Immune therapy can control fertility in mammals

March 31 2011

Researchers at Weill Cornell Medical College have shown that it is possible to immunize mammals to control fertility. They say their technique could possibly be used on other mammals -- including humans -- because fertility hormones and their receptors are species-non-specific and are similar in both females and males. For pets, the technique could be an alternative to castration and adverse effects of hormone administration.

In the Feb. 24 online issue of *Genetic Engineering and Biotechnology Journal*, the researchers say their newly synthesized novel chimeric genes produce bi-functional recombinant proteins that are antigenic. The antibodies can tamp down production of progesterone in females and testosterone in males. The most immediate use of this technique might be to control fertility in dogs and cats or other mammals in need of population control, says the study's lead investigator, Dr. Brij B. Saxena, the Harold and Percy Uris Professor of Reproductive Biology at Weill Cornell Medical College.

After extensive preclinical testing for the efficacy, safety and reversibility in animals, the immune therapy might be possible in humans as a treatment for androgen excess syndromes as well as an immunological method to control fertility, adds Dr. Saxena.

The new chimeric gene was engineered by Dr. Saxena and his Weill Cornell colleagues, Dr. Meirong Hao and Dr. Premila Rathnam, and then inserted into insect cells to produce recombinant bi-functional protein.

Immunity against fertility can be provided by the production of a bi-functional antibody by active or passive immunization using the recombinant protein.

This new gene contains DNA sequences from two natural genes that are integral to fertility in mammals. One portion is the extracellular domain (ECD) of the ligand (hormone) binding region of the human lutropin/human chorionic gonadotropin receptor (ECD-hLH-R), which is present in the ovaries and testes. The other component is the unique C-terminal peptide of the human chorionic gonadotropin β-subunit (hCG β-CTP).

Key to development of this new chimeric gene and recombinant protein is the researchers' finding that the hLH-R and hCG-β-CTP recombinant proteins are antigenic -- meaning that they can produce an immune response in the body, and produce bifunctional antibodies with dual effect. The antibodies are able to block the hormone binding to the receptor and thus suppress the signal to produce ovarian hormones, specifically progesterone. The second component of the antibody specific to hCG β-CTP would neutralize the hCG-like material produced by the fertilized egg prior to or at the time of implantation. This would lead to lack of stimulation to promote progesterone production by the corpus luteum, resulting in the lack of proliferation of endometrial growth that is vital for the implantation of the fertilized egg -- thus preventing pregnancy.

The scientists are now working on methods to upscale the production of recombinant chimeric protein to be tested as antigens in dogs and cats.

Provided by New York- Presbyterian Hospital