Symposium: Immunocontraception

Guest Editor: T.C.Anand Kumar

Development of immunocontraceptives: an introduction

T.C.Anand Kumar

Reproductive Health Clinic and Research Center, 12 Aga Abbas Ali Road, Bangalore 560 042, India

The contraceptive revolution started during the middle of the present century when world-wide consensus held that newer and better contraceptives would go a long way to reduce the pressures of population overgrowth. The eradication of smallpox from planet Earth through vaccinations gave reason to believe that a contraceptive vaccine may provide a solution to the mounting pressures of excessive population growth. The Government of India, through their Department of Biotechnology and the Indian Council of Medical Research, mounted a major effort in the mid-seventies to develop birth control vaccines which would be effective both in men and women. The quartet of papers included in this mini-symposium represent some of the most important developments that have occurred out of such efforts.

The β human chorionic gonadotrophin (HCG) vaccine developed by Talwar (1997) was the first contraceptive vaccine to be clinically tested in the world and found to be safe for use in women. The first ever contraceptive vaccine to be tested in the male is the heterologous follicle stimulating hormone (FSH) vaccine developed by Moudgal et al. (1997) which has been proven to cause infertility in monkeys and Phase I trials have unequivocally been shown that the vaccine does not cause any ill-effects in men and also that some of important semen characteristics are altered in a manner normally seen in infertile men.

Gupta (1997) has explored the possibility of developing a vaccine by using the zona pellucida proteins as the antigen with encouraging results.

There is, however, one common thread that runs through all these studies, none of the vaccines is effective in all the individuals; there are good as well as poor responders. This is not surprising as we well know none of the vaccines used for prophylactic purposes is 100% effective. More research is required in this area. For example, epitope mapping using overlapping octapeptide scanning of the entire sequence of chicken RCP has revealed that at least six common epitopic sequences, including N- and C-terminal peptidyl sequences are recognized by mice, rats rabbits and Bonnet monkeys during polyclonal response to chicken reduced and carboxy methylated RCP (RCM–RCP) as the antigen. Purified human RCP polyclonal antibodies in rabbits also recognize four of these common epitope structures. Recognition of such sequences and elucidation of bio-neutralizing efficacy of these epitope-specific antibodies should afford a rational design of a vaccine by recombinant technology or chemical synthesis (P.R.Adiga, personal communication).

In some instances, such as the β-HCG vaccine, a surprising spin-off has been found with immunocontraceptives, such as in treating cancers.

It will become obvious to the reader of this quartet of papers that the studies carried out so far in this frontier area of immunocontraception have been arduous, but quite promising. Much has been learnt on how vaccines work in human subjects. Insights have been gained on future directions for research. It remains to be shown whether the use of a polyvaccine or a combination of contraceptive vaccines such as anti-FS11 plus anti-RCP or anti-HCG plus...
anti-RCP, could increase the overall effectiveness of immunocontraceptives.

There has been a disturbing trend in some quarters which believe in obtaining quick results. One view holds that despite the massive efforts, no new contraceptive has emerged over the horizon during the last three decades and therefore there is every likelihood of a new contraceptive never being developed during a reasonable period of time. It is also held that further support for contraceptive research is unlikely to aid population control because birth rates have dropped significantly with the use of existing contraceptives in some countries.

This is a sad and dangerous view for developing countries which still face the problems caused by overpopulation and where there is a need to have a wide range of contraceptives to suit various human needs. Immunocontraception is one such area that holds promise provided funding agencies recognize the importance of supporting such research.

References


