Male Contraception

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UNDP/UNFPA/WHO/World Bank
Special Programme of Research Development and Research Training in Human Reproduction
WHO’s Male Reproductive Health Research

- Contraceptive research and development
- Targeted basic science
- Social science
- Men’s role in reproductive health
- Norms and Standards in Andrology
- Training workshops
Why Men in Family Planning?

• International Conference on Population and Development, 1994
• Disproportionate reproductive disease burden
• Shared responsibility and gender equity
## Distribution of Contraceptive Use

### Prevalence

<table>
<thead>
<tr>
<th>Contraceptive</th>
<th>No. of users (Millions)</th>
<th>Users (%)</th>
<th>First year failure rate (%) - Typical use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total users</strong></td>
<td>550</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td><strong>Modern methods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female sterilization</td>
<td>163</td>
<td>30</td>
<td>0.5</td>
</tr>
<tr>
<td>IUD</td>
<td>110</td>
<td>20</td>
<td>0.8</td>
</tr>
<tr>
<td>Oral contraceptives</td>
<td>91</td>
<td>17</td>
<td>5.0</td>
</tr>
<tr>
<td>Condom</td>
<td>49</td>
<td>9</td>
<td>14.0</td>
</tr>
<tr>
<td>Male sterilization</td>
<td>45</td>
<td>8</td>
<td>0.15</td>
</tr>
<tr>
<td>Injectables/implants</td>
<td>11</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>Vaginal barriers</td>
<td>8</td>
<td>1</td>
<td>20.0</td>
</tr>
<tr>
<td><strong>Traditional methods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withdrawal</td>
<td>41</td>
<td>7</td>
<td>19.0</td>
</tr>
<tr>
<td>Rhythm</td>
<td>32</td>
<td>6</td>
<td>25.0</td>
</tr>
</tbody>
</table>

UNFPA, 1994
Male Contraception

Research and Development

• Use of existing male methods is low, with regional and country differences
• Men are aware of family planning methods
• Men approve of the use of family planning
• Low levels of use may be related to the negative characteristics of existing methods
• Example: In a study conducted in Fiji, Iran, India and Korea, men considered a male pill or injection to be more acceptable than vasectomy
The Ideal Male Contraceptive

- **Safe** - *no harmful side effects*
- **Effective** - *it works!*
- **Acceptable** - *to men and their partners*
- **Affordable** - *to donors, programs, and potential users*
Approaches to Male Contraception:  
Targeting the sperm  

- Inhibit production  
- Interrupt transport  
- Block deposition  
- Disrupt function  
- Prevent fertilization
## Inhibiting Sperm Production

### Hormonal Contraception

<table>
<thead>
<tr>
<th>Androgen alone</th>
<th>T Enanthate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T Undecanoate</td>
</tr>
<tr>
<td></td>
<td>T Buciclate</td>
</tr>
<tr>
<td></td>
<td>Pellets</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Progestin + Androgen</th>
<th>Norplant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DMPA</td>
</tr>
<tr>
<td></td>
<td>Norethisterone Enanthate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GnRH</th>
<th>Agonists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Antagonists</td>
</tr>
<tr>
<td></td>
<td>Vaccines</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FSH</th>
<th>Antagonists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vaccines</td>
</tr>
</tbody>
</table>

**Department of Reproductive Health and Research**

**Département Santé et Recherche Génésiques**
Hormonal Male Contraception

- Hypothalamus
  - Pituitary
    - GnRH (+)
    - T (-)
    - LH, FSH (+)
- Testes
Hormonal Approaches to Male Contraception

Androgen alone

- 1990: 200 mg testosterone enanthate/week will reduce sperm production in some men
- Sperm concentrations consistently below 1 million/ml result in few or zero pregnancies
- All men do not fully suppress
- Requirement for weekly injections and high T concentrations
Hormonal Approaches to Male Contraception

Androgen alone

Asian Men

Sperm concentrations following weekly inj. 200 mg T-enanthate

Non-Asian Men

Azoospermia

91%  
60%

9%  
14%

<5 x 10^6 / ml  
>5 x 10^6 / ml

26%
Hormonal Approaches to Male Contraception

**Androgen alone**

Testosterone Enanthate

- Extensive clinical experience
- “Burst” effect
- Short acting
- Weekly injections
- High levels testosterone
Hormonal Approaches to Male Contraception

Androgen alone

Testosterone Undecanoate
- Oral or injectable
- Longer release profile
- 4-8 week injection intervals may be adequate
- Maintains testosterone in physiological range
- Large dose required

Testosterone Buciclate
- No “burst” effect
- Long-acting injectable
- Injections at 3-4 month intervals may be adequate
- High dose required
Hormonal Approaches to Male Contraception

Androgen alone
Hormonal Approaches to Male Contraception

Androgen with Progestin

- More rapid and effective sperm suppression
- Effective in diverse populations
- Reduced overall drug load
- Physiological testosterone levels
- Requires a 2 drug regimen
- Drugs may have different routes or frequencies of administration
### Hormonal Approaches to Male Contraception

**Androgen with Progestin**

<table>
<thead>
<tr>
<th>Progestagen</th>
<th>Androgen</th>
<th>% Azoo-spermic</th>
<th>% Oligozo-spermic</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMPA 250 mg every 6 weeks</td>
<td><strong>19 NT</strong> (200 mg every week x 6/7 weeks, then 200 mg/3 or 4 weeks)</td>
<td>67 (W)</td>
<td>92 (W)</td>
<td>Knuth et al (1987)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>98 (A)</td>
<td>99 (A)</td>
<td></td>
</tr>
<tr>
<td>TE (200 mg(IM every week x 6/7 weeks, then 200 mg/4 weeks)</td>
<td>59 (W)</td>
<td>91 (W)</td>
<td>WHO (1993)</td>
<td></td>
</tr>
<tr>
<td>DMPA 300 mg</td>
<td><strong>T implant</strong> (800 mg)</td>
<td>90 (W)</td>
<td>100 (W)</td>
<td>Handelsman et al (1996)</td>
</tr>
</tbody>
</table>

/continued
Hormonal Approaches to Male Contraception

Androgen with Progestin

<table>
<thead>
<tr>
<th>Progestagen</th>
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<th>% Oligozo-spermic</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Levonorgestrel (oral)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 µg/day</td>
<td>TE (100 mg/week IM)</td>
<td>67 (W)</td>
<td>94 (W)</td>
<td>Bebb et al (1996)</td>
</tr>
<tr>
<td>250 µg/day</td>
<td>TE (100 mg/week IM)</td>
<td>78 (W)</td>
<td>89 (W)</td>
<td>Anawalt et al (1997)</td>
</tr>
<tr>
<td>125 µg/day</td>
<td>TE (100 mg/week IM)</td>
<td>61 (W)</td>
<td>94 (W)</td>
<td></td>
</tr>
<tr>
<td><strong>Desogestrel (oral)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300 µg/day</td>
<td>TE (100 mg/week IM)</td>
<td>81 (W)</td>
<td>94 (W)</td>
<td>Wu et al (1998)</td>
</tr>
<tr>
<td>150 µg/day</td>
<td>TE (50 mg/week IM)</td>
<td>73 (W)</td>
<td>100 (W)</td>
<td></td>
</tr>
</tbody>
</table>

W=White, A=Asian, DMPA=depotmedroxyprogesterone acetate, TE=testosterone enanthate
19 NT= 19 nortestosterone hexyloxyphenylpropionate
Hormonal Approaches to Male Contraception

Androgen with Progestin
Hormonal Approaches to Male Contraception

**Other Approaches**

- **Androgen with anti-androgen** (*cyproterone acetate*)
  - Progestin with anti-androgen properties
  - May block the activity of any residual T in the testis

- **Androgen with GnRH Analogue**
  - Effective suppression of gonadotrophins
  - High cost; frequent application
Interrupting Sperm Transport

Vasectomy/Sterilization

Worldwide, 42-60 million men (5-8% of married couples) rely on vasectomy

- New Zealand - 23%
- United States - 11%
- The Netherlands - 11%
- South Korea - 11%
- Australia 10%

- China - 8%
- India - 7%
- Nepal - 5%
- Thailand - 5.3%
- Sri Lanka - 4.6%
- Brazil 1.6%

All other developing countries have <1% prevalence of use
## Interrupting Sperm Transport

**Vasectomy/Sterilization**

<table>
<thead>
<tr>
<th>Method</th>
<th>1982 (n=172,788)</th>
<th>1988 (n=406,387)</th>
<th>1992 (n=73,946)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterilization</td>
<td>24.5%</td>
<td>35.0%</td>
<td>46.1%</td>
</tr>
<tr>
<td>Female</td>
<td>17.6%</td>
<td>27.2%</td>
<td>35.9%</td>
</tr>
<tr>
<td>Male</td>
<td>6.9%</td>
<td>7.8%</td>
<td>10.2%</td>
</tr>
<tr>
<td>IUD</td>
<td>34.9%</td>
<td>29.5%</td>
<td>33.1%</td>
</tr>
<tr>
<td>Others*</td>
<td>10.1%</td>
<td>6.6%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Non-users</td>
<td>30.5%</td>
<td>28.9%</td>
<td>15.4%</td>
</tr>
</tbody>
</table>

*The oral pill, condom, spermicide and other methods.*

Interrupting Sperm Transport

Vasectomy/Sterilization

• **Conventional vasectomy**
  – highly effective and safe
  – incision required
  – permanent

• **No-scalpel vasectomy**
  – highly effective
  – Somewhat more acceptable
  – lower complication rates

• **Percutaneous vas occlusion**
  – many compounds evaluated
  – lower efficacy rates
  – some additional complications

Conventional vasectomy is highly effective and safe, requires an incision, and is permanent. No-scalpel vasectomy is more acceptable, has lower complication rates, and is highly effective. Percutaneous vas occlusion uses many compounds, has lower efficacy rates, and may come with some additional complications.
## Methods of Vasectomy

### Success of Reversal

<table>
<thead>
<tr>
<th>Method</th>
<th>Follow-up (no and %)</th>
<th>Sperm (no and %)</th>
<th>Normal (no and %)</th>
<th>Pregnancy (no and %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-scalpel Vasectomy</td>
<td>19/23 (82.6)</td>
<td>16/19 (84.2)</td>
<td>13/19 (68.4)</td>
<td>15/19 (78.9)</td>
</tr>
<tr>
<td>Chemical Vas occlusion</td>
<td>26/31 (83.9)</td>
<td>18/26 (69.2)</td>
<td>12/26 (46.2)</td>
<td>13/26 (50.0)</td>
</tr>
<tr>
<td>MPU Vas occlusion</td>
<td>31/34 (91.2)</td>
<td>10/31 (32.3)</td>
<td>10/31 (32.3)</td>
<td>9/31 (29.0)</td>
</tr>
</tbody>
</table>
Blocking sperm deposition
Blocking sperm deposition

Male Condoms

- Condoms are effective at preventing pregnancy and STI/HIV
- Condom use is low even in countries with high prevalence of HIV/AIDS
- How can we increase condom use?
Blocking sperm deposition

Male Condoms

Condom studies

• Randomized comparative studies of “standard” and “new” condoms
  – Acceptability and preference
  – Contraceptive efficacy
  – Prevention of STI

• Reasons for use and non-use of condoms
Disrupting Sperm Function and Preventing Fertilization

• Targeted basic science research on testicular, epididymal or vas approaches:

• Some promising targets:
  – functional development, i.e. motility
  – structural development, i.e. organelles
  – structure and function, i.e. membrane integrity and intracellular pathways
Acceptability/Sociobehavioral Studies

- Current use of male methods
- Preferences for new methods
- Characteristics of new methods
- Continuation and discontinuation of trial
- Effects on mood
- Effects on behavior
- Effects on cognition
- Partner’s views on mood and behavior
Acceptability/Sociobehavioral Studies

Reports from 25 Swedish men participating in TE trial

Expectations
• Freedom and security
• Problems with female methods
• Desire for more satisfying sex life
• Need for male control
• Fear of negative side effects

Satisfaction
• Greater freedom
• More ease in sex life
• Would recommend method to others
• Trouble with injections
• Fear of problems with aggressiveness
• Dermatological problems
## Acceptability/Sociobehavioral Studies

<table>
<thead>
<tr>
<th>Statement</th>
<th>Very important</th>
<th>Somewhat important</th>
<th>Not important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men should share responsibility for contraception</td>
<td>41.2</td>
<td>51.0</td>
<td>7.8</td>
</tr>
<tr>
<td>Contributing to solving the population problem</td>
<td>41.6</td>
<td>48.7</td>
<td>9.7</td>
</tr>
<tr>
<td>I felt I was doing a good thing for my country</td>
<td>36.7</td>
<td>52.9</td>
<td>7.9</td>
</tr>
<tr>
<td>I like to be involved in new things</td>
<td>25.0</td>
<td>56.8</td>
<td>18.2</td>
</tr>
<tr>
<td>I felt pride in contributing to scientific advancement</td>
<td>26.9</td>
<td>51.6</td>
<td>21.4</td>
</tr>
<tr>
<td>Pioneer of a new method of contraception</td>
<td>24.4</td>
<td>46.1</td>
<td>29.5</td>
</tr>
<tr>
<td>My wife wanted me to take responsibility</td>
<td>23.1</td>
<td>44.8</td>
<td>32.1</td>
</tr>
<tr>
<td>I joined for getting the financial compensation</td>
<td>12.7</td>
<td>28.6</td>
<td>58.8</td>
</tr>
</tbody>
</table>
### Acceptability/Sociobehavioral Studies

<table>
<thead>
<tr>
<th>Reasons for perceived inconvenience</th>
<th>Month 4 (%)</th>
<th>Month 8 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have to come to clinic</td>
<td>23.1</td>
<td>9.3</td>
</tr>
<tr>
<td>Once a month too frequent</td>
<td>70.5</td>
<td>76.3</td>
</tr>
<tr>
<td>Wait at the clinic</td>
<td>1.3</td>
<td>5.1</td>
</tr>
<tr>
<td>Other</td>
<td>5.1</td>
<td>9.3</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reasons for dissatisfaction</th>
<th>Month 4 (%)</th>
<th>Month 8 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side effect</td>
<td>11.5</td>
<td>6.0</td>
</tr>
<tr>
<td>Inconvenience</td>
<td>54.0</td>
<td>48.7</td>
</tr>
<tr>
<td>Injection pain</td>
<td>21.8</td>
<td>12.0</td>
</tr>
<tr>
<td>Others</td>
<td>12.6</td>
<td>33.3</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Men’s Role in Reproductive Health

Men can:

- Inhibit access to and use of FP
- Expose women and themselves to disease including HIV
- Act as barriers to women’s reproductive health
- Facilitate use of contraception
- Protect themselves and their partners from infection
- Act as partners in promoting reproductive rights and care for all

OR

OR

OR