Immunocontraception

Postgraduate Research Training in Reproductive Health

Faculty of Medicine, University of Yaounde

Pierre Marie Tebeu (M.D)

pmtebeu@yahoo.fr
Specific objectives

- Definition
- Identify who will be able to use immunocontraception
- Justify the development of immunocontraception
- Identify the advantages of immunocontraception
- Identify the disadvantages of immunocontraception
- The target of immunocontraceptive agents
- The mechanism of action of immunocontraceptive agents
- Identify the actual limits of immunocontraception
What is Immunocontraception?

- Immunity = Body defense mechanisms
- Contraception = Protection against unplanned pregnancy
- Immunocontraception = The use of body defense mechanisms to provide protection against an unplanned pregnancy
Distinguish
anti-disease vaccine # Immunocontraception

- Anti-disease vaccine.
  - Protection against disease
  - Target is foreign pathogen
  - Immunity often boosted by exposure to pathogens
  - Long acting vaccine induced immunity

- Immunocontraception
  - Protection for pregnancy
  - Target is self cells/hormon
  - Vaccine induced immunity
  - Immunity is not boosted by re-exposure to antigen
  - Long acting vaccine induced immunity
Why the Immunocontraception?
(1)-Unplanned pregnancies

- New pregnancies/year: 210 millions (Aitken 2002).
- 38% are unplanned.
- 22% are aborted
Why the Immunocontraception? (2)-population overgrowth

- By year 2000: 6 billions
- By year 2004: 6.4 billions
- By year 2050: 10 billions
- 97% world growth is in developing countries
- This overgrowth will worsen the impact of many social, ecologic, economic and medical trends
Why the Immunocontraception?(3)

- To provide an additional long acting option to family planning users
- Recourse to the self immune system, easily use
Why the Immunocontraception?
(4) - To diminish wildlife animals

- As wildlife habitat continues to diminish and animals adapt to living near us, we have a practical and perhaps a moral obligation to find new management solutions.
Why the Immunocontraception? (5) - A mean to control wildlife population
Examples of biocontrol approach

- Interfering with fertilisation
- Preventing development of embryo
- Preventing the development of the reproductive system
- Interfering with lactation
Target of immunocontraceptive agents

- GnRH
- FSH
- Steroids
- Gametes
- hCG
Common mechanism of action

- Induction to the body the production of antibodies against it's own reproductive proteins
- This would block the action of the reproductive proteins or destroy them
Various stages of clinical testing (1)-Phase I study

- Safety of the preparation in human
- About 50 subjects allocated sequentially to increase the dose.
- Lasting 1-2 years
Various stages of clinical testing
(2)-Phase II study

- The efficacy of selected dose

- About 100-200 subjects allocated

- Lasting 2-3 years
Various stages of clinical testing
(3)-Phase III study

- The safety and efficacy
- About 1000 subjects randomized in groups
- Lasting 4-6 years
GnRH immunocontraception

- Immunological castration (Preclinical trials)
- Prolong anovulation in postpartum women (Clinical trials ongoing)
- Hormonal suppression in man with prostatic cancer (Clinical trial)
FSH immunocontraceptives

- Immunogenesis + effect on spermatogenesis
  (Phase I clinical trial)

- Results:
  - Some reduction in sperm number and motility
  - No significant effect on semen parameters
  - Preparation was weakly immunogenic
Steroid immunocontraceptives

- Only preclinical trials are conducted

- No clinical trial conducted to date
Gamete immunocontraceptives
(sponsor-agent)

- Only preclinical trials are conducted
- Sponsor: HSUS (Human Society of the United States)
- Agent: Zona pellucida proteins (PZP)
Gamete immunocontraceptives
(Mechanism of action)

- Action of PZP:Spay-Vac\textsuperscript{R}: form of immunovaccine
- After injection of pig PZP to the animal, that animal body produces antibodies to it. These antibodies attach to female ZP protein, then prevent sperm from attaching
- No clinical trial conducted to date
hCG immunocontraceptives studies

- Many preclinical trials completed
- Many phase I, II clinical trials completed
- Phase III clinical trials are ongoing
hCG immunocontraceptives sponsors

- National Institute of Immunology, Delhi, India.
- Population Council, New York, USA.
- World Health Organization, Geneva, Switzerland.
hCG immunocontraceptives sponsor and specific agent used:

1-National Institute of Immunology India

- **Agent:** Heterospecies dimer of Beta-hCG
  - alpha-oLH,
  - tetanus toxoid,
  - diphtheria toxoid,
  - LPS,
  - alum

- Many phase I, II clinical trials completed
- Phase III clinical trials are ongoing
hCG immunocontraceptives sponsor and specific agent used:
2-Population Council, New York, USA

- **Agent:**
  - beta hCG
  - tetanus toxoid,
  - alum.

- **Many phase I, clinical trials completed**
hCG immunocontraceptives sponsor and specific agent used:
3-World Health Organization, Geneva, Switzerland

- **Agent:**
  - hCG specific peptides,
  - diptheria toxoid,
  - muramyl dipeptide,
  - slow-release copolymer matrix,
  - water-in-oil emulsion vehicle

- **Many phase I, clinical preparation**
Specific needs for Immunocontraception

- Clarification of mechanisms of action
- Reversal of contraceptive effect on demand
- Assessment of long term safety
- Assess the acceptability
- Clarify the social, economic and political issue
Conclusion

- Immunocontraception is a long term family planning option for tomorrow
- But we need to keep its development in mind