

biomedical sciences

Hitting viruses in the paunch

Scientists have tried to kill viruses by attacking their nucleic acids or their proteins (or enzymes). Little, if any, attention has been paid to killing viruses by attacking their fats—until now. Evidence that this approach has validity was reported last week at the Gustav Stern Symposium on Perspectives in Virology in New York by Sidney E. Grossberg of the Medical College of Wisconsin.

Grossberg gave a fat-lowering drug, clofibrate (also known as Atromid-S), to chick embryos infected with several kinds of encephalitis viruses. The drug not only lowered fats in the embryos but also reduced viruses in their blood. The drug might well have killed the viruses by depriving them of host-cell-membrane lipids that they needed to make their own membrane coats. This finding, Grossberg says, "may open ways to inhibiting viral replication in ways we had not thought of before." Such inhibition, he believes, may have clinical potential. But no one has yet looked to see whether the many patients on Atromid-S have fewer viral infections than other people do.

Hepatitis and sexual contact

Hepatitis B is a disease caused by a so-called B virus. It is known to be transmitted by injection of infected blood or by the use of contaminated needles. Clinically the disease is similar to infectious hepatitis, which is caused by a so-called A virus.

Epidemiological studies have suggested that hepatitis B may also be transmitted by sexual activities. Jenny Heathcote of the Royal Free Hospital in London and her virology colleagues at Middlesex Hospital in London decided to see whether 24 men whose blood contained hepatitis B antigen (viral protein) had the antigen in their saliva and semen as well. Some of the men were thought to have transmitted hepatitis B to their sexual partners.

As Heathcote and her colleagues report in the Jan. 19 LANCET, the antigen was detected by a highly sensitive and accurate radioimmunoassay technique in the saliva of 18 of the 24 men. The semen of 10 of these 18 men also contained the antigen. But investigators stress that more research has to be done before the presence of the viral antigen means that the saliva or semen contains infectious virus.

Muscle tension and biofeedback

Abnormal states of chronic muscle tensions are thought to help cause pains in the head, neck and jaws. Some investigators have found that such tension can be effectively reduced by electromyographic feedback.

One problem with EMG feedback as treatment for muscle tension is that patients have trouble estimating tension levels outside the laboratory, Roy S. Fowler Jr. and George H. Kraft of the University of Washington Medical School report in the January ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

They investigated the ability of 10 patients with chronic muscle tension and 35 healthy subjects to estimate muscle-tension levels. They found that the patients, when engaged in a task, produced significantly higher levels of muscle tension than did the healthy persons. However both healthy persons and patients were equally inaccurate in estimating tension levels.

So Fowler and Kraft suggest "that when feedback is used to facilitate muscle relaxation it should be supplemented by training in muscle-tension perception."

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physical sciences

From our reporter at the meeting of the American Physical Society in Chicago

Tracking smog formation

The hydroxyl radical (OH) plays an important role in the formation of photochemical smog and in controlling the global concentrations of carbon monoxide and methane. Finding a way to measure the concentration of hydroxyl from time to time in the air could give an accurate way to trace various photochemical processes that go on in both natural and polluted atmospheres. But hydroxyl has been difficult to measure; it amounts to less than one part in a trillion in the atmosphere. Nevertheless, a way of measuring it has been found at the Ford Motor Co.'s Research and Engineering Center in Dearborn, Mich.

The method involves detecting the resonance fluorescence that a tunable ultraviolet laser excites in the hydroxyl. Measurements with air samples taken from outside the laboratory already show that hydroxyl concentrations vary considerably during the course of a day, peaking at noon and disappearing after sunset. If the day is cloudy, there is no measurable concentration of hydroxyl. The early data already confirm the conclusion of some Harvard scientists that nature is the biggest polluter of all because of its production of carbon monoxide by oxidation of atmospheric methane through the agency of the hydroxyl radical.

Matter to close the universe

Many cosmologists seem determined to find enough mass in the universe to close it by mutual gravitational attraction—to slow down and ultimately reverse the expansion of the universe and cause it to begin to collapse upon itself. Jeremiah P. Ostriker of Princeton University says he does not know why so many of his colleagues have this predilection; an open universe would be just as acceptable to him. One of the outstanding problems for those who want a closed universe has always been that observation does not show enough luminous matter to do the job.

Studies of the rotation of galaxies have convinced Ostriker that the galaxies do in fact contain more mass than is seen. The "halos" of matter that surround them extend farther than is visible, he says and could increase the total galactic mass by about 20 percent. This could be enough.

Muons probe superconductors

Muons are particles that are light in weight (compared to protons and neutrons), electrically charged, and capable of penetrating some distance into samples of solids. They are thus quite useful for probing magnetic fields inside solids. This is especially true because they can be produced in polarized beams, beams in which the spins of all the muons are in the same direction.

Success in experiments of this kind using certain superconductors was reported by D. E. Murnick, M. Leventhal and A. T. Fiory of Bell Telephone Laboratories and W. L. Kossler of the College of William and Mary. Some superconductors will totally eject an externally applied magnetic field; others have a range of temperature where they permit partial penetration. It was this latter type of superconductor that was used. The results show that the fields inside them are in some way shifted from the field that was applied. The work continues in an attempt, important for both theoretical and practical purposes, to learn more about the structure of magnetic fields in superconductors.

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