# Ovarian Hyperstimulation Syndrome (OHSS)

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# OHSS

- ภาวะแทรกซ้อนที่เกิดขึ้นจากการกระตุ้นรังไข่ด้วยฮอร์โมน FSH (±LH) ในกระบวนการรักษามีบุตรยาก เพื่อให้เกิดการสร้างฟองไข่จำนวนมากกว่าธรรมชาติ ส่งผลให้เกิดการรั่วของซีรั่มออกจากเส้นเลือดเข้าสู่ Third space (เช่น ช่องท้อง ช่องปอด) ในรายที่เป็นรุนแรงอาจทำให้เกิดภาวะเส้นเลือดดำอุดตัน จนถึงเสียชีวิตได้

# Infertility : Inability to conceive despite regular unprotected sexual intercourse over 1-2 years

| Time of exposure | % pregnant |
|---|---|
| 3 months | 57 |
| 6 months | 72 |
| 1 year | 85 |
| 2 years | 93 |

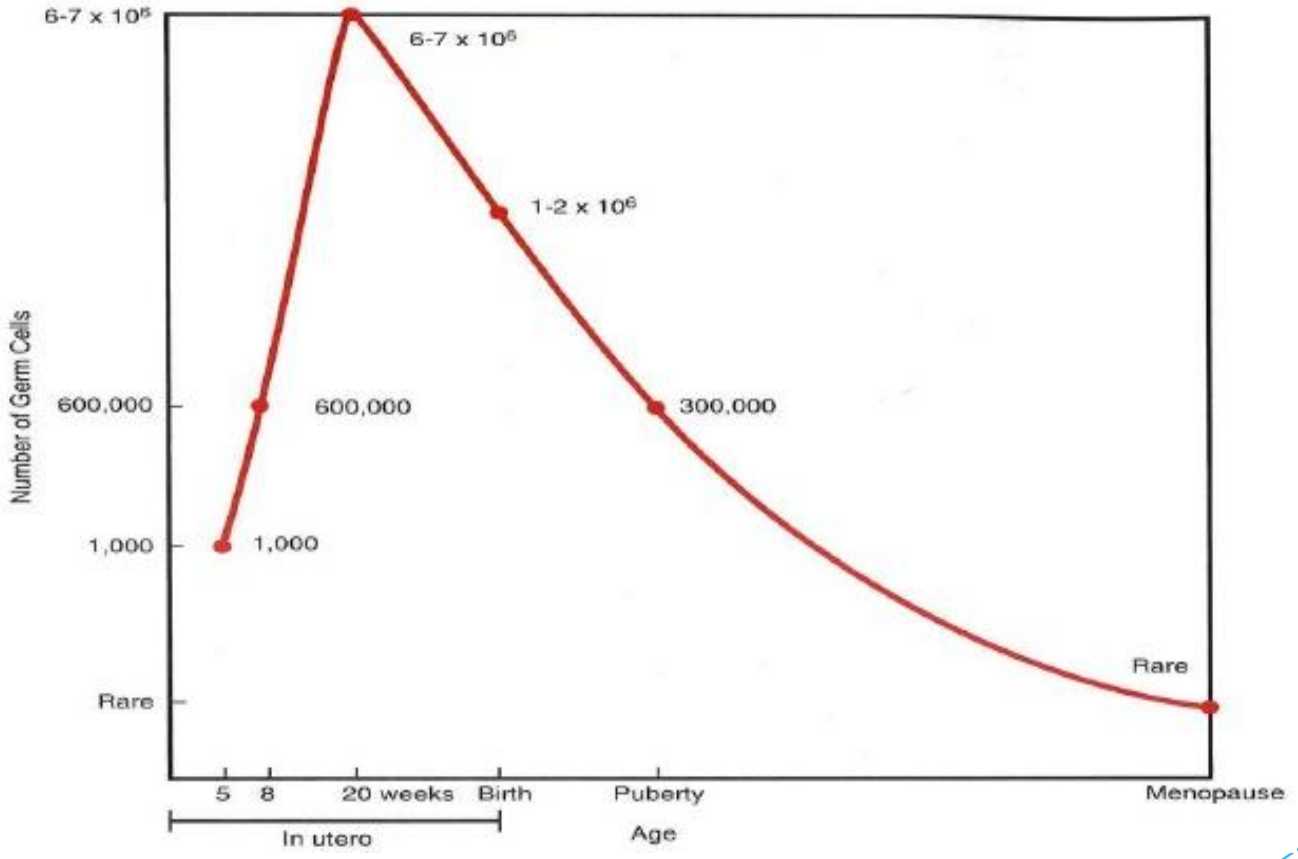
Guttmacher AF. JAMA 161:855,1956.

# Causes of Infertility

| Factors | % |
|---|---|
| Male | 20-35 |
| Ovulatory | 15-20 |
| Tubal & pelvic | 20-35 |
| Unexplained | 15-25 |
| Others | 5-10 |

# Aging and Reproduction in Women

# Age vs Infertility

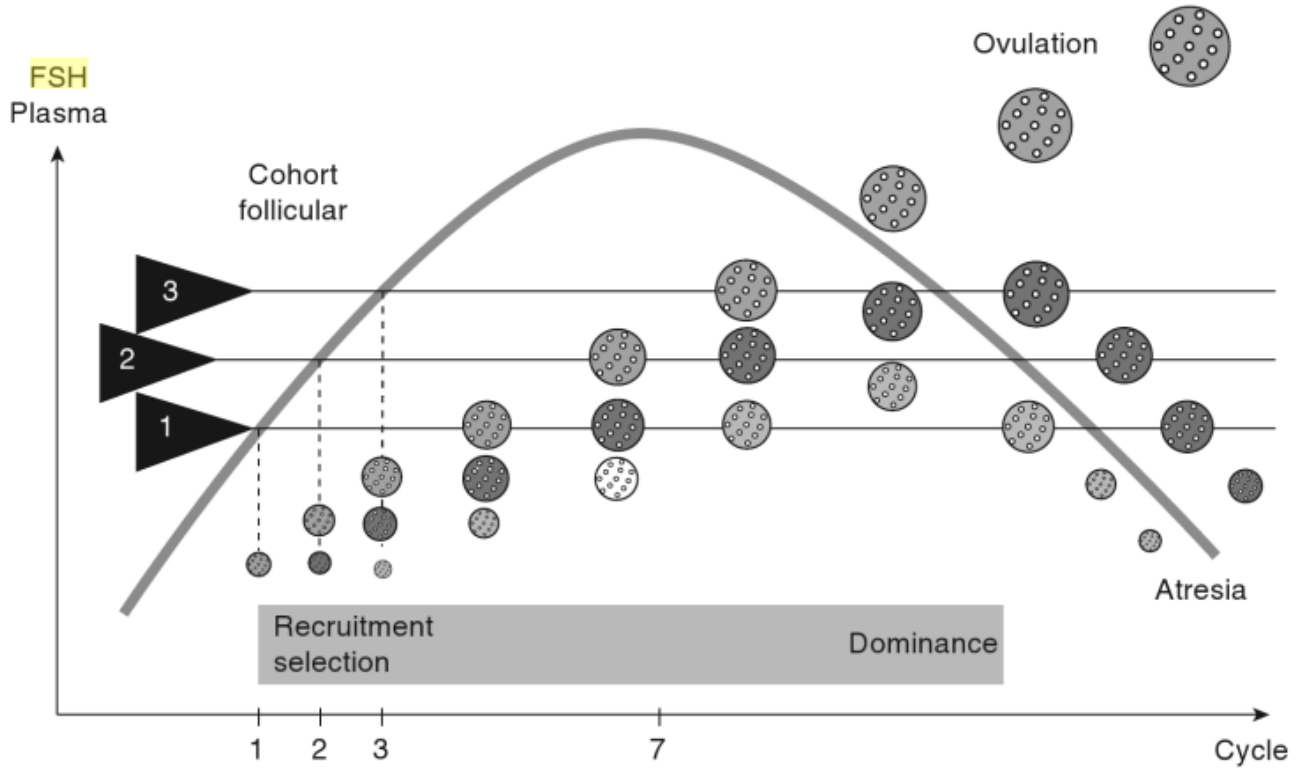


# กระบวนการรักษาภาวะมีบุตรยาก

- **Assisted Reproductive Technology (ART)**
  - **Intrauterine Insemination (IUI)**
  - **In Vitro Fertilization (IVF)**
  - **Intracytoplasmic Sperm Injection (ICSI)**

**Controlled ovarian hyperstimulation COH**

# Natural Follicle Growth



# Ovulation induction







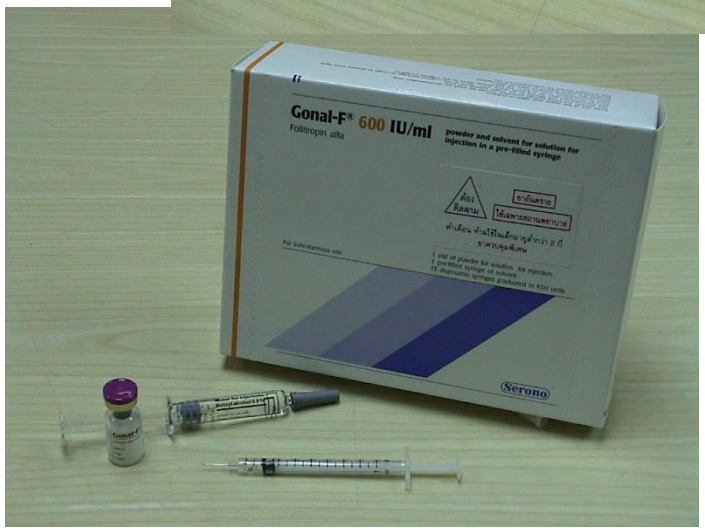


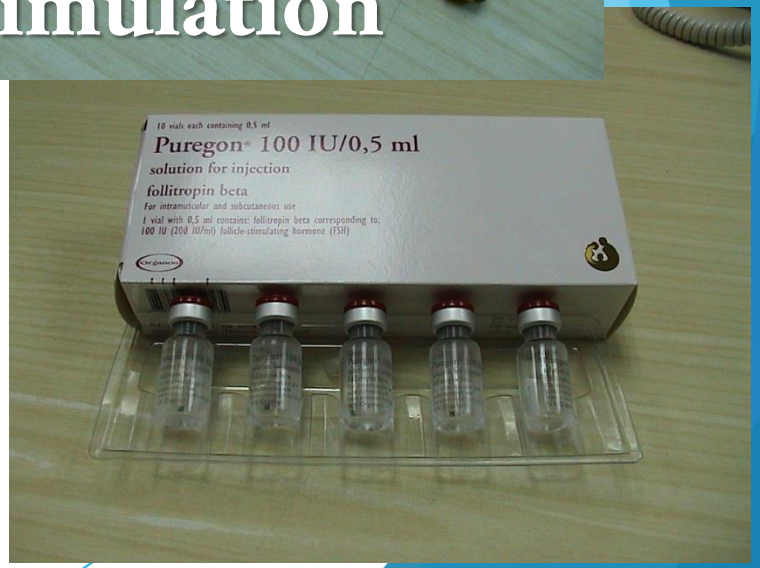


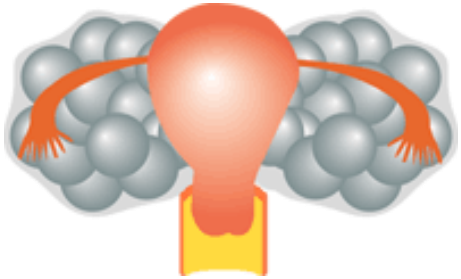




# Control ovarian stimulation

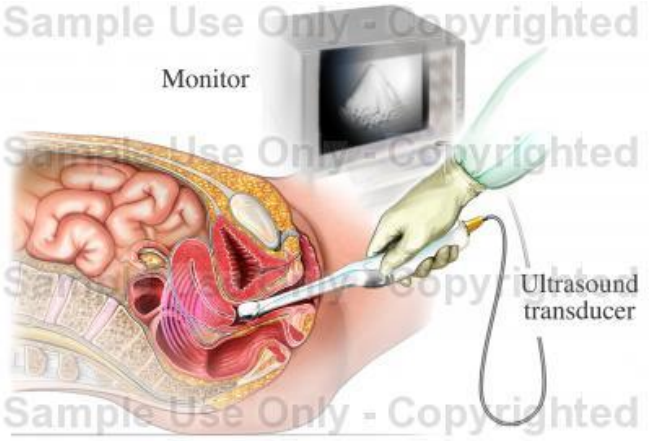


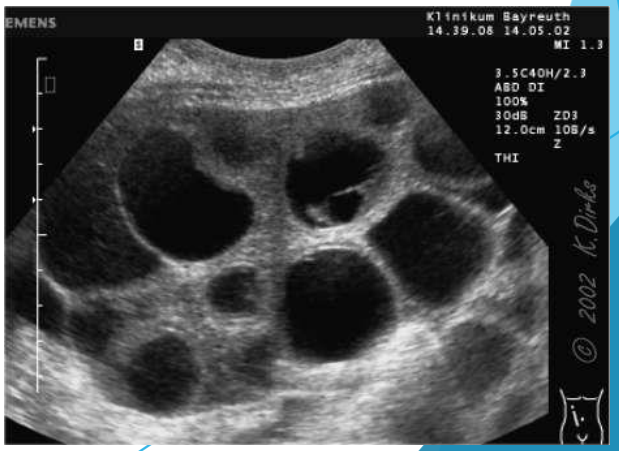



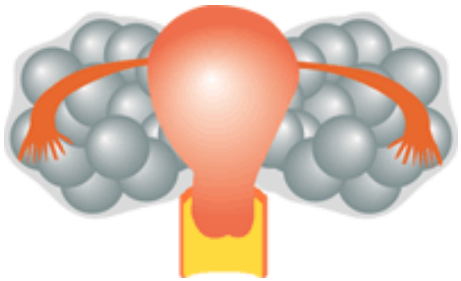


# Follow up

- TVS evaluate number of follicle
- Estradiol level
- Accurate time for Gn inject daily
- Evaluate for hCG inject: maturation of oocyte

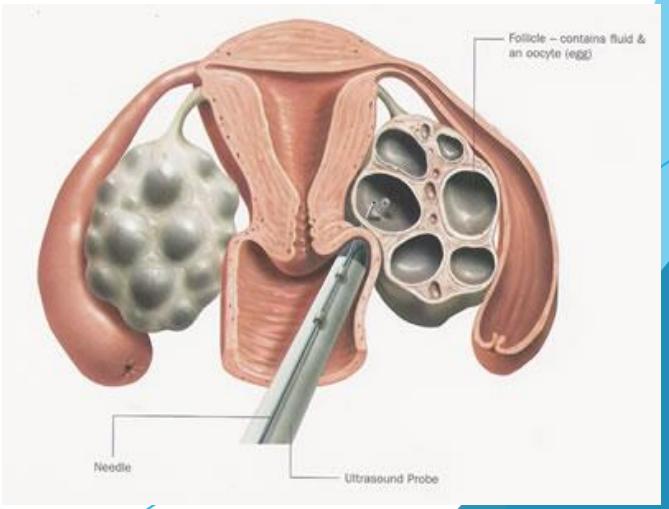


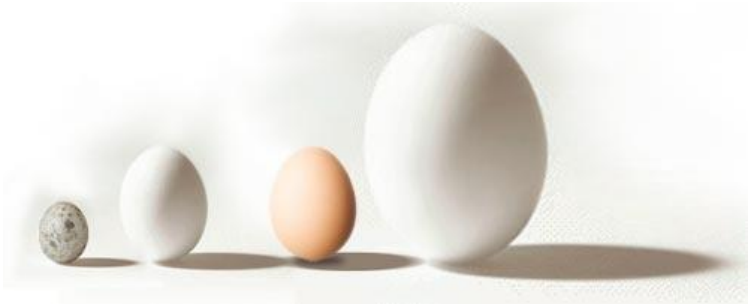


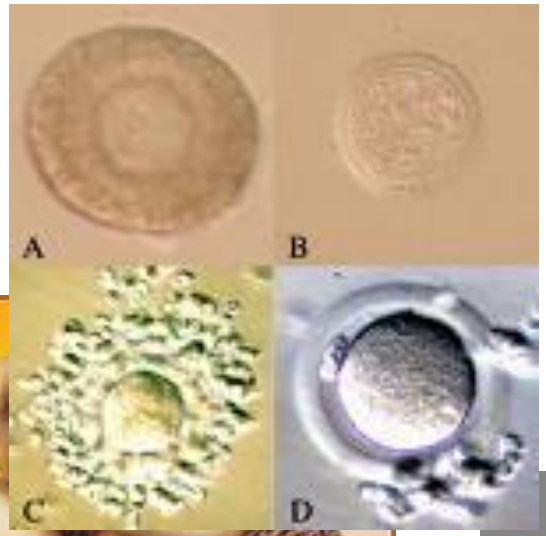
# Oocyte pick up

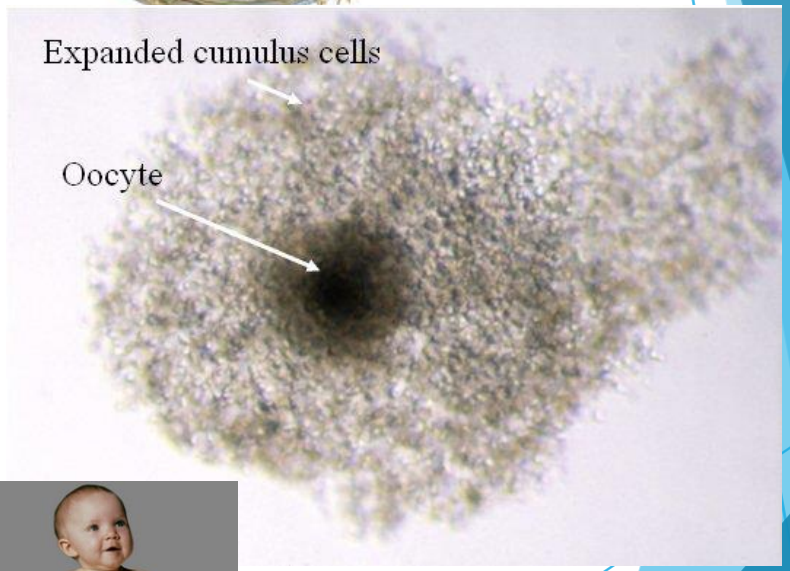
- Accurate time: after hCG inject ~ 34-36 hr
- Under GA
  - Anesthetic agent: oocyte quality
  - Deep of anesthesia
- OPD case



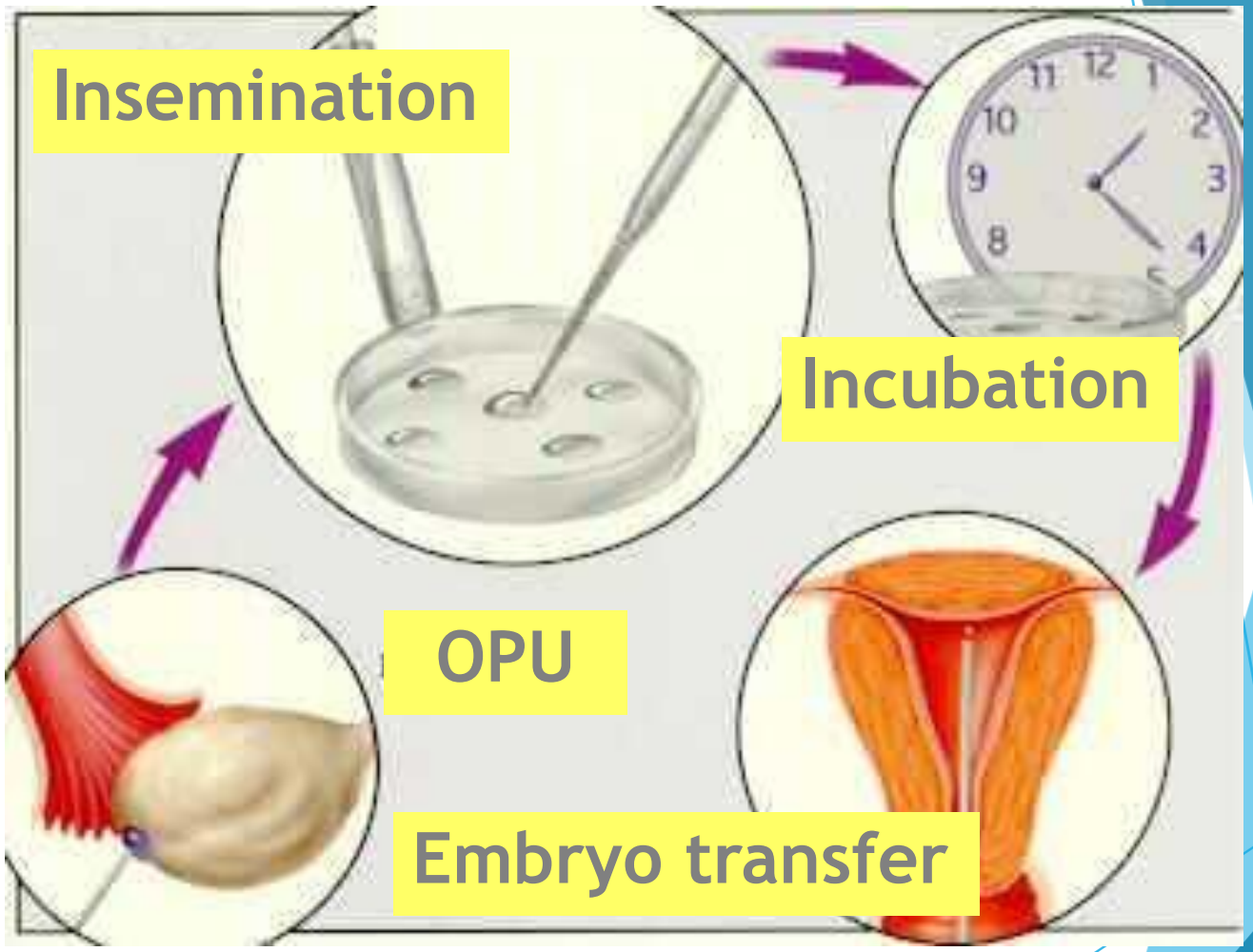
# Oocyte pick up





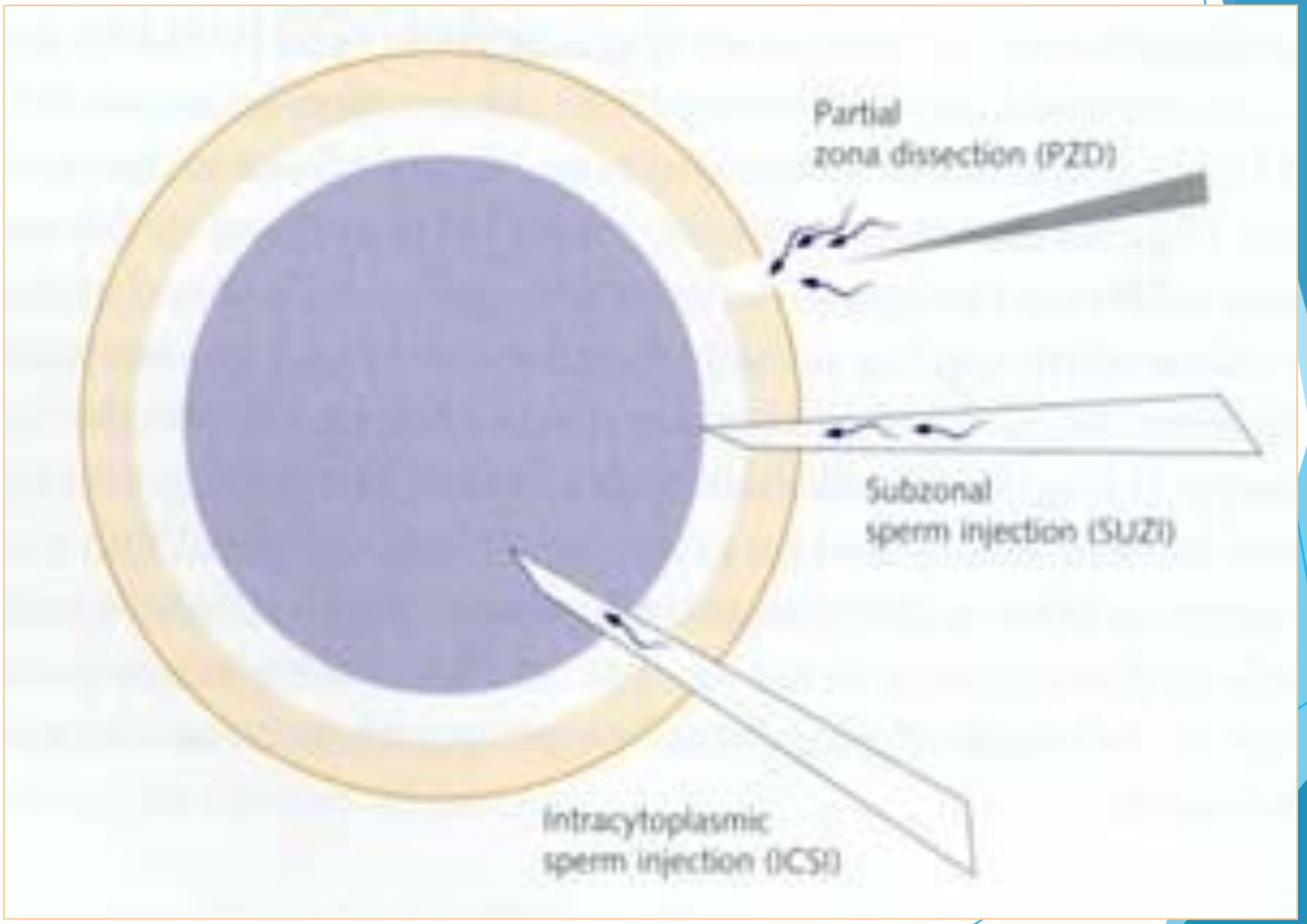




# IVF

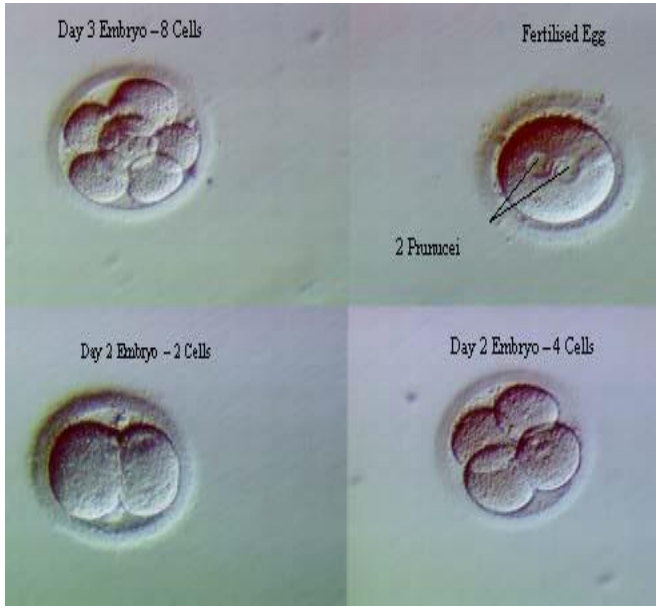



Control ovarian hyperstimulation

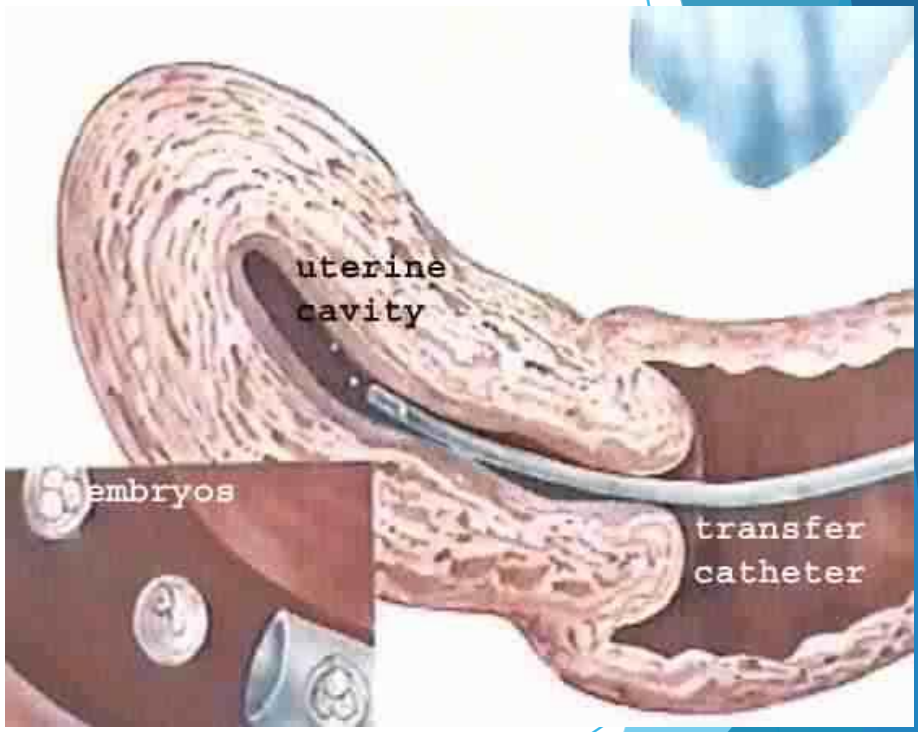
# ICSI


Partial
zona dissection (PZD)
Subzonal
sperm injection (SUZI)
Intracytoplasmic
sperm injection (ICSI)

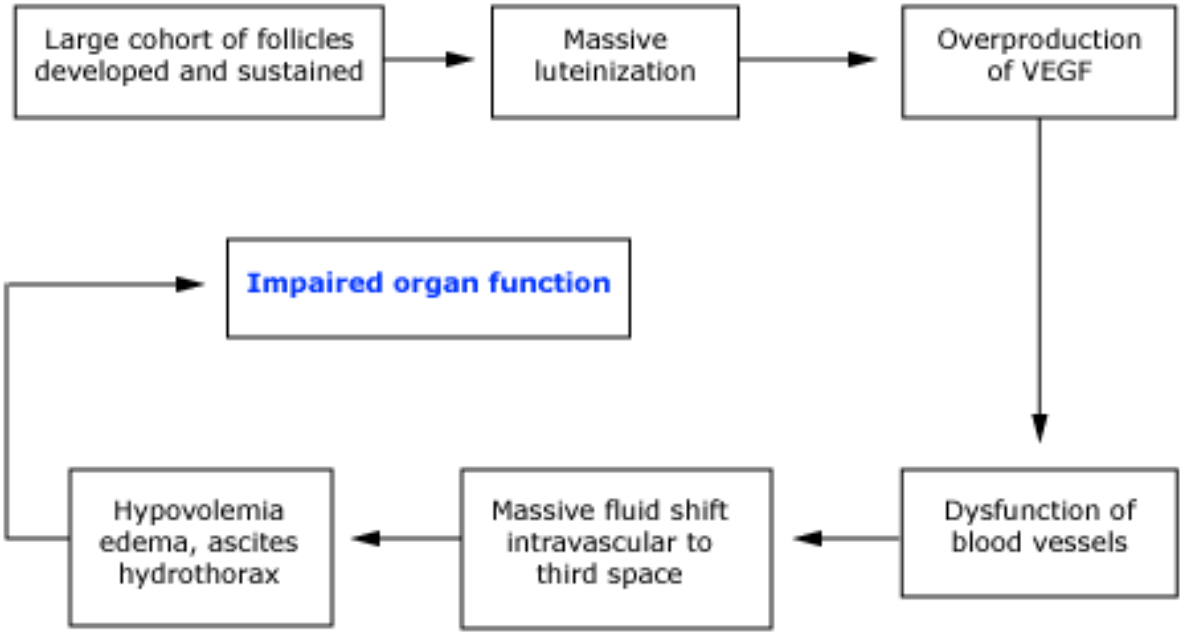
# Embryo transfer




Laboratory room



# Pathogenesis of OHSS




**OHSS: ovarian hyperstimulation syndrome;**
**VEGF: vascular endothelial growth factor.**

# Risk factors of OHSS

| Risk factors present at baseline :<br>Before gonadotropin administration |
| --- |
| Previous OHSS |
| PCOS |
| Potential markers: |
| • Basal serum anti-müllerian hormone >3.3 ng/mL |
| • Antral follicle count >8 |
| Single nucleotide polymorphisms (SNP) in genes involved in follicular growth (*BMP15*) |

# Risk factors of OHSS

| Risk factors related to ovarian response |
| --- |
| Multiple follicles >20 follicles larger than 10 mm |
| High or rapidly rising serum estradiol concentration (>3500 pg/mL [12,850 pmol/L] in COH) |
| High number of oocytes retrieved |
| hCG given for luteal phase supplementation |
| Elevated serum/follicular fluid VEGF levels |
| Pregnancy (increase in endogenous hCG) |

# Classification of OHSS

1. Mild
2. Moderate
3. Severe
4. Critical

# Mild

| | Clinical features | Biochemical features |
|---|---|---|
| Mild | • Abdominal distention/discomfort<br>• Mild nausea/vomiting<br>• Diarrhea<br>• Enlarged ovaries | • No clinically important laboratory findings |

OHSS: ovarian hyperstimulation syndrome; Hct: hematocrit;
WBC: white blood cell; Na: sodium; K: potassium;
ARDS: acute respiratory distress syndrome.

# Moderate

| | Clinical features | Biochemical features |
|---|---|---|
| Moderate | • Presence of mild features plus:<br>  • Ultrasonographic evidence of ascites | • Elevated Hct (>41%)<br>• Elevated WBC (>15,000/mL)<br>• Hypoproteinemia |

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# Severe

| | Clinical features | Biochemical features |
|---|---|---|
| Severe | • Presence of mild and moderate features plus:<br>  • Clinical evidence of ascites (can be tense ascites)<br>  • Severe abdominal pain<br>  • Intractable nausea and vomiting<br>  • Rapid weight gain (>1 kg in 24 hours)<br>  • Pleural effusion<br>  • Severe dyspnea<br>  • Oliguria/anuria<br>  • Low blood/central venous pressure<br>  • Syncope<br>  • Venous thrombosis | • Hemoconcentration (Hct >55%)<br>• WBC >25,000/mL<br>• Serum creatinine >1.6 mg/dL<br>• Creatinine clearance <50 mL/min<br>• Hyponatremia ($Na^+$ <135 mEq/L)<br>• Hyperkalemia ($K^+$ >5 mEq/L)<br>• Elevated liver enzymes |

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# Critical

| | Clinical features | Biochemical features |
|---|---|---|
| Critical | • Presence of severe features plus :<br>• Anuria/acute renal failure<br>• Arrhythmia<br>• Pericardial effusion<br>• Massive hydrothorax<br>• Thromboembolism<br>• Arterial thrombosis<br>• ARDS<br>• Sepsis | • Worsening of biochemical findings seen with severe OHSS |

OHSS: ovarian hyperstimulation syndrome; Hct: hematocrit;
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# Management of OHSS

1. Mild
2. Moderate

Outpatient basis

3. Severe
4. Critical

Hospitalization

# Mild OHSS

- Self – limited
- Goal of relieving symptoms
  - analgesics eg. acetaminophen
  - avoid heavy physical activity
- Observation of worsening abdominal pain, weight gain and increasing abdominal girth

# Moderate OHSS

- Oral fluid intake of 1-2 liters/day
- Avoid physical activity, ±Bed Rest
- Dialy  wt, AC, urine output
- Monitor signs of progression
- Periodic visits. (every 2-3 days)

# Severe and Critical OHSS

- Hospitalization
- Evaluation and monitoring
  - Weight, abdominal circumference
  - Laboratory testing
  - TVUS & TAS
  - Chest x-ray ± echocardiogram
  - Central veous pressure

# Management

- IV hydration
- Culdocentesis or Paracentesis
- Prophylactic anticoagulation (for thromboembolism)
- Pain relief
- Antiemetics if needed

# OHSS

- Early OHSS
- Late OHSS (if pregnant)

# Prevention of OHSS

1. Identify the potential risks for the individual patient

   eg - previous OHSS

   - PCOS

   - high number of follicles

2. GnRH antagonist protocol rather than GnRH agonist in high risk for OHSS
3. Metformin pretreatment for women with PCOS undergoing IVF

# Prevention of OHSS

4. High-risk cycles for OHSS
   - Coasting
   - GnRH agonist instead of HCG
   - Dopamine agonist if hCG already given
5. Others
   - withhold hCG
   - cryopreservation of embryos

# Management of OHSS