# BIOMEDICINE

## Interferon tackles serious diseases

Interferon is a protein that cells make to help defend themselves against viruses. Since it was identified 20 years ago, scientists have feverishly attempted to isolate it in large enough amounts to see whether it can be used to combat viral diseases. Progress has been slow because of the difficulties of isolation, but encouraging. Interferon has been found to protect human subjects against flu, colds, chickenpox and shingles (SN: 3/31/73, p. 208; 2/16/74, p. 103).

Now interferon is being tried against a number of serious diseases definitively or possibly caused by viruses—breast cancer, osteogenic sarcoma, cytomegalovirus infections in neonates, varicella-zoster infections in noncancer and cancer patients, herpes infections of the eye and hepatitis. The studies are being conducted at a number of centers—Stanford University, Massachusetts General Hospital, the Sloan-Kettering Institute, Columbia University and Kyoto University.

Although study results aren't officially in yet, preliminary results at Stanford look promising, Thomas Merigan of Stanford reported at the recent Third Conference on Antiviral Substances in New York City. For instance, interferon seems to be decreasing the major complications of varicella-zoster infections, reducing the level of cytomegalovirus in patients and the level of hepatitis virus in carriers.

## Interferon made in test tube

For the first time, a protein from an organism higher than a bacterium has been synthesized in the test tube, by Sidney Pestka and his associates at the Roche Institute of Molecular Biology in Nutley, N.J., and at the New York University School of Medicine. The protein is human interferon.

Pestka and his team partially purified the messenger RNA for human interferon from human skin cells. They then succeeded in using the MRNA to make human interferon in the test tube. "This is the first cell-free synthesis of an eukaryote protein," Pestka declared at the recent Third Conference on Antiviral Substances. It should lead, he said, to the purification of human interferon and perhaps even to the isolation of the gene that makes it. Someday the gene might be inserted into bacteria, so that bacteria can make human interferon for drug use.

## Cell protein assists tumor virus

The more molecular virologists probe the actions of tumor viruses in cells, the more intricate these actions seem to be. During the past several years, for example, they have found that RNA tumor viruses transfer their genetic information—a single strand of RNA—into a RNA-DNA hybrid, thanks to a viral enzyme known as reverse transcriptase. The enzyme converts the RNA-DNA hybrid into free, unintegrated DNA-DNA. The double-stranded DNA (provirus) is then integrated into the chromosomes of the host cell.

A protein that assists these actions has recently been isolated by P.P. Hung and S.G. Lee of Abbott Laboratories in North Chicago. The protein, they report in the Feb. 12 NATURE, doesn't seem to be made by the virus. So it is probably a cellular protein and hence a traitor to the cell's well-being.

Hung and Lee isolated the protein from skin cells made cancerous by the Rous sarcoma virus. They then found that the isolated protein was capable of unwinding the viral RNA-DNA hybrid and the subsequent DNA-DNA duplex. Such unwinding, they conjecture, would not only conserve the viral RNA strand for further reverse transcription, but would also facilitate replication of the double-stranded viral DNA into many copies of provirus before integration into the host cell chromosomes.

# PHYSICAL SCIENCES

## Pulsars and monopoles

Pulsars apparently have strong magnetic fields. If magnetic monopoles, particles carrying either a single north or south magnetic pole in analogy to positive and negative electric charges really exist (for the latest on that controversy, see SN: 2/21/76, p. 122), pulsar fields ought to act as traps for them.

This is pointed out in the Feb. 12 NATURE by G. Kalman and D. ter Haar of the Department of Theoretical Physics at Oxford University. Calculating what would happen in a monopole-pulsar encounter, they find that monopoles would be accelerated by the pulsar fields and channeled along field lines toward the pulsar's magnetic poles. The acceleration gives the incoming monopoles enough energy to produce pairs of secondary monopoles in collisions with other particles near the pulsar surface.

The member of the secondary pair that had the wrong magnetic charge to be attracted to the pole near which it was made would be accelerated back into space. Thus, pulsars would be sources of copious fluxes of high-energy secondary monopoles. "It would be of interest to look for correlations between monopole events and pulsar positions, if monopole events are observed in any significant number," Kalman and ter Haar suggest.

Furthermore, the persistence of pulsar fields over time means there are not enough monopoles in space to deplete their energy, and this may set a more stringent limit on monopoles than other considerations now used, but the limit cannot be calculated until the cross section for monopole pair production is known. Even so, the density of monopoles in space is likely to be so low that a collision between oppositely charged monopoles, which would result in their annihilation, would be an extremely rare event.

## The muonic decay of K mesons

For a long time, unsuccessful attempts to discover the radioactive decay of $K^0_L$ (pronounced K-zero-long) mesons into a pair of muons made particle physicists very nervous. Among all the processes particle physicists have to deal with, the decay of K into two muons may seem a small thing to cause consternation, but its nonappearance indicated a possible violation of a fundamental law, the principle of unitarity.

The principle says that, given a particle that can decay by several modes, the fractions taking each mode should add up to one. If not, particles are vanishing without a trace, and that violates the law of conservation of mass and energy.

An experiment reported in 1973 finally found the two-muon decay, recording nine instances of it.

This was a clear disagreement with previous experiments, and so a confirmation was necessary. The confirming experiment, done at Brookhaven National Laboratory, is reported in the Feb. 16 PHYSICAL REVIEW LETTERS by Y. Fukushima and six others from Princeton University and the University of Massachusetts. They find that the fraction of two-muon decays is $8.8 \times 10^{-9}$, in agreement with theory.

## If you knew what the U knew

Among the exotic new particles found in collisions of electrons and positrons are the U particles reported some time ago by Martin Perl of the Stanford Linear Acclerator Center. Hypothetically, the U's might be either another sort of "charm" particle or heavy members of the lepton family. Perl reported at the recent meeting of the American Physical Society that further study of their decay products leans toward the heavy lepton hypothesis. But still more study is needed to be certain.