Controversial Topics in Reproduction: Assisted Reproduction and the Slippery Slope

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Section A

Male Contraception
Testis

Courtesy of Martin Dym
Testis Cross Section

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Cross Section of a Seminiferous Epithelium
The Seminiferous Epithelium
Hypothalamic-Pituitary-Testicular Axis

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Testosterone and Estradiol Implants

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T-E Implants: Effects on LH

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Leydig Cells in Untreated Testis
Leydig Cells in Contracepted Rat
T-E Implants: Effects on Testicular T Secretion

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Effect of TE Implants on Intratesticular T
Effect on Testis of TE Implants
Percutaneous Aspiration of Testicular Fluid in Man

Courtesy of Dr. Jonathan Jarrow
Human: Serum T and ITT

Testosterone (nmol/L)

0 200 400 600 800 1000

Serum Testosterone

Intratesticular Testosterone

Human: Serum T and ITT
Intratesticular and Serum Testosterone Concentrations in Men

- Intratesticular Testosterone (ng/mL)
  - Range: 250 to 1250
- Serum Testosterone (ng/mL)
  - Range: 0 to 5
Testosterone Plus Levonorgestrel

- Testosterone plus levonorgestrel suppresses intratesticular testosterone
  - Protocol
    - Testosterone enanthate, IM, 100 mg weekly
    - Levonorgestrel (LNG), 31.25 or 62.5 µg daily
    - Treatment period: six months
Serum Testosterone

![Graph showing serum testosterone levels at baseline and month 6.](image)
Intratesticular Testosterone

![Graph showing testosterone levels over time](image-url)
Sperm Count

![Bar graph showing sperm count (millions/ml) at baseline and month 6.](Image)
Section B

How Does Testosterone Function?

Courtesy of Lonnie Russell
Effect on Testis of TE Implants

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TUNEL Staining after Testosterone/Estradiol Implants

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Intratesticular Testosterone and Testicular Cell Death

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Graph showing Intratesticular Testosterone levels over time post TE (days). A significant decrease is observed, with levels dropping drastically post operatively. The graph indicates a marked reduction in testosterone levels with time, marked by "*" at the 5-day post TE point. A gel image showing bands at 4 Kb is also displayed.
How Does Testosterone Function?

Courtesy of Lonnie Russell
Effect of Reduced Intratesticular Testosterone

- Effect of reduced intratesticular testosterone on sertoli cell cytoarchitecture

Vimentin distribution in sertoli cells
BMF = Bcl2 Modifying Factor

- Actin-associated pro-apoptosis protein
- When cells lose attachment to their underlying basal lamina, BMF interacts with Bcl2 family members to promote apoptosis
Upregulation of BMF in pachytene spermatocytes and round spermatids in response to TE
Hypothetical Model of Germ Cell Apoptosis

Reduced Intratesticular T

Loss of Sertoli-Spermatid Adhesion
O’Donnell et al. (1996)

Bax, Bcl XL, Bclw
?Effector

BMF
Trigger?

Release of Cytochrome c
Sinha-Hikim et al. (2004)

Caspase 3
“executioner”
Kim et al. (2000)
New Ways To Have Kids: Are We On A Slippery Slope?
New Ways To Have Kids

- New ways to have kids: are we on a slippery slope?
  - Sperm-egg interaction during fertilization
  - Assisted reproductive technologies: promise, controversy, and public health implications
Maturation of Sperm in the Female Genital Tract

Fusion of the Ovum and Sperm

- Acrosome
- Sperm binds zona pellucida
- Sperm digests and moves through zona pellucida
- Cortical granule
- Zona pellucida
- Vitelline layer
- Ovum
In Vitro Fertilization

In-vitro Fertilization Procedure

1. Egg Aspiration
2. Insemination
3. Incubation
4. Embryo Transfer
Intracytoplasmic Sperm Injection (ICSI)
Sex Selection Process

DNA Stained

Cell Sorter Used

Sperm Sorted by Amount of DNA

X-Containing Sperm Separated From Those With Y-Chromosomes
Cloning
How to Clone an Adult Horse

Donor cell

Transfer nucleus from donor cell to egg cell

Foster mother

Implant embryo into foster mother

Clone

Foal born genetically identical to donor

Remove cells from adult and culture

Unfertilized egg cell

Remove nucleus