, aka Ovulation Induction (can be used with injectable medications also, e.g., Follistim™)
3. Intrauterine Insemination (IUI), aka Artificial Insemination
4. Surgery for Tubal Reversal
5. In Vitro Fertilization (IVF) - “Test Tube Baby”
Timed Intercourse: "natural"

Women: Egg, natural state

Men: Sperm, natural state

or
Outcomes: Timed Intercourse or Sex
Pregnancy Rates per Month

Not as high as you thought, huh?
Ovulation Induction: Eggs

versus

or
Intrauterine Insemination (IUI) versus Intercourse
Outcomes: Clomid + IUI
Pregnancy Rates per Month

- Sex
- Clomid
- Clomid + IUI

Pregnancy Rates

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Clomid</th>
<th>Clomid + IUI</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 yo</td>
<td></td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>30 yo</td>
<td></td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>40 yo</td>
<td></td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>45 yo</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Should we try IUI first?

- Yes
- Yes
- Yes
- Maybe???
Sex and Surgery

Pregnancy Rates

- 20 yo
- 30 yo
- 40 yo

Sex
Surgery
In Vitro means “In Glass” which is another name for “In the Lab”
Goals

- “Save” eggs
- Grow eggs from both ovaries
- Get largest number of “mature” i.e., fertilizable eggs are developed
- Improve selection process of eggs, sperm, and embryos to enhance the pregnancy rates to levels up to 10 times the natural rates
- “Cure” male factor infertility
- “Cure” tubal factor infertility
In Vitro Fertilization

**IVF PROCEDURE**

- **Insemination**
- **Incubation**
- **Egg Aspiration**
- **Embryo Transfer**

**Ultrasound monitor**
- Needle tip in egg follicle

**Uterus**
- Fimbria
- Fimbriae
- Ovary

**Pubic bone**
- Importance of anatomical positioning

**Rectum**
- Proximity to the ovary

**Coccyx**
- Orientation and stability

**Needle guide tube**
- Connection to the ultrasound probe

**Fluid ejection**
- Needle aspiration process

For most IVF and ICSI techniques, the woman's eggs are collected through the vagina using an ultrasound scanner to guide a needle into the follicles and draw off the fluid and eggs.
IVF – In Vitro Fertilization: Eggs

versus

or
Egg Aspiration

For most IVF and ICSI techniques, the woman’s eggs are collected through the vagina using an ultrasound scanner to guide a needle into the follicles and draw off the fluid and eggs.
IVF - Fertilization

OLD

NEW - ICSI
ICSI: Intracytoplasmic Sperm Injection

Intercourse

versus

ICSI
In Vitro Fertilization - Lab
What if there are no sperm?

Testicular Biopsy
- Biopsy of Testicular Tissue
  - TESE = Testicular Sperm Extraction
  - PESA, MESA
- Goal
  - Get sperm
    - If Vasectomy then > 98% sperm
    - If born without sperm in ejaculate then > 70% chance of sperm
Incubate Fertilized Eggs for 3 to 5 days
In Vitro Embryonic Development

Day-1  
(A)

Day-2  
(B)

Day-3  
(C)

Day-4  
(D)

Day-5  
(E)

- Inner Cell Mass (ICM)
- Blastocoel
- Trophectoderm (TE)
IVF last step: Embryo Transfer
How Many Embryos should I ask for?

- **20 yo**
  - One or two
    - Each embryo has a **29%** chance of "sticking"

- **30 yo**
  - Two or three
    - Each embryo has a **15%** chance

- **40 yo**
  - Four or more
    - Each embryo has a **4%** chance

- **> 40**
  - ?????
God has a sense of humor!
Outcomes: IVF at RMFC
Pregnancy Rates per Attempt

Pregnancy Rates

20 yo: 20% Intercourse, 30% Clomid & IUI, 60% IVF
30 yo: 10% Intercourse, 15% Clomid & IUI, 45% IVF
40 yo: 5% Intercourse, 8% Clomid & IUI, 25% IVF
45 yo: 1% Intercourse, 2% Clomid & IUI, 4% IVF

Intercourse, Clomid & IUI, IVF
Average IVF Cost in Colorado is 17,335 + meds, at RMFC $12000 + meds

- Colorado
- National
- RMFC

Military Discount $500
Do I have to do IVF?

- NO
- NO
- NO
- Maybe!!!
Summary

- Know the Facts
  - Sperm, Egg, Age, Other causes of infertility
- Know the Tests
  - Semen analysis, SDFA, OAR, HSG
- Know the Treatments
  - TCM, Ovulation Induction, Insemination, Surgery and IVF
- Know the Outcomes
  - What are the realistic expectations for getting pregnant using YOUR egg and YOUR sperm!
A Gift of Progeny for you!

- As a way to thank you for coming tonight, RMFC is pleased to provide you with a coupon for one thousand dollars ($1,000) off the cost of IVF.
Relax, Enjoy, Breath, Recharge!
What about Synergy?

Can adding TCM in the form of Acupuncture help me get pregnant?
Pre-implantation Genetic Diagnosis

- Diagnoses genetic disease in embryo so that only “normal” embryos are transferred – currently there are over 59 genetic markers that they can test
  - Help to “Balance Families”

- Ovarian tissue freezing
- Oocyte freezing
Preimplantation Genetic Diagnosis

Embryo at 8 cell stage
Hole made with enzymes
Pipette used to suck out Blastomere
Preimplantation Genetic Diagnosis

- Blastomere being remove
- Two Blastomere with full chromosomal complement
Aneuploidy or Woops!

Downs Trisomy 21
Trisomy 15

Santiago Munné
The Institute for Reproductive Med. and Science of Saint Barnabas, Livingston, NJ
PGD last step: Embryo Transfer

Genetically normal embryos
Family Balancing

Corona Institute for Reproductive Medicine & Fertility has joined leading national IVF centers by offering families the opportunity to balance the sex of their future additional offspring.

Family Balancing:
• Married
• Have at least one child
• Desire a child of the less represented sex of children in the family

Issues:
• Not for everyone
• May be medically indicated
• Can reduce risks of genetic disease in offspring

Please consult your religious advisors regarding these treatments. It is certainly not for everyone, but some couples may need our help and we will be here for you.