Male Contraception

Kirsten M. Vogelsong, PhD

UNDP/UNFPA/WHO/World Bank
Special Programme of Research Development and Research Training in Human Reproduction
Why Men in Family Planning?

- International Conference on Population and Development, 1994
- Shared responsibility and gender equity
Male Involvement in Fertility Regulation

- Condom
- Vasectomy
- Withdrawal
- Calendar/Rhythm
### Distribution of Contraceptive Use

#### Prevalence

**World wide contraceptive use (Married Women of Reproductive age)**

<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>Total users</td>
<td>648</td>
<td>61.9</td>
<td></td>
</tr>
<tr>
<td><strong>Modern methods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female sterilization</td>
<td>210</td>
<td>20.1</td>
<td>0.5</td>
</tr>
<tr>
<td>IUD</td>
<td>156</td>
<td>14.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Oral contraceptives</td>
<td>82</td>
<td>7.8</td>
<td>5.0</td>
</tr>
<tr>
<td>Condom</td>
<td>53</td>
<td>5.1</td>
<td>14.0</td>
</tr>
<tr>
<td>Male sterilization</td>
<td>43</td>
<td>4.1</td>
<td>0.15</td>
</tr>
<tr>
<td>Injectables</td>
<td>27</td>
<td>2.6</td>
<td>0.3</td>
</tr>
<tr>
<td>Vaginal barriers</td>
<td>4.2</td>
<td>0.4</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>32</td>
<td>3.1</td>
<td>19.0</td>
</tr>
<tr>
<td>Rhythm</td>
<td>27</td>
<td>2.6</td>
<td>25.0</td>
</tr>
</tbody>
</table>

UN Population Division, 2001
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 programs, potential users, and donors*
Approaches to Male Contraception: Targeting the sperm

- Block deposition
- Interrupt transport
- Inhibit production
- Disrupt function
- Prevent fertilization

Source: Image House Medical, Copenhagen
Blocking Sperm Deposition
Blocking Sperm Deposition

**Male Condoms**

- Condoms are effective at preventing pregnancy and STI/AIDS.
- 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
Interrupting Sperm Transport

Vasectomy/Sterilization

Worldwide, nearly 43 million married couples rely on vasectomy

- United Kingdom - 18%
- New Zealand - 18%
- Canada - 15.2%
- Rep. of Korea - 13%
- United States - 13%
- The Netherlands - 11%
- Australia - 10%

- Switzerland - 8.3%
- Spain - 8.1%
- Bhutan - 8%
- China - 8%
- Belgium - 7.0%
- Nepal - 5.4%
- Thailand - 5.3%
- Denmark - 5%

UN Population Division, 2001
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
# 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>
Inhibiting Sperm Production

Hormonal Contraception

Hypothalamus ➔ Pituitary

GnRH (+)

Testes

LH, FSH (+)

T (-)
## Inhibiting Sperm Production

### Hormonal Contraception

<table>
<thead>
<tr>
<th>Androgen alone</th>
<th>T Enanthate</th>
<th>T Undecanoate</th>
<th>T Buciclate</th>
<th>Pellets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progestin + Androgen</td>
<td>Norplant</td>
<td>DMPA</td>
<td>Norethisterone Enanthate</td>
<td></td>
</tr>
<tr>
<td>GnRH</td>
<td>Agonists</td>
<td>Antagonists</td>
<td>Vaccines</td>
<td></td>
</tr>
<tr>
<td>FSH</td>
<td>Antagonists</td>
<td>Vaccines</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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

Sperm concentrations following weekly inj. 200 mg T-enanthate

Asian Men

Non-Asian Men

91% ↔ >5 x 10^6 / ml → 14%

<5 x 10^6 / ml → 26%

Azoospermia

60%
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>% Oligozoo spermic</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMPA 250 mg</td>
<td>19 NT (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>DMPA 300 mg</td>
<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>
</tr>
<tr>
<td></td>
<td></td>
<td>96 (A)</td>
<td>96 (A)</td>
<td></td>
</tr>
<tr>
<td>DMPA 300 mg</td>
<td>T implant (800 mg)</td>
<td>90 (W)</td>
<td>100 (W)</td>
<td>Handelsman et al (1996)</td>
</tr>
</tbody>
</table>
## Hormonal Approaches to Male Contraception

### Androgen with Progestin

<table>
<thead>
<tr>
<th>Progestagen</th>
<th>Androgen</th>
<th>% Azoo-spermic</th>
<th>% Oligozoospermic</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Levonorgestrel</strong> (oral)</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</strong> (oral)</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

![Graph showing sperm concentration over time withTU and TU+DMPA](image.png)
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
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
Male Reproductive Health Agenda

- Contraceptive research and development
- Targeted basic science - physiology and fertility
- Social & behavioral sciences
- Men’s roles in reproductive health
- Building networks
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
<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>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<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>
</tbody>
</table>

### Reasons for dissatisfaction

<table>
<thead>
<tr>
<th>Reasons for dissatisfaction</th>
<th>Month 4</th>
<th>Month 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<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>
</tbody>
</table>

(n = 78) (n = 117)
Men’s Roles 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

OR

- Facilitate & support use of contraception
- Protect themselves and their partners from infection
- Act as partners in promoting reproductive rights and care for all
Providing FP Services to Men

• How can FP service facilities address men’s needs?

• How to create and then address an increase in demand for FP services for men?

• Who will provide FP services to men?