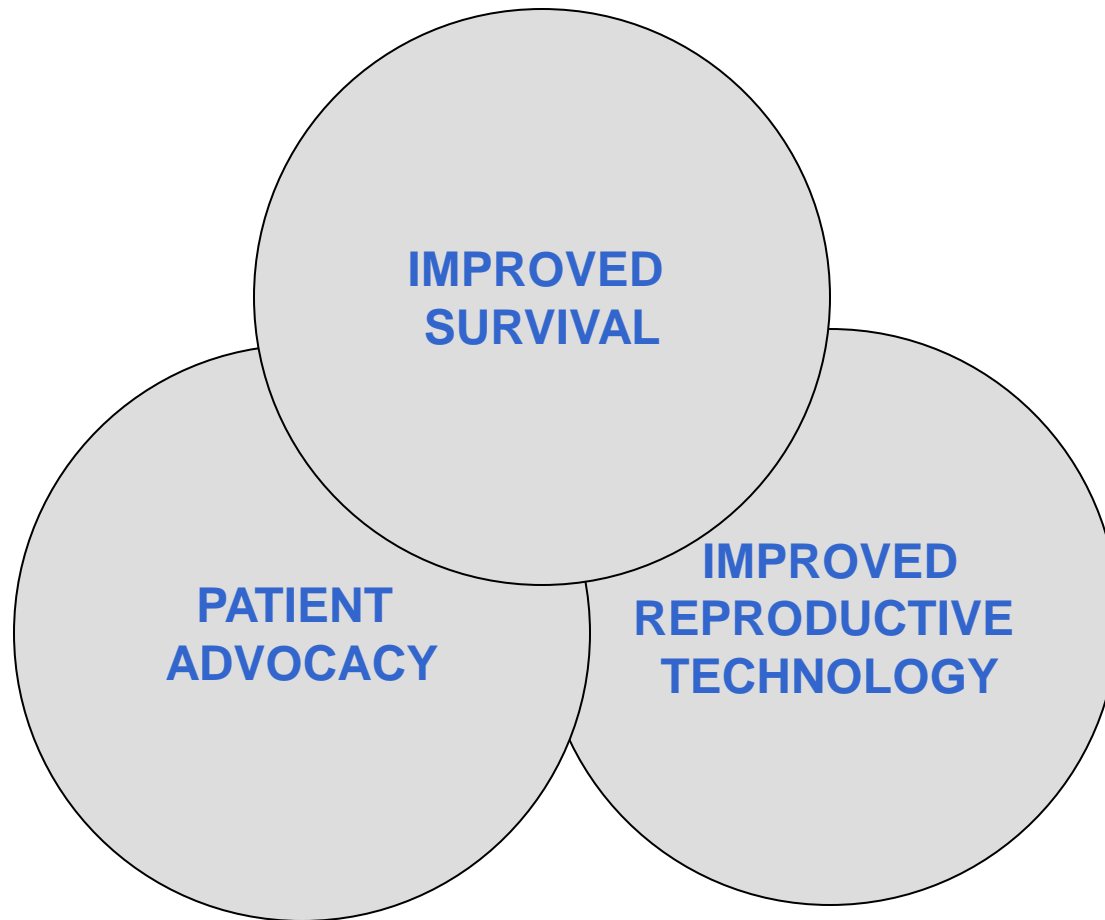


# Fertility Preservation in Adolescents and Young Adults with Cancer

Jennifer Levine, MD, MSW  
Columbia University Medical Center



# Fertility Preservation for Adolescents and Young Adults



# Organization Guidelines



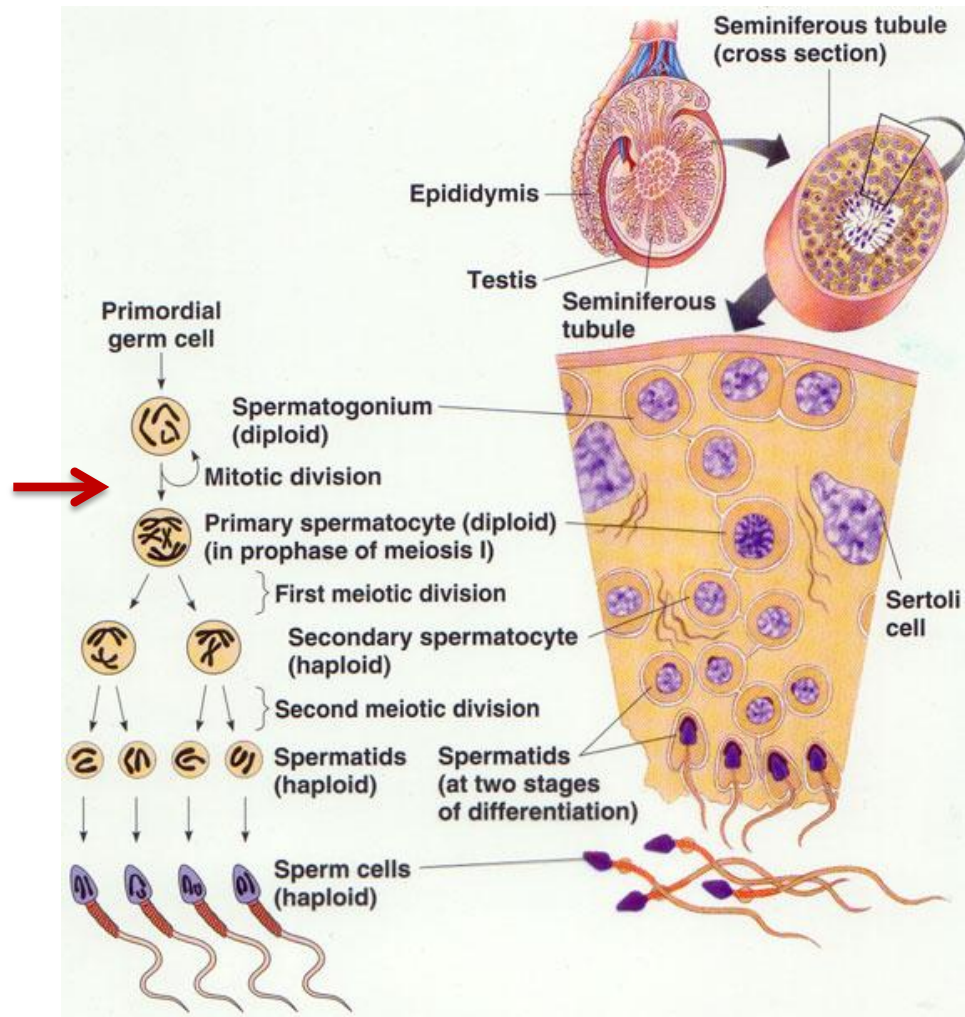
National  
Comprehensive  
Cancer  
Network®

# Objectives

- Review Pathophysiology of Reproduction
- Review Fertility Preservation Options
- Discuss Gaps and Challenges

# Males and Fertility Preservation

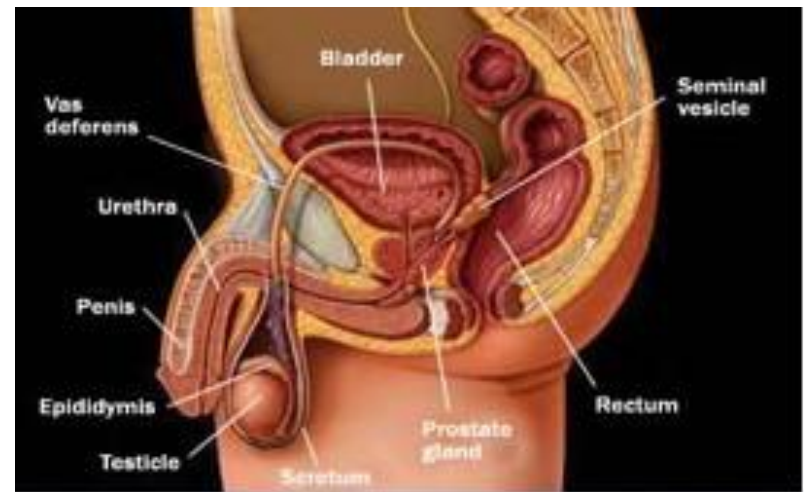
# Reproductive Pathophysiology



# Impact of Cancer Treatment on Male Fertility

- Depletion of Germ Cells
  - CT, RT, surgery
  - Temporary
  - Permanent
- Ductal system
- Pelvic Nerves
- Pituitary

<http://www.mansoormedical.org/gynaecology/infertility.html>



# Sperm Banking

- Non-Experimental
- Most common method:
  - Masturbate to ejaculation
  - Semen Analysis
  - Cryopreservation
  - Storage
- Outpatient/Inpatient





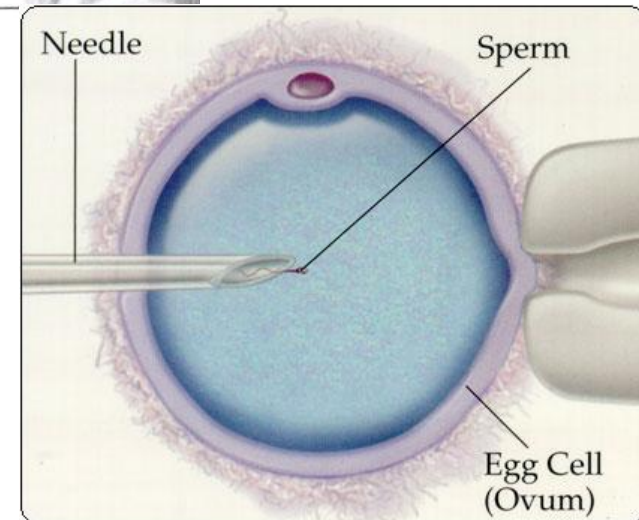
# Sperm Banking: Challenges

- Impact of Disease
- Timing re: Therapy
- Cost
- Adolescents
- Religious/Cultural Beliefs
- Physical Limitations



# Testicular Sperm Extraction (TESE)

- Outpatient procedure
  - Surgical removal of tissue
  - Sperm extraction
- Feasible in conjunction with ICSI



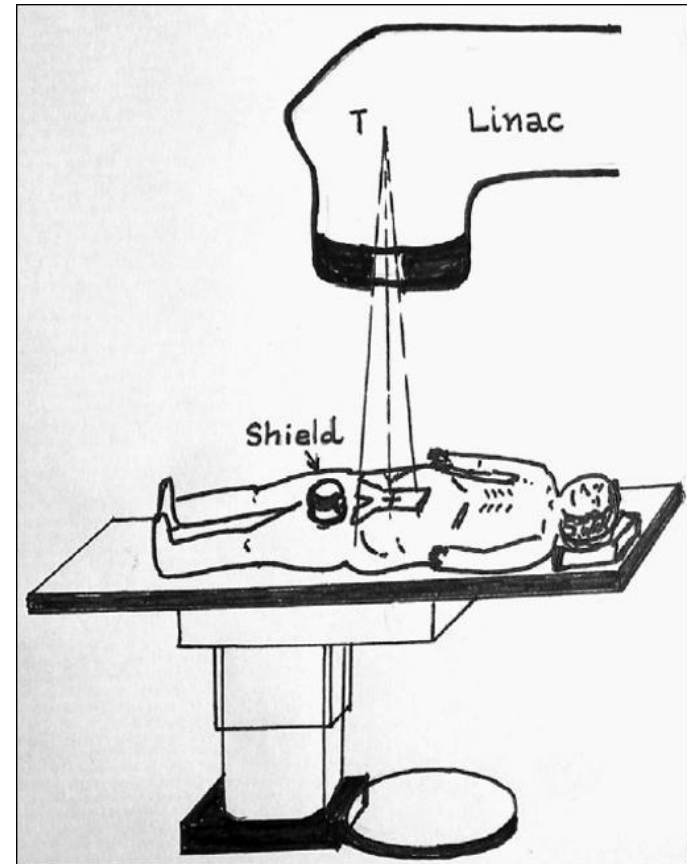
# Testicular Tissue Freezing

- Experimental
- Outpatient procedure
  - Removal of Tissue
  - Cryopreservation
  - Storage
- Early germ cells preserved
- No human births



# Gonadal shielding

- Radiation therapy



# Parenthood After Cancer

- Natural Conception
  - Timing re: relapse risk
  - Semen analysis
- Assisted Reproduction
  - Banked Sperm/ICSI
  - TESE/ICSI
  - Donor Sperm
- Adoption

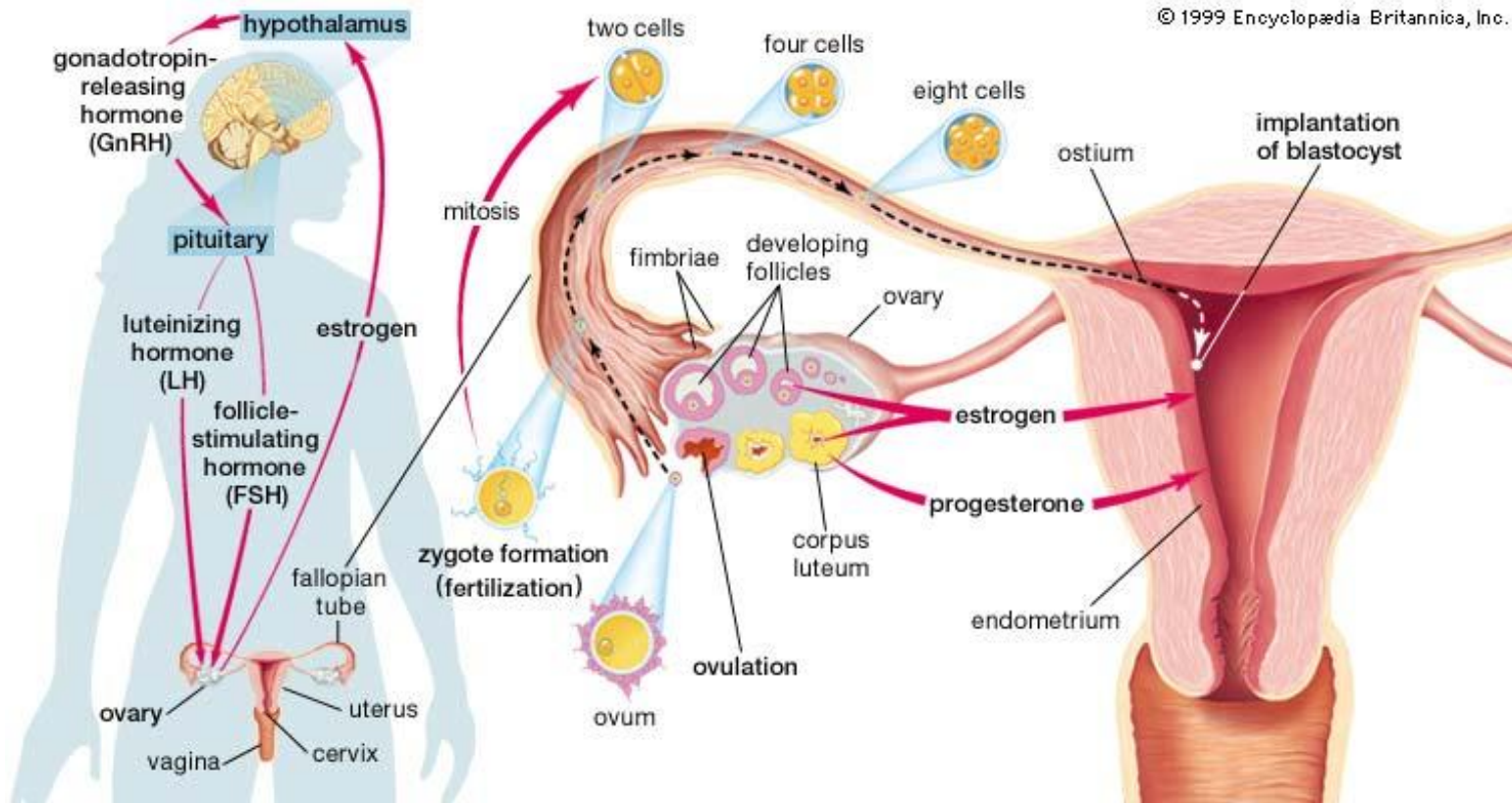


# Summary Recommendations

- Sperm banking before therapy
  - All interested post pubertal males
- Semen Analysis post therapy
  - Assess whether to keep stored sperm

# Females and Fertility Preservation

# Reproductive Pathophysiology

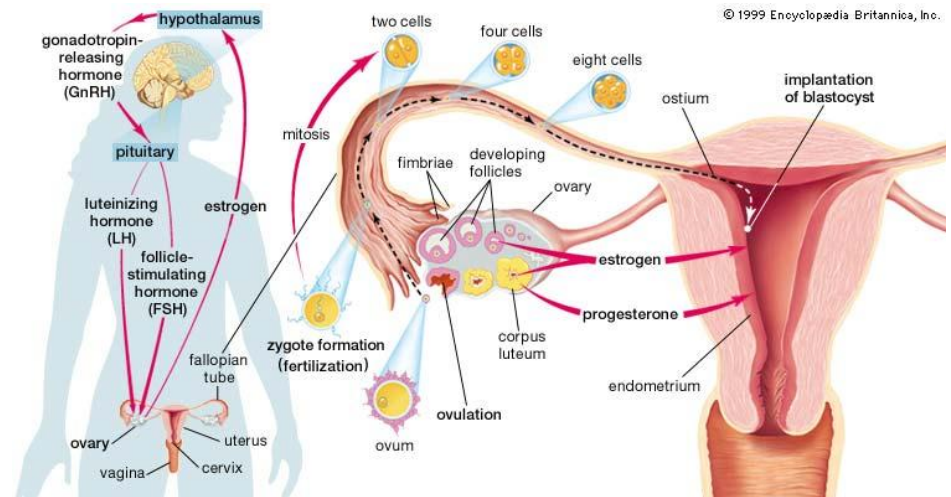


<http://www.britannica.com/EBchecked/media/19665/The-ovaries-in-addition-to-producing-egg-cells-secrete-and>

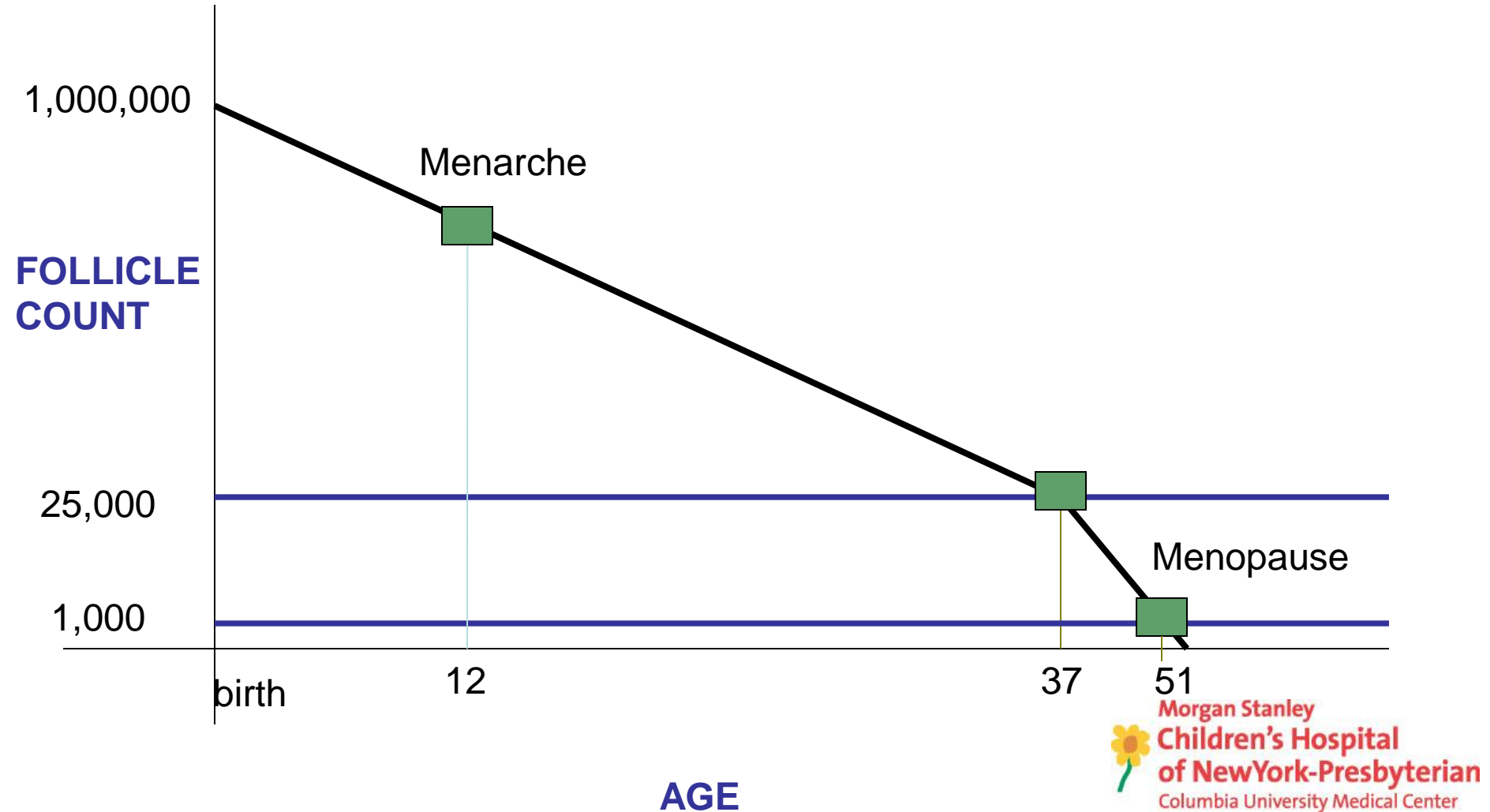


# Potential Impact of Cancer and Treatment on Fertility

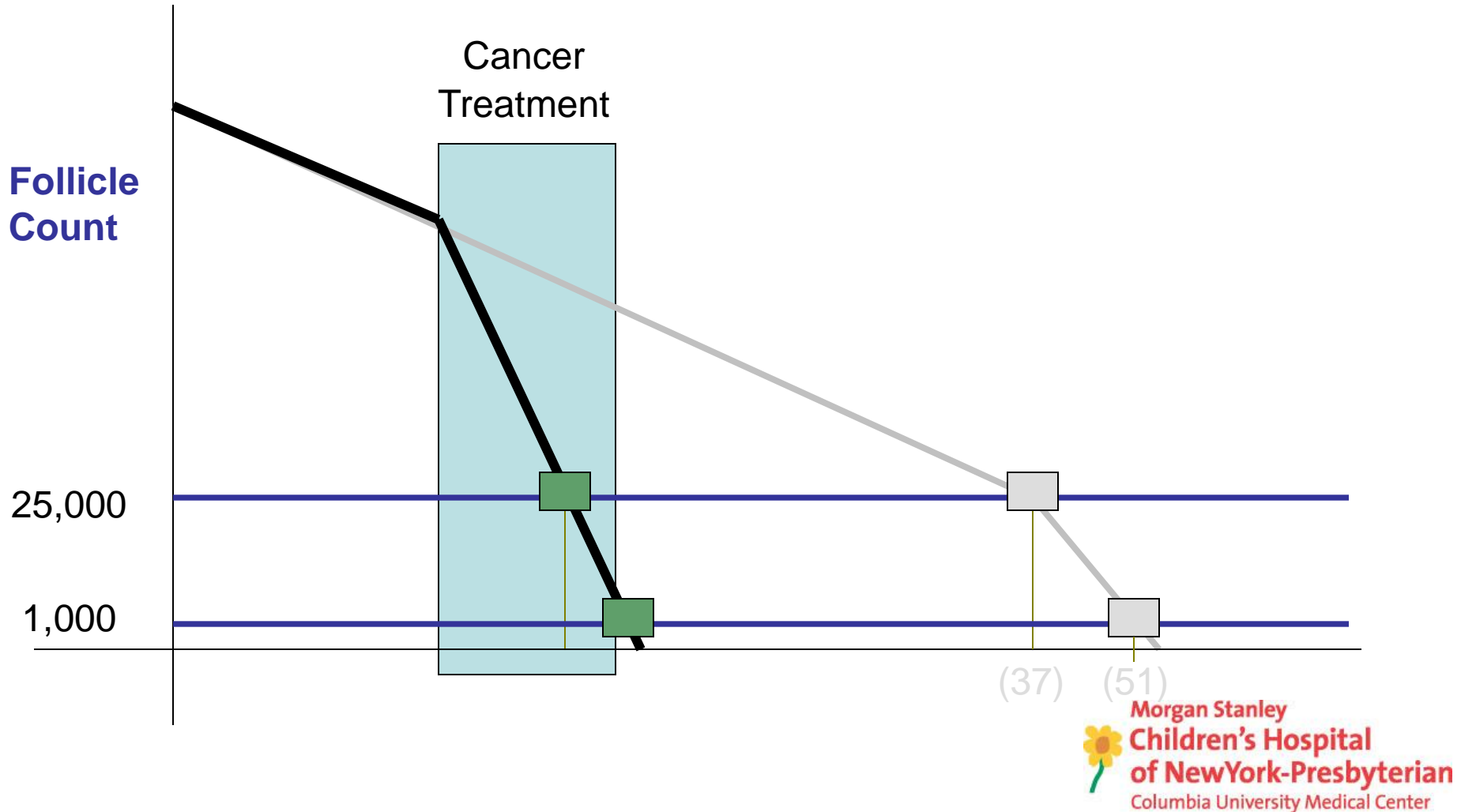
- Removal of uterus or ovaries
- Damage to uterus (fibrosis, vascular insufficiency)
  - Implantation
  - Pre-term loss
- Hormonal dysfunction via the neuroendocrine system
- Germ Cell Loss



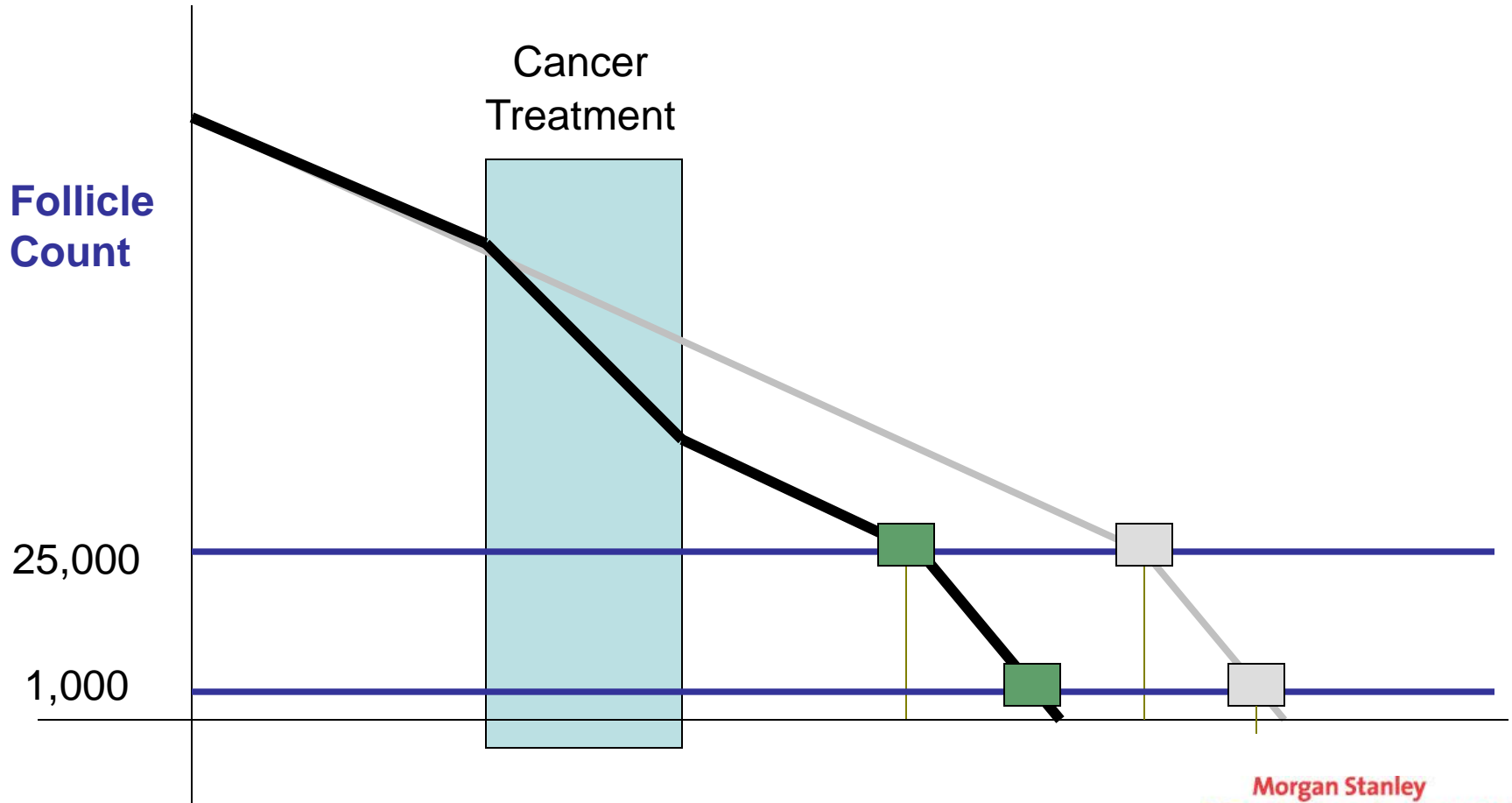
# Reproductive Review: Normal Ovarian Reserve



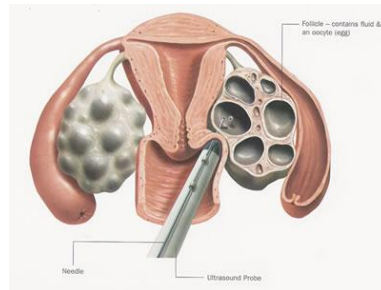
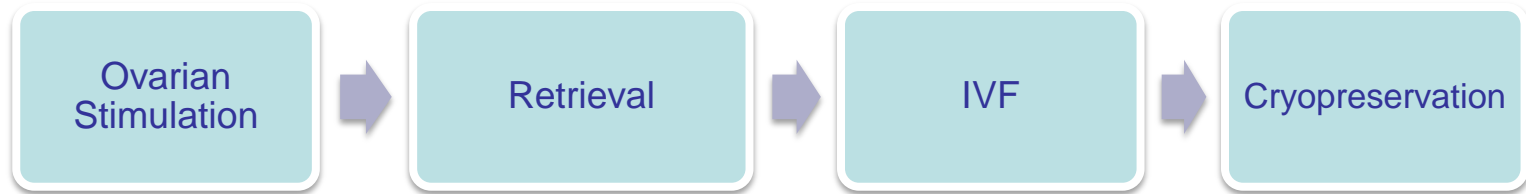
# Acute Ovarian Failure



# Premature Menopause



# Embryo Cryopreservation



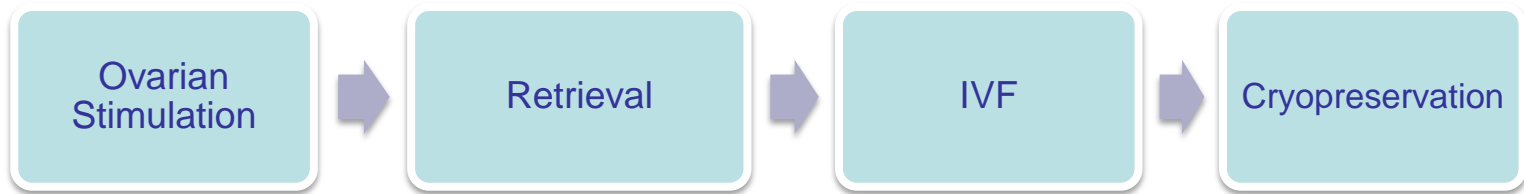
<http://www.advancedfertility.com/ovarstim.htm>

<http://www.fertilitycrete.gr/fertility-treatments/ovarian-stimulation-ovulation-induction>

<http://www.infertile.com/infertility-treatments/icsi.htm>

<http://www.sandiegofertilityspecialist.com/fertility-services/embryo-cyropreservation-fertility-preservation/>

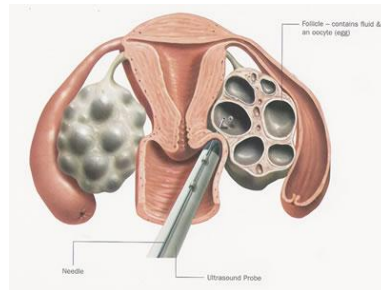
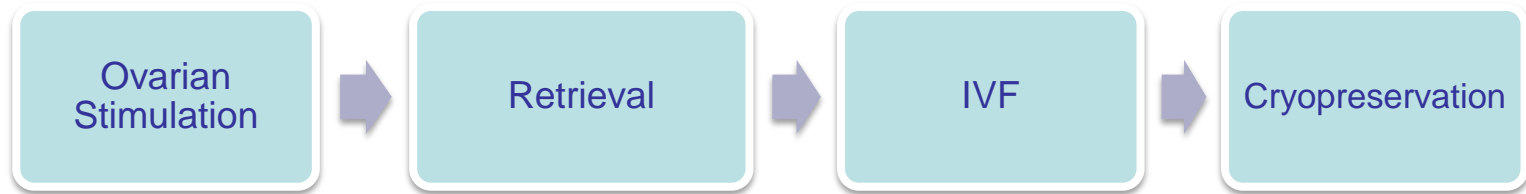
# Embryo Cryopreservation



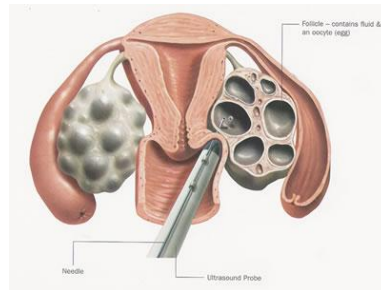
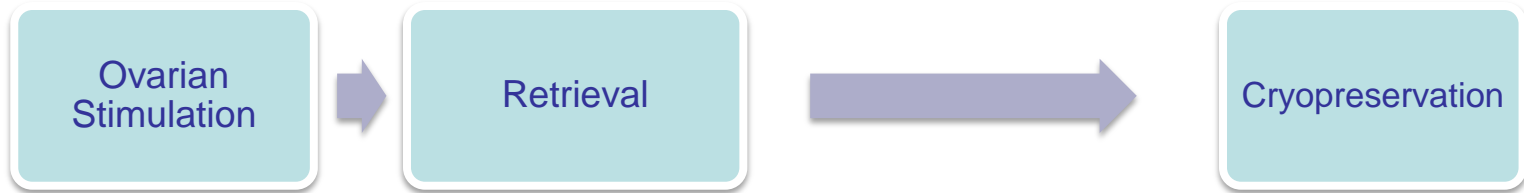
## Limitations

- Age of patient
- Religious Beliefs
- Need a partner or donor sperm
- Expensive
- Takes time, impacts start of therapy

# Oocyte Cryopreservation

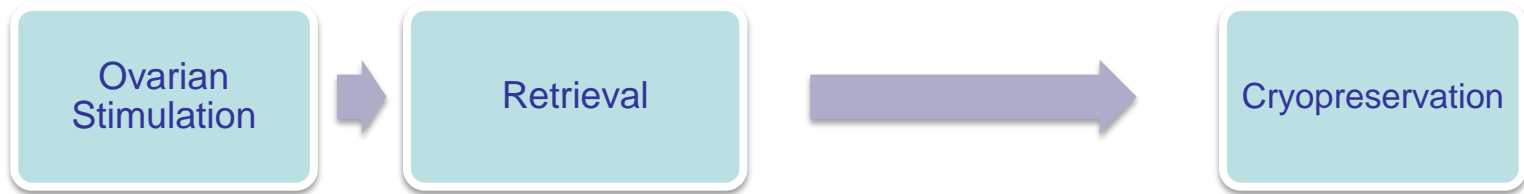


# Oocyte Cryopreservation





# Oocyte Cryopreservation



## Limitations

- Oocytes are more susceptible to injury than embryos
- Expensive
- Takes time, impacts start of therapy

# Ovarian Tissue Cryopreservation

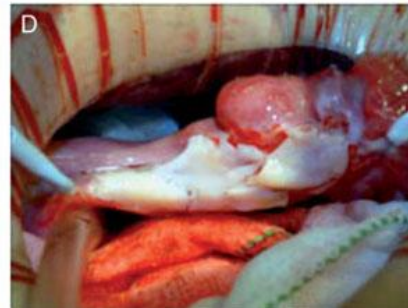
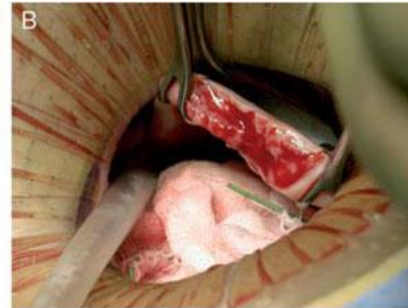
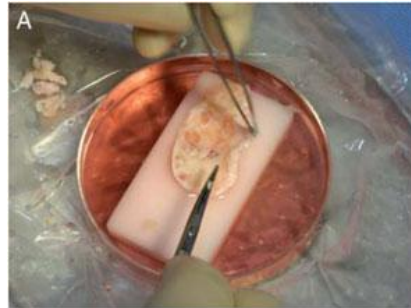
Removal of  
ovarian strips



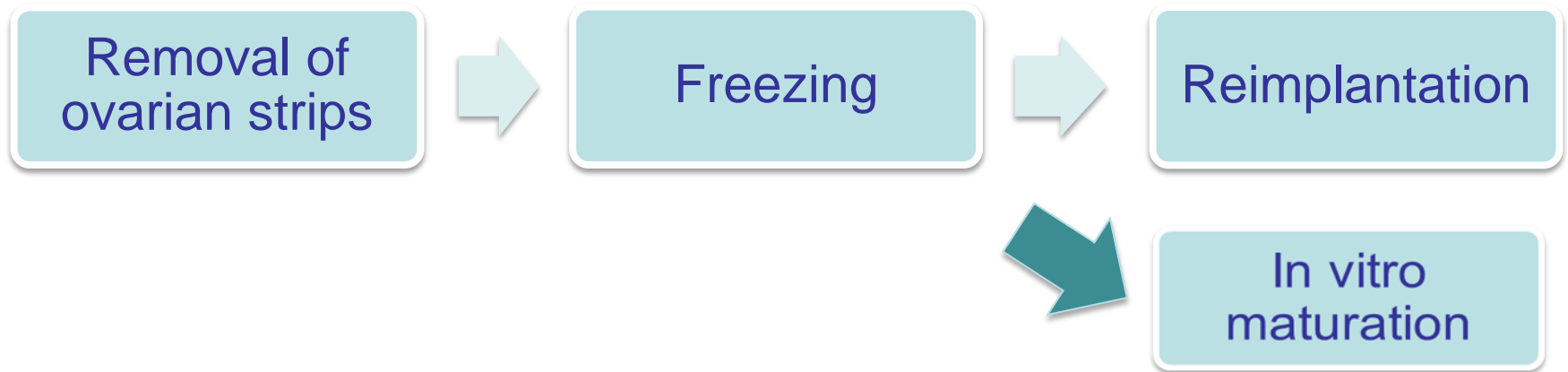
Freezing



Reimplantation



# Ovarian Tissue Cryopreservation



## Limitations

- Experimental
- Re-implantation not recommended in leukemia
- “12” live births with transplantation
- Cost

# Radical Trachelectomy

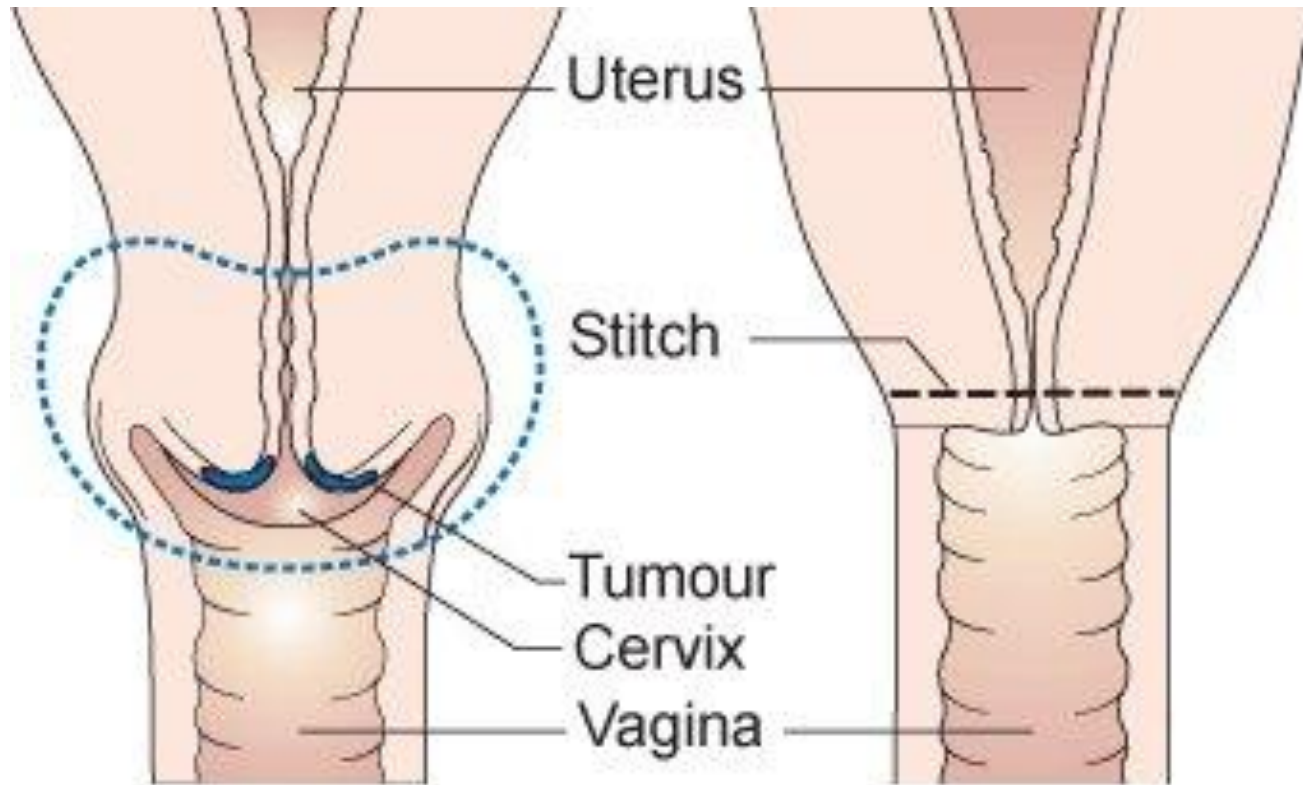
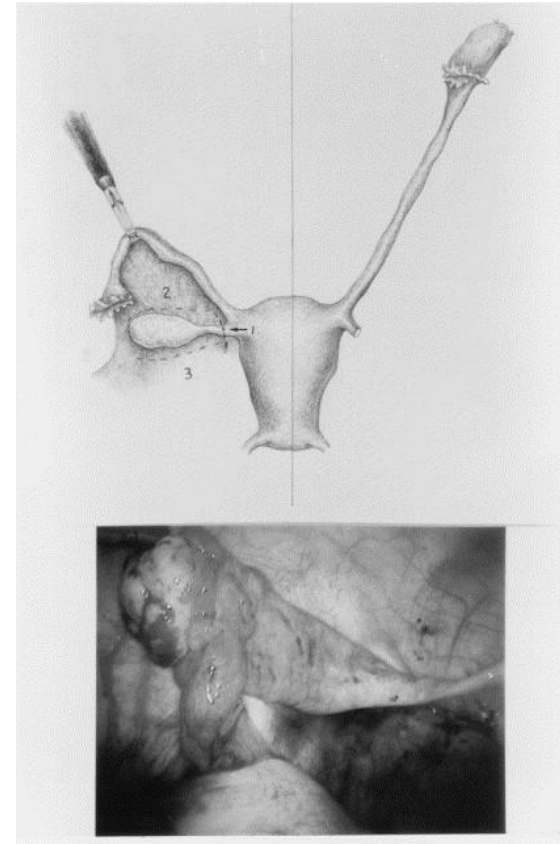
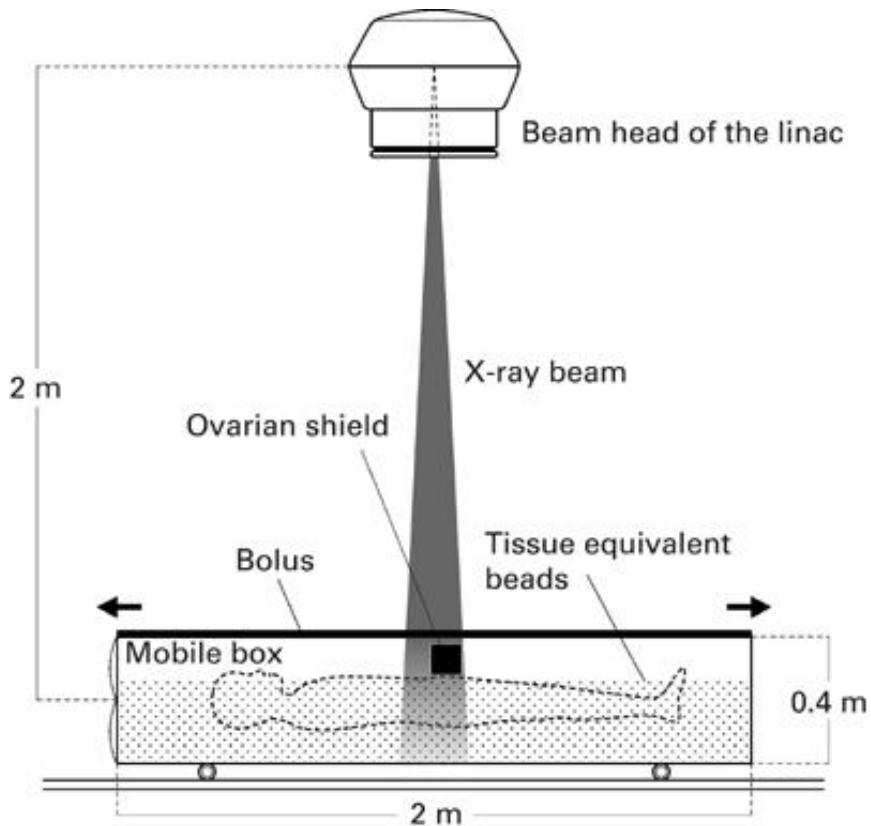


Diagram showing the parts removed with a trachelectomy surgery

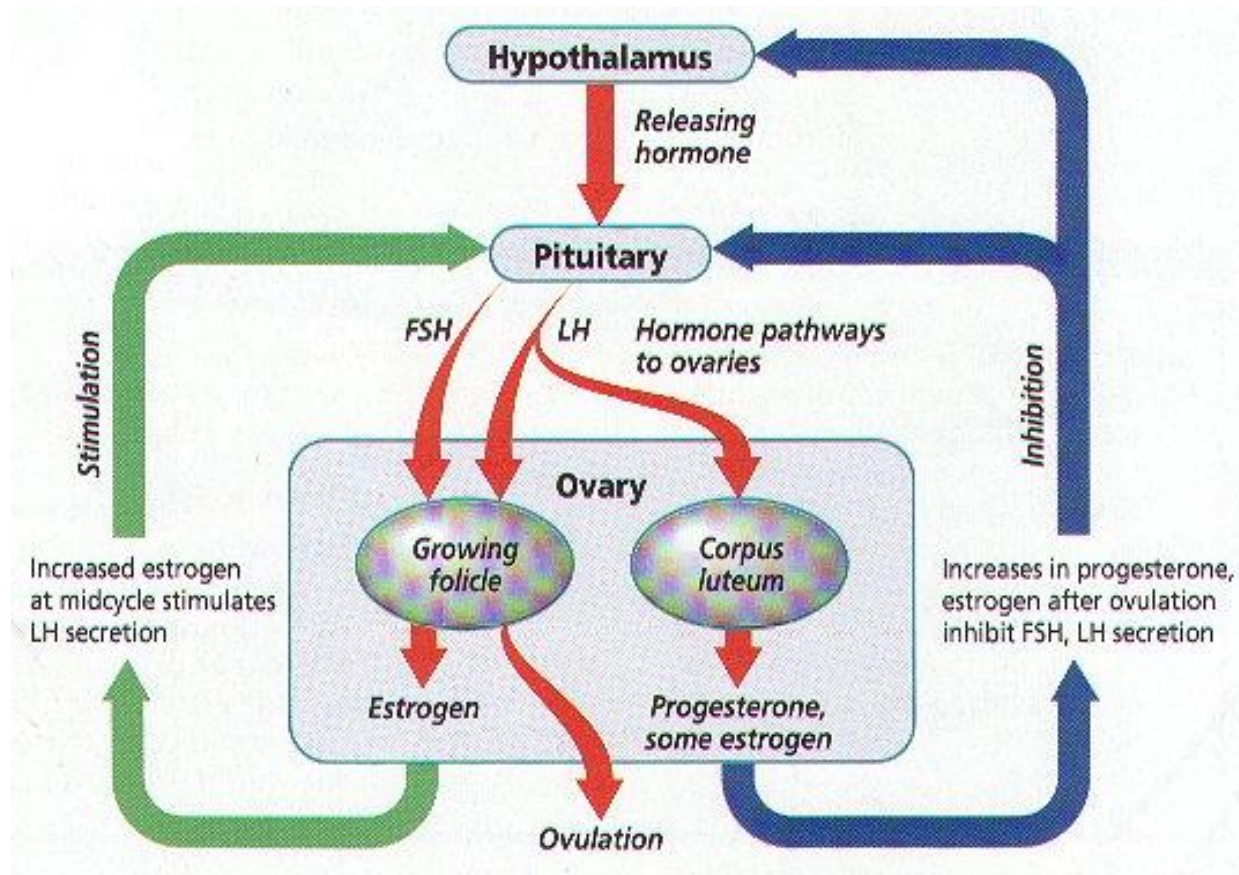
© CancerHelp UK

# Protection of Ovaries

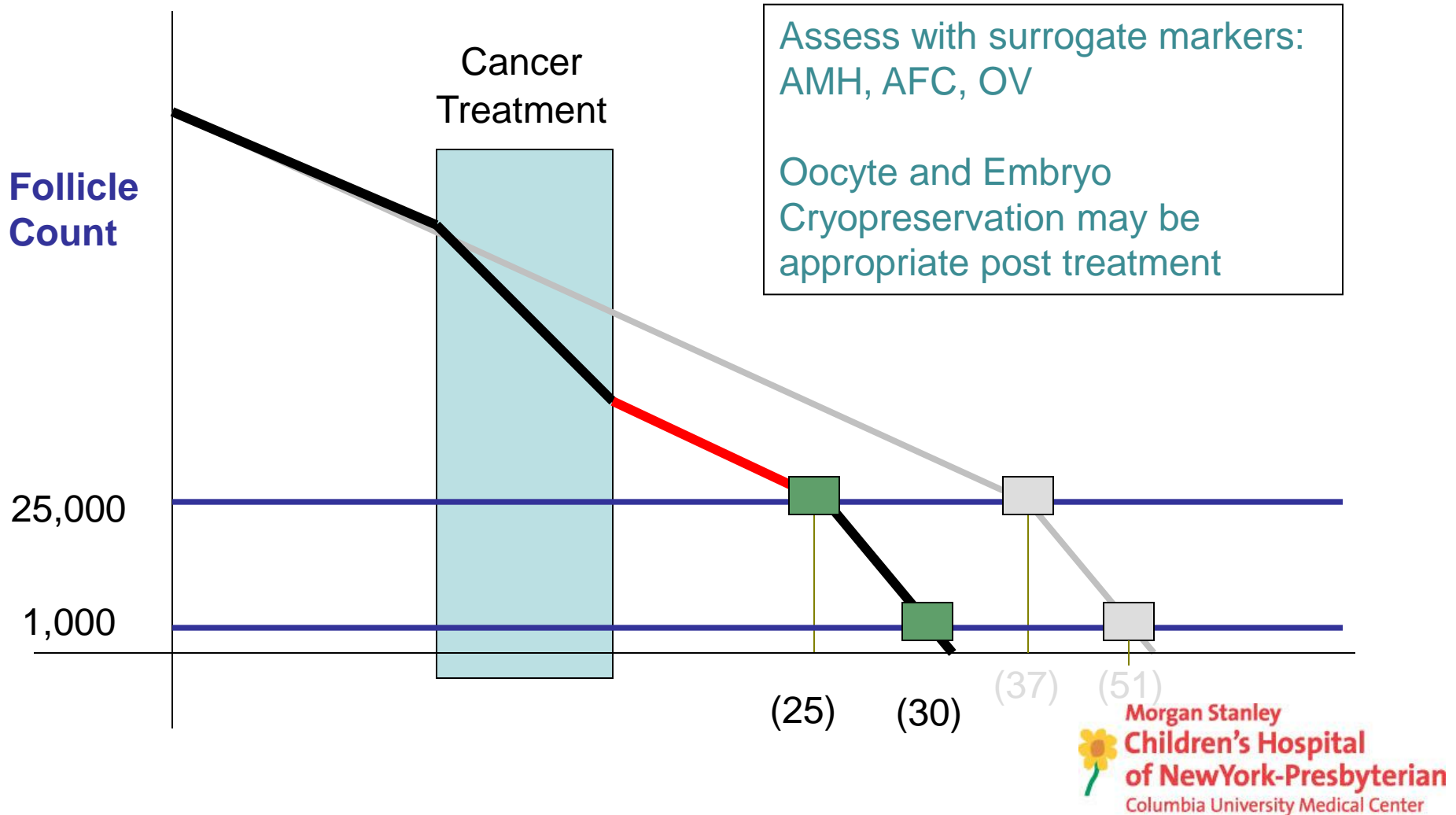


Nakagawa, Bone Marrow  
Transplantation 2006

# GnRH Agonist/Antagonist



# Fertility Preservation Post Treatment



# Parenthood after Treatment

- Natural conception
  - Timing
- Assisted Reproduction
  - Thawed embryos/oocytes
  - IVF
  - Donor Oocytes
  - Donor Embryos
- Surrogacy
- Adoption





# Pregnancy Post Treatment

- Timing
- Late Effects
- PGD



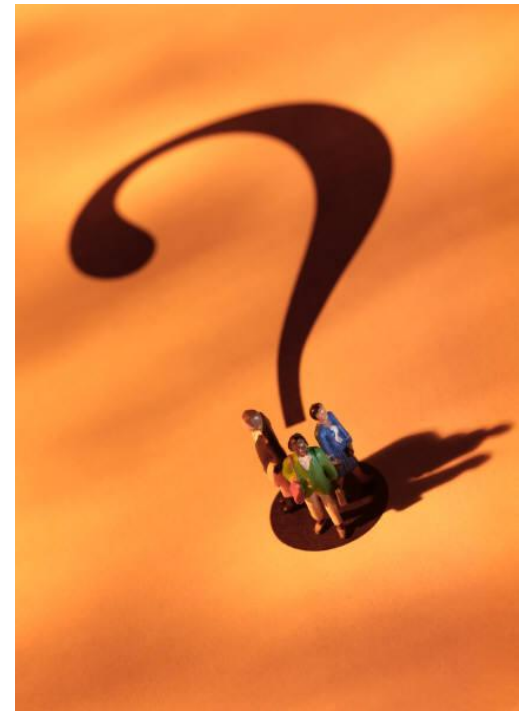
# Summary Recommendations

- Discussion about fertility at diagnosis
- Referral to Reproductive Endocrinology
  - Anyone who wants referral
  - Age
  - High Risk Exposure
- Post Treatment Assessment if not at diagnosis

# Gaps and Challenges

# Clinical Research: Information on risk remains limited

- Exposure
- Host
- New therapies
- Estimates of fertility
- Impact on Decision Making



# Basic Science: Limitations of Options

- Improvements in Current Technologies
- Maturation of Testicular Tissue
- Maturation of Ovarian Tissue

# Clinical Care:

## Integrating FP in AYA Care

- Mechanism to provide information to all patients
  - Institutional support
  - Many models
    - Fertility Czar
    - Fertility Navigator/consult service
  - Part of intake process
- **Established** referral mechanism
  - Established partnerships

# Resources about Fertility Preservation

- Utilization of existing websites

- [www.fertilehope.org](http://www.fertilehope.org)



- [www.livestrong.org](http://www.livestrong.org)



- [www.oncofertility.northwestern.edu](http://www.oncofertility.northwestern.edu)



# Policy:

## Cost of fertility preservation

- Insurance reform
- AMA policy statement







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