

Sperm Banking: When, Why, and How?

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Sperm banking

- What is sperm banking?
- Why need sperm banking?
- Who need sperm banking?

Why and When Do Men Need to Bank Their Sperm ?

- Couples
 - 無適當機會受孕
 - 男性不孕症
 - 可試 TESE, PESA
 - Men about to have prostate or testicular surgery
 - 睪固酮低下
 - 結紮前貯存
 - Ejaculatory dysfunction
- Patients with Cancer

Why and When Do Men Need to Bank Their Sperm ?

- Patients with Cancer
 - Malignancy in reproductive age male
 - Testicular cancer, Hodgkin's disease
 - Before chemotherapy, radiotherapy

Factors That Prevent Patients from Sperm Banking

- Failure to provide information
- Infertility risk was downplayed
- personal preferences, financial constraints, time interval from diagnosis to treatment, and anxiety regarding the consequences of sperm banking
- No time for banking
- Risk of congenital problem and malignancy

How Does Sperm Banking Work:

Techniques of Semen Cryopreservation

- Select high quality sperm
- Vitrification
 - Cryopreservation agent that minimize cryodamage by decreasing intracellular water content and prevent intracellular ice crystal formation
- Freeze cells to -196 degree
 - Rapid freezing or slow freezing
 - Store at liquid nitrogen

How Does Sperm Banking Work:

Techniques of Semen Cryopreservation

- Preparation and Preselection
 - Swim-up method
 - Magnetic-activated cell sorting (MACS)
 - Annexin microbeads to immunolabel and remove apoptotic spermatozoa

How Does Sperm Banking Work:

Techniques of Semen Cryopreservation

- Rapid Freezing
 - The Irvine Scientific (IS) method
- Slow Freezing
 - The Cleveland Clinic Foundation (CCF) method
 - -20 degree for 8 mins
 - -96 degree for 2h in nitrogen vapors
 - Immersion in liquid nitrogen

How Does Sperm Banking Work:

Techniques of Semen

Cryopreservation

- Vitrification
 - advantageous, requires no equipment straightforward, quick, and inexpensive
 - drastically reduced spermatozoal motility

Advantages and Disadvantages of Cryoprotectants

- Freezing and thawing process has detrimental effects on spermatozoa
- Cryoprotective agent
 - to protect sperm cells during the freezing process
 - cause irreparable damage to the ultrastructural morphology of the sperm

Advantages and Disadvantages of Cryoprotectants

- Glycerol
 - high permeability
 - Sperm energy source
 - Stabilize cell membrane and reduce damage
 - supplemented with cryobuffers (citrate or egg yolk)
 - Replace by soy lecithin

Advantages and Disadvantages of Cryoprotectants

- TEST -Yolk Buffer
 - Combination of TES [*N*-Tris(hydroxymethyl)methyl-2-aminoethanesulfonic acid, *pK* 7.5] and Tris[(hydroxymethyl)aminomethane]
 - Preferred cryoprotectant
 - longest longevity
 - Higher post-thaw motility and viability

The Effect of Cryopreservation on Sperm Characteristics

- Harm of cryopreservation to sperm
- To cancer patient
- The storage duration?
- The age of male?
- Damage to cell membrane during thawing
- Reactive oxygen species (ROS)
 - Treat with pentoxifylline before freezing

ART Outcomes with Banked Semen Specimens

- Post-thaw semen quality is often not good enough for IUI
- ICSI (Intracytoplasmic sperm injection)
 - Success rates as high as fresh semen
 - 33~73% pregnancy rate
 - Cancer patient?

Advantages of ICSI and Use of Cryopreserved Spermatozoa

- IV F and ICSI have revolutionized the treatment of male-factor infertility
- ICSI had lower fertilization failure than conventional IV F in cancer cases
- ICSI is an option for utilizing the cryopreserved sperm for obstructive as well as nonobstructive azoospermia

Challenges and Risks Associated with Cryopreservation

- Cross-contamination problem
 - Current good tissue practice (CGTP) guidelines
 - FDA and American Association of Tissue Banks (AATB) guidelines