Sperm inhibitors as contraceptives

Oral contraceptives and intrauterine devices (IUD's) are undoubtedly the best available birth control methods, short of sterilization, but they have been linked to an increasing number of complications, such as high blood pressure, strokes, heavy menstrual flow and pain. So scientists are back at their benches trying to devise more specific, less side-effect-plagued methods. Lourens J. Zaneveld of the University of Illinois Medical Center at Chicago has targeted an enzyme in the cap-like cover of the sperm for his attack on the problem.

He has chosen the enzyme acrosin because without it the sperm cannot fertilize the egg, and because it is found nowhere in the body except the sperm head. Because of the enzyme's exclusiveness, a specific inhibitor of acrosin should have minimal side effects. Potentially the contraceptive could be used by both men and women. Women could use it locally, coupled with contraceptive foam or cream; both men and women may someday take a pill.

Acrosin tunnels a path through an acellular layer of proteins and sugars that coat the egg. If this layer, the zone pellucida, is not removed the sperm cannot fertilize the egg. Actually, male semen contains natural inhibitors of acrosin, but these proteins and polypeptides are removed when the sperm are trekking up the female reproductive track. Zaneveld sought out smaller synthetic inhibitors which bind to the active site of the enzyme and will not come off.

He admits to not yet having the perfect inhibitor, but he said in an interview that experiments using the synthetic inhibitor p-Nitrophenol-p'-guanidino benzoate (NPGB) look promising. Zaneveld, A. K. Bhattacharya and D. S. Kim found that by adding NPGB to Delfen vaginal contraceptive cream, fewer pregnancies occurred in female monkeys than in those administered the Delfen cream alone. They also found that if they added NPGB to K-Y jelly, a lubricant with no contraceptive power by itself, K-Y jelly became as effective as the Delfen cream.

Contraceptive foams and creams have dismal track records. Reports vary, but they seem to be only 70 to 80 percent effective. Zaneveld said the acrosin inhibitor could increase the effectiveness of the foam by mobilizing a second mode of attack against the sperm. Spermicides in the foam work by damaging sperm membranes; the inhibitor would stop an essential enzyme.

Zaneveld is now looking for a more specific inhibitor than NPGB, however, because NPGB could cause complications if absorbed into the general circulation.

If a perfect or near-perfect specific inhibitor is found, could this be a long sought and loudly demanded male birth control method? Not yet. Another obstacle must be leaped. The inhibitor cannot be applied locally in males as it can in females. Men would need an oral medication. It remains to be seen if enough inhibitor can cross over into the male reproductive tract to stop the 300 million sperm produced each day. □

Molecule suppresses allergic reactions

David H. Katz has made a discovery not to be sneezed at. The researcher at the Scripps Clinic and Research Foundation in La Jolla, Calif., found that nonallergic mice have a blood serum substance that can turn down the production of IgE, the type of antibody molecule responsible for the allergic reaction of mice and men. If these findings can be extended to human beings, and Katz believes they can, we may better understand why some people are allergic and others are not.

Katz dosed mice of a highly inbred strain resistant to allergies with low levels of X-rays. They became extremely allergic to allergens, or allergy-producing substances, such as hay fever pollen, he told a recent meeting of the American Academy of Allergy. But their allergy-resistance could be restored if they were transfused with serum from nonirradiated mice of the same strain that had been exposed to an allergen (not necessarily the same one). The allergen boosted their levels of allergy-resistance substance. Later experiments found that the suppressor molecule in the nonirradiated mice serum has a molecular weight of about 150,000.

The allergy resistance could only be passed between mice of the same strain, not between mice of different strains. In interstrain transfusions, the suppressor molecule was recognized as "foreign" and destroyed.

Any number of allergens dampened IgE production in the nonallergic mice; apparently the suppressive serum molecule increases when any allergen is encountered, not just a specific one. Yet only IgE antibodies and not IgG, another type of antibody essential for warding off diseases, were suppressed.

Does this mean help for the 31 million Americans who sneeze, wheeze and are periodically festooned with hives? Humans are not inbred, so human suppressor molecules, if they exist, cannot be transfused from the nonallergic to the allergic. However, while emphasizing that he is only speculating, Katz suggests the possibility of protecting allergic individuals by finding a way to boost production of the suppressor molecule.

The only treatment now available is "desensitization," which is time-consuming, costly and too often inefficient. It consists of weekly shots in increasing doses of each allergen (if you're allergic to one substance, you're likely to be allergic to others) to which the person is allergic. Increased suppressor molecule production could give protection against most allergens, not just one.

At this stage, however, he says, "Perhaps the main clinical implication of this work is that we now better understand the biological basis for distinguishing allergic from nonallergic beings." □

Home-grown truffles?

The truffle, according to ancient Romans, was the offspring of thunder and the soil. Now French scientists, perhaps less dramatically but more practically, have successfully cultivated truffles after 20 years of attempts.

Until now that rare delicacy only arose spontaneously in limited areas — a symbiotic association between tree roots and the underground mushroom's filaments. Three and one-half years ago Gérard Chevalier, at the French National Institute for Agronomic Research, successfully inoculated the roots of nut trees with fungus. Now he and colleagues have harvested 20 truffles, a crop of 1 kilogram. Normally, truffles take six years to mature, so the cultivation broke speed records as well as set an agronomic precedent.

Truffles aren't necessarily a delicacy limited to Europe. Almost half of the world's truffle species are North American. Despite earlier pessimism that the New World cousins all taste like rancid bacon (SN: 10/18/75, p. 250), James M. Trappe of Oregon State University says, "We have some good candidates for table use." Fully mature specimens of *Tuber gibbosum* (the truffle with humps) are to his palate and nose equivalent to the gourmet Italian white truffle. Food technologists are currently making comparative chemical analyses to back up his taste buds. The early discouragement, Trappe says, resulted from sampling unripe specimens.

For U.S. scientists, fascination with truffles is incidental to their work on the value of fungi for promoting growth of tree seedlings. They plan to use the truffle fungus in inoculating nurseries as soon as they have it growing better in the laboratory. So far, laboratory conditions are inferior to root-laced soil. "It's getting something from the tree," Trappe says, "but we don't know what." The French researchers sent samples of European black truffle, their cultivation triumph, to Trappe. He and co-workers plan to inoculate native American trees in hopes of producing a delicious multi-national truffle. □