Oocyte Cryopreservation (aka Egg Freezing)

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Audience Poll
In the last year, how often have you discussed egg freezing with your patients?

A. Never 43% 39%
B. Rarely
C. At least once per month 13% 5%
D. At least once per week

Disclosure
No one involved in the planning or presentation of this activity has any relevant financial relationships with a commercial interest to disclose.

Overview
- Indications
  - Why, who, when?
- The Science
  - Embryo vs egg freezing
  - Success rates
- The Procedure
  - Timeline and logistics
  - Risks
  - How to prepare your patient
Indications: Why?

- Why consider egg freezing?
  - To preserve a woman’s current fertility and increase their chances of achieving pregnancy at a later age

- Fertility Preservation Program
  - www.elle.com

Indications: Who?

- Who should consider egg freezing?
  - Women who require medical or surgical treatments that reduce ovarian reserve
    - Cancer
    - Other conditions requiring chemotherapy (SLE, thalassemia)
    - Complex and/or recurrent ovarian cysts
    - BRCA mutation carriers
  - Women at risk for early menopause
    - Family history of primary ovarian insufficiency (POI)
    - Personal history of diminished ovarian reserve (DOR)
Indications: Who?

- Elective ("Social") Egg Freezing
  - Women who wish to delay childbearing due to personal or professional circumstances

Reasons egg freezing patients gave for not pursuing childbearing earlier:

- Lack of partner 35%
- Professional 24%
- Financial 15%
- Too large a commitment 15%
- Other 8%

Indications: Who?

- Elective ("Social") Egg Freezing
  - Women/couples who want to have more than 1 child

Maximum female age for starting families with 1, 2 or 3 children with a 50, 73 and 90 percent chance of success:

- Without IVF:
  - 50%: 41
  - 75%: 37
  - 90%: 33
- With IVF:
  - 50%: 42
  - 75%: 38
  - 90%: 35

Optimal timing for elective egg freezing:

- What is the optimal age?

Optimal timing for elective egg freezing vs no action:

- ages 25-40 yrs, attempting procreation 3, 5 or 7 years after
- unassisted attempts for 6 months and then IVF
- conception rates and cost estimates for fresh IVF cycles vs egg freezing, storage and subsequent usage

Decision-tree model for egg freezing vs no action:

- Unassisted - 6 months
- IVF - 3, 5 or 7 years after
- Conception rates and cost estimates for fresh IVF cycles vs egg freezing, storage and subsequent usage
• Live birth rate (LBR) highest when egg freezing performed at <34 yrs (>70%)
  – Steadily declines with increasing age to 26.2% at age 40 yrs
• Greatest improvement in LBR at age 37 yrs
  – 30% difference in chance of live birth with egg freezing compared to no action (51.6% vs 21.9%)
• Little benefit at ages 25-30 yrs (2.6-7.1% increase)
• Egg freezing was most cost-effective at age 37 yrs

Indications: When?

• When should a woman undergo egg freezing?
  – Early to mid-30s is ideal
  – Take personal timeline into consideration
  – No absolute age cut-off

Embryo versus Egg Freezing

• Embryo cryopreservation
  – Well-established
    • Most data
    • Highest success rates
      – Higher survival
      – Pre-implantation genetic screening (PGS)
  – Limitations:
    • Requires male partner or donor sperm
    • Legal and ethical issues

• Oocyte cryopreservation
  – More practical
    • Future sperm of choice
    • Lower initial cost
    • Logistically more simple
  – No longer “experimental” (ASRM 2012)
  – Limitations:
    • Less long-term data
      – Short-term data with no increased risk of chromosomal or congenital anomalies
    • Lower success rates
      – Unknown fertilization rates and embryo quality
### Success Rates

**TABLE 1**

Summary of randomized controlled trials comparing fresh versus vitrified oocytes.

<table>
<thead>
<tr>
<th>Patient population</th>
<th>Oocytes donors</th>
<th>Isofert patients &lt;43 years of age requiring IC/ICSI with &lt;10 mature oocytes</th>
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<th>Persephone 2011 (19)</th>
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</thead>
<tbody>
<tr>
<td>Nb. patients</td>
<td>30 fresh</td>
<td>295 vitrification</td>
<td>30 vitrification</td>
<td>31 vitrification</td>
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<tr>
<td>Mean age at retrieval</td>
<td>26</td>
<td>40 fresh</td>
<td>40 fresh</td>
<td>31 fresh</td>
</tr>
<tr>
<td>Nb. oocytes</td>
<td>231 vitrification</td>
<td>3286 vitrification</td>
<td>124 vitrification</td>
<td>168 vitrification</td>
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<tr>
<td>No. oocytes per retrieval</td>
<td>93</td>
<td>130 fresh</td>
<td>108 fresh</td>
<td>80</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>30</td>
<td>3024 vitrification</td>
<td>258 vitrification</td>
<td>366</td>
</tr>
</tbody>
</table>

- **FSH+LH**
- **hCG trigger**

**Note:** All FSH stimulation with FSHpp; 15% RH < 11% RH ppm < 1 mm Hg; OOP = oocyte pregnancy rate.

**Photo Credit:** Oocyte Cryopreservation; April 2013

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### Egg Freezing Procedure

- The procedure is typically completed within 2 weeks

**Egg Freezing Procedure**

- FSH+LH
- Days
- 1, 3, 5, 7, 9, 11, 13
- hCG trigger

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### Success Rates

**TABLE 2**

Representation of probabilities (%) of live birth for ages 25-42 years, according to number of oocytes thawed, injected, or embryos transferred.

<table>
<thead>
<tr>
<th>Age (y)</th>
<th>Oocytes thawed</th>
<th>Oocytes injected</th>
<th>Embryos transferred</th>
<th>Oocytes thawed</th>
<th>Oocytes injected</th>
<th>Embryos transferred</th>
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<td>10.3</td>
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<td>29</td>
<td>9.8</td>
<td>10.5</td>
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</tbody>
</table>

**Note:** Use birth probability with egg freezing; April 2013

**Photo Credit:** Oocyte Cryopreservation; April 2013

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### Egg Freezing Procedure

- Each visit during ovarian stimulation involves monitoring of estradiol levels and follicle sizes

**Egg Freezing Procedure**

- Days
- 1, 3, 5, 7, 9, 11, 13
- hCG trigger
Egg Freezing Procedure

- Egg retrieval is performed under MAC anesthesia
- Mature eggs are cryopreserved (unless cancer)
- Once frozen, quality of eggs does not change

Risks of Egg Freezing

- Ovarian hyperstimulation syndrome (OHSS)
- Ovarian torsion
- Bleeding
- Infection
- Damage to adjacent organs

- No association with long-term risks to the patient:
  - Breast cancer
  - Ovarian cancer
  - Premature menopause

Preparing your patient for egg freezing

- Initial work up
  - Ovarian reserve testing (AMH, day 3 FSH/E2)
  - *Additional labs: T+S, CBC, ID panel
  - Formal pelvic ultrasound not necessary
  - Updated healthcare maintenance: pap smear, mammogram

- Hormonal contraceptives
  - Stop long-term OCPs temporarily
  - Hold on replacing LARCs (except Paragard)

Summary

- A woman’s egg quantity and quality decline with increasing age, particularly after her mid-30s
- Egg freezing offers women the opportunity to delay childbearing for medical or elective reasons
- Egg freezing is a safe, non-experimental procedure that is typically completed within 2 weeks
- The ideal candidate is a healthy woman in her early to mid-30s with high ovarian reserve who is able to freeze 20 mature eggs
Thank you