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# Biomedicine

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*From our reporter at the annual meeting of the Federation of American Societies for Experimental Biology in Atlantic City*

## Antibodies and genes

Immunological procedures have been used to probe human blood types and the mechanisms of autoimmune diseases. They are also being used to explore genetic material and its protein products. Bernard F. Erlanger and Rose M. D'Alisa, microbiologists at Columbia University College of Physicians and Surgeons, have now managed to make antibodies to three triplet codons. A codon is a set of three nucleotides that, as part of a nucleic acid DNA, orders a particular amino acid to become part of a protein. The codons they have made antibodies to are two that specify the amino acids lysine and asparagine and the one (known as AUG) that initiates protein synthesis.

By making antibodies to codons, investigators can block different aspects of gene translation and thus learn more about it. For example, if antibodies to AUG inhibit protein synthesis by blocking the process of initiation, they could serve as useful tools for understanding the mechanism by which proteins, or specific proteins such as enzymes and antibodies, are synthesized.

## The why of nicotine fits

Some scientists believe that nicotine fits, the withdrawal anguish that smokers experience when they run out of cigarettes or stop smoking, is caused by the deprivation of oral pacification (no longer having something to mouth or suck on). Other investigators believe nicotine fits are physiological.

University of Louisville neurobiologists J. E. Hubbard and Robin S. Gohd injected rats once a day for six days with nicotine in quantities that approximated those smoked by people. The injections disrupted the rats' brain wave patterns and aroused them. But after six days these neurological-behavioral changes slacked off, suggesting that the rats had become tolerant of the nicotine—or addicted to it in a sense.

Hubbard interprets the findings as an indication that nicotine fits are physiological. In other words, when nicotine is no longer available, the body, which has become used to it, reacts.

## Children and drug sensitivity

S. A. Miller and Frank Cremin of the Massachusetts Institute of Technology fed young and adult animals excess amounts of the common food preservative BHT. They found that the young animals were more sensitive than the adults. BHT appeared to trigger liver damage and changes in the bile duct.

Miller says they were not out to prove that BHT is harmful to young animals, but rather to point up the need for studies to see how children respond to different drugs and food preservatives. Surprisingly little research has been conducted to determine whether children react differently, but the little evidence that is available suggests that children are sometimes more sensitive in their reactions to morphine, lead or DDT.

## Cholera toxin unmasked

Since the 1960's Africa, parts of Europe and the Soviet

Union have been swept by a cholera pandemic—the largest since the 19th century. Cholera vaccines have been available since 1890, but they consist of dead cholera bacteria and provide limited protection. A better understanding of cholera bacteria and their products is essential if a more effective cholera vaccine is to be found.

During the 1960's and early 1970's, Richard Finkelstein, a microbiologist at the University of Texas Southwestern Medical School and his colleagues, identified, purified and characterized the enterotoxin made by one cholera-bacterium strain. It is the enterotoxin that damages the host cell and causes cholera. Finkelstein now reports that they have broken the enterotoxin down into two subfractions—one that interacts with the membrane of the host cells and one that damages the cells.

They will now screen cholera-bacteria strains in hopes of finding a mutant strain that makes a nontoxic enterotoxin. If they find one, it might be given to people and stimulate immune protection against cholera, yet not run the risk of infecting them with the disease. "That might be the ultimate immunologic weapon against cholera," says Finkelstein.

## Breast cancer immunization

A vaccine against breast cancer in mice has been developed by Jesse Charney and his team at the Institute for Medical Research in Camden, N.J. Because of a close parallel between mouse and human breast cancer, and the possibility that they are caused by related viruses, the New Jersey immunologists believe that the vaccine may serve as a possible model for a vaccine against human breast cancer.

The vaccine consists of killed mouse breast tumor virus. A single dose of the vaccine, which seems to prime cellular immunity, completely protected mice against cancer. Control mice that did not receive the vaccine showed a 55 percent rate of virus infection and a two-year tumor incidence of 36 percent. The vaccine also reduced endogenous expression of the virus in the mice, which expresses itself late in life just as breast cancer tends to hit women late in life.

## The intrigue of antibody diversity

A single animal seems capable of producing thousands of different antibodies in response to different antigens. So immunologists wonder whether all of us possess, from birth, a genetic blueprint for every one of the antibodies we are potentially able to produce, or whether it is necessary to invoke some special mechanism to explain the formidable capability. To answer this question, Rose Lieberman and her colleagues at the National Institutes of Health looked for a particular type of antibody, known as T15 idiomotype, in different strains of mice, many of which were closely related. They found significant levels of the antibody in several of the strains, but not in others, and only those strains carrying a particular set of genes turned out to have the antibody.

These findings, the immunologists believe, support the so-called "germ line theory" of antibody diversity which postulates that mice and people, along with other vertebrates, possess from birth all the genetic instructions for antibody formation that they will ever have.