

# Cancer Clue Found

The mutation of genes causes an alteration of hydrogen bonds, a phenomenon suggested as a possible explanation of the chemistry of cancer

► A POSSIBLE explanation of the chemistry of cancer is seen in a report of hydrogen bond alteration as a major result of a gene mutation. Most authorities believe that cancer usually or always is a result of the mutation of a body cell gene.

Research by scientists under the direction of Dr. Alexander Rich at the Massachusetts Institute of Technology showed hydrogen bonding change related to electrical forces within the DNA (deoxyribonucleic acid) molecule, strands of which are held together by hydrogen bonds.

Genes are made of DNA, which is a very long, segmented, two-stranded molecule. The segments contain bases that are indicated by their initials, A, T, G and C, for adenine, thymine, guanine and cytosine, each attached to a sugar connected to its neighboring segments by a phosphate.

On the double strands of DNA, A is always paired with T, and G with C.

The strands are bound together by the attractive force of the hydrogen atoms in each strand segment.

What Dr. Rich and his associates discovered was that it is possible to form crystals of materials related to the A-T pair of the double-stranded DNA. One of the pairs linked A with U (uracil), which is closely related to the T base, thymine or 5-methyl uracil. The other crystal involved A with a bromo U, bromouracil.

The significant thing is that bromo U is a mutagen, known to bring about an alteration in the genes of experimental animals. It differs from U in that a bromine atom is substituted for a hydrogen atom and it is similar to T.

Replacement of the hydrogen atom by a bromine atom brought about a profound change in "hydrogen bonding"—the way the two molecules were packed together in the crystal.

The fact that a known mutagen, bromo U, brings about a change in the

hydrogen bonding could give a clue to the mechanism of mutation, the researchers believe. Alteration in the normal hydrogen bond that holds the DNA molecule together may be an important influence in altering genes and may represent one of the mechanisms of cancer induction through mutation formation.

Drs. F. Scott Mathews, Louis Katz and Ken-ichi Tomita worked with Dr. Rich in the studies, supported in part by the American Cancer Society.

## MEDICINE

### Blood Clots Prevented In Broken Hip Patients

► TO PREVENT pulmonary embolism, which is the leading cause of death after hip fractures especially in persons over the age of 75, anticoagulation therapy was used successfully in 83 elderly patients at Massachusetts General Hospital, Boston.

In none of the treated group of men and women did pulmonary embolism develop while an anticoagulant was being given. Warfarin in the form of Coumadin tablets was given in most cases before surgical reduction of the fracture.

Blood clotting was carefully checked to avoid excessive bleeding.

In the control group of 83 other patients, six had pulmonary embolism, and in 18, thrombophlebitis developed. Even a short period of bed rest can cause a high risk of bloodclotting complications.

Reporting in the *New England Journal of Medicine*, 275:122, 1966, were Drs. Edwin W. Salzman, William H. Harris and Roman W. DeSanctis of the Harvard Medical School.

## IMMUNOLOGY

### Measles-Smallpox Vaccine Jet-Injected

► A PAINLESS automatic jet-injection apparatus promises quick mass immunization in public health campaigns where 25 to 50 children can be assembled at one time.

Already tried out successfully in Pennsylvania, field studies have been extended to the West African nation of Upper Volta and are being considered in South America.

The combination measles-smallpox vaccine was administered to a total of 25 children by Drs. Robert E. Weibel and Joseph Stokes Jr. of the University of Pennsylvania's department of pediatrics. Tests involved 52 children at a Scranton, Pa., institution. The combination vaccine was developed at West Point, Pa., by Drs. Maurice R. Hilleman, Eugene Buynak and Paul W. Grunmeier of Merck Sharp and Dohme Laboratories.



PHS World

IT DOES NOT HURT AT ALL—Immunization of large groups of children can be accomplished quickly and painlessly with jet-inoculation guns. The hand-crank jet injector in use here by a Public Health Service doctor requires a firm hand and steady pressure to avoid slipping.