Immunocontraception

Postgraduate Research Training in Reproductive Health

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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% worid 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 whilelife 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 2-3years

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

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

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^{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.
- Word 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,
  .dipthteria 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 pnase 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