BIOMEDICINE

A clue to rheumatoid arthritis

Rheumatoid arthritis is probably the most devastating of all forms of arthritis, causing excruciatingly painful joint inflammation, systemic disease and perhaps even death. Evidence to date suggests that rheumatoid arthritis is an autoimmune disease — that immune cells in the body (B cells) make antibodies that mistakenly attack the body's own tissues. The reason that B cells make autoantibodies may now have been found by Marius Teodorescu of the University of Illinois Medical Center in Chicago.

First Teodorescu and his co-workers discovered that immune cells from rabbits (probably T cells, not B cells) produce an activator that in turn stimulates B cells to make autoantibodies. Based on this, the researchers hypothesized that something in healthy rabbits and in healthy humans keeps such an activator from bringing about autoantibody production, but perhaps such a restraint is missing in rheumatoid patients, and the activator is therefore able to create autoimmune disease. To test the latter part of this hypothesis, Teodorescu and his team examined the blood of 21 rheumatoid patients for the activator. Sure enough, 19 of the 21 patients had it, and they were the ones with active disease. So it looks as if the activator might indeed be a major culprit in the production of rheumatoid arthritis.

Teodorescu and his co-workers now are trying to determine the chemistry of the activator, and when they get it, they hope to find some way to thwart its autoimmune abilities and in turn the rheumatoid process. If they succeed, it would be a stupendous victory against a common chronic disease for which there is currently no cure.

Pinpointing hardening of the arteries

Cholesterol and cholesterol-carrying low-density lipoproteins in the blood are closely linked with hardening of the arteries, which in turn is a major risk factor in heart disease. Researchers have assumed that the cholesterol content of LDL's accurately reflects the quantity of LDL's present in the blood. But this is not always so. What's more, many victims of hardening of the arteries do not show elevated blood levels of cholesterol or of LDL cholesterol. So Allan Sniderman of McGill University in Montreal and his colleagues hypothesized that the protein constituent of LDL's, rather than the cholesterol on them, might be a more accurate indicator of hardening of the arteries.

To test their hypothesis they measured blood levels of cholesterol, LDL cholesterol and LDL protein in 100 patients undergoing catheterization of their coronary arteries. The patients were divided into two groups — those with and those without hardening of the arteries. As the researchers report in the January PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, cholesterol and LDL cholesterol levels were significantly higher in patients with hardening of the arteries than in those without, but LDL protein was even more abundant in the former group.

So it looks as if LDL protein is a better indicator of hardening of the arteries than are cholesterol and LDL cholesterol.

More black widow weapons

A protein with a molecular weight of 130,000 is one of the weapons in black widow venom. It increases neurotransmitters at the nerve-muscle junction of mammalian victims and causes muscle spasms. Now a protein toxin with a molecular weight of 65,000 and several smaller protein toxins in the spider's venom have been found to bring about the same effects in lobsters. These results are reported in the Jan. 31 NATURE by L. C. Fritz, M.-C. Tzeng and A. Mauro of Rockefeller University in New York City.

BIOLOGY

Julie Ann Miller reports from New York at the Gustav Stern Symposium on Perspectives in Virology

The viruses behind sick stomach

Only two viruses have been convincingly linked to human gastroenteritis, the stomach and intestinal illness characterized by nausea, vomiting and diarrhea. One is human rotavirus, which was recently grown in the laboratory for the first time (SN: 1/19/80, p. 38). The other, called Norwalk virus, only infects humans and chimpanzees and has not yet been cultivated, but epidemiological and clinical studies are beginning to provide data about the virus and its role in disease.

Harry B. Greenberg of the National Institutes of Health has used a radioimmunoassay to analyze outbreaks of gastroenteritis. Of 70 outbreaks, he finds that 24 were caused by Norwalk virus. The victims characteristically had a short, self-limited illness with occasional fever. The sources of virus were contaminated shellfish, drinking and swimming water, as well as infected family and community members. In contrast to rotavirus, which causes infantile gastroenteritis, Norwalk virus caused illness in all age groups except the very young.

Initially, scientists expected Norwalk virus to be one of a large number of distinct viral groups causing gastroenteritis epidemics, analogous to the more than 100 rhinoviruses that cause colds. However, the large proportion (34 percent) of gastroenteritis outbreaks attributed to Norwalk virus indicates that the total number of distinct gastroenteritis agents may be quite limited.

Immunity to Norwalk virus is still a puzzling topic. Blood antibodies do not guarantee protection. In some studies, the volunteers with the highest levels of antibody before the experimental exposure turned out to be most susceptible to illness. In another experiment with volunteers inoculated on two occasions with Norwalk virus, those who developed illness the first time again became ill after the second exposure. "Preliminary findings suggest that non-immune factors, perhaps genetic, are of primary importance in determining resistance," Greenberg concludes.

Interferon from plants

Plants as well as animals must fight disease to survive, and some of the strategies appear nearly the same in the two kingdoms. Interferon, which has been in the news as a possible near-panacea to human disease (SN: 1/26/80, p. 52), also appears to have a role in plant defense. Ilan Sela and colleagues at Hebrew University in Jerusalem report purification and characterization of an interferon-like anti-viral agent from plants.

The plant factor, produced by certain tobacco plants in response to viral infection, limits virus multiplication and therefore the spread of disease. The gene for viral resistance, called the N-gene, already had been bred into commercial tobacco varieties. Sela says that the product of that gene, in the presence of plant virus, is a phosphorylated glycoprotein that, like animal interferon, is resistant to acid. Four or five molecules per cell is sufficient to confer resistance on a plant.

The plant factor shares other properties with animal interferons. It acts to induce removal of histidine groups from "charged" RNA molecules. This activity seems to be regulated by polymerized adenosine, as in the animal system. "I do dare say now that AVF [anti-viral factor] is an interferon-like material," Sela told reporters.

While the material is active against diverse viruses in a variety of plants, it has never worked against an animal virus. So it is not an obvious source of material for pharmaceutical use. Sela suggests, however, that the material may improve crops. Plants begun in tissue culture and treated with the interferon-like material or endowed with the resistance gene might provide virus-free stock for future agriculture.