BIOMEDICINE

Predicting heart attacks

It is possible to predict which patients admitted to a hospital with chest pain will later have a heart attack, John S. Schroeder and his cardiology team at Stanford University reported this week at the American Heart Association's 49th Scientific Sessions in Miami.

Of some 200 patients complaining of chest pain and admitted to Stanford's coronary care unit, only 50 met the criteria for already having had a heart attack. So Schroeder and his co-workers evaluated the other 150 to see whether they might pinpoint certain factors that could be used to predict which of the 150 might have a heart attack. The factors they came up with were a noticeable change in the waves of a patient's electrocardiogram; a high level of fats and cholesterol in the blood; the absence of high blood pressure; no previous history of heart attack; the presence of typical cardiac pain with nausea, and continued pain after being admitted to the hospital.

The researchers submitted these factors to statistical analysis to establish three risk groups for 132 of the 150 patients. Sixty patients were placed in the lowest-risk group, 60 in the medium-risk group and 12 in the high-risk group. Did the factors turn out to have predictive value? Indeed they did. Of the 12 patients in the high-risk group, all had a heart attack later in the hospital; of the 60 in the middle-risk group, 18 had a heart attack in the hospital; and of the 60 in the low-risk group, none had a heart attack in the hospital.

These results can help doctors decide which patients need drugs to prevent an attack and which need minimal care.

Cervical cancer and carrier husbands

Cervical cancer has been strongly linked to the genital herpes virus and to its transmission between sexual partners. Now Irving I. Kessler of the Johns Hopkins Medical Institutions has found that cervical cancer tends to cluster among women who marry men who are genital herpes carriers.

Kessler identified 5,000 women who had cancer of the cervix during the previous 20 years and the husbands of these women, as well as all previous or subsequent wives of the husbands. For those women deceased, the cause of death was determined. Pap tests for cervical cancer were given to those women still living. He compared the incidence of cervical cancer among all the women to a control group of women similar in age, race and area of residence. The risk of developing cervical cancer is increased three to four times among wives of men who at some other time were married to women who developed cervical cancer, he has found.

Vaccine against tooth decay

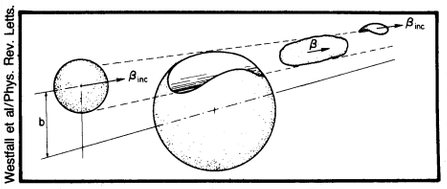
In 1972, T. Lehner and his team of immunologists and microbiologists at Guy's Hospital Medical and Dental Schools in London found that the saliva of people with lots of dental caries had fewer antibodies to caries-producing bacteria, notably *Streptococcus mutans*, than did the saliva of people with little caries. This finding suggested that a vaccine might be made against tooth decay (SN: 8/12/72, p. 106).

Lehner and his co-workers made such a vaccine out of killed *S. mutans* and found that it was indeed effective in primates. They now report in the Nov. 4 NATURE how the vaccine exerts its effects, that is, which parts of the body's immune system it stimulates into action against *S. mutans*.

The vaccine provokes B cells, those cells known to make antibodies; the class of antibodies known as the IgGs and to a lesser extent the class known as the IgMs; and T cells, those cells that provide cellular immunity.

PHYSICAL SCIENCES

Nuclear fireballs



Westfall et al/Phys. Rev. Letts.

It is amusing, and a little amazing, how often the newly born physical specialty of striking accelerated atomic nuclei (heavy ions) against other atomic nuclei finds analogies from the behavior of gross and less exotic matter for the strange things that happen in the collisions. The latest is a nuclear fireball suggested by eight physicists from the Lawrence Berkeley Laboratory and the University of Marburg in West Germany in the Nov. 1 PHYSICAL REVIEW LETTERS (G. D. Westfall et al.).

It happens some times in such heavy-ion collisions that a number of neutrons and protons come off with velocities different from the velocity of either the projectile nucleus or the target. The explanation presented here is quite simple. In the collision a piece of the projectile and a piece of the target stick together and come away as a fireball with an intermediate velocity. The fireball then falls apart into its individual neutron and proton constituents just as an ideal gas will expand, cool and disperse when pressure is released.

The crowd in the center of the galaxy

Many astrophysicists believe that the centers of galaxies are inhabited by very dense crowds of stars. Unfortunately the center of our galaxy, where proof might be found, is obscured by dust and can be studied only in infrared radiation. A new study of the motions of one of the infrared point sources that has been found near the galactic center now yields evidence for such a dense core.

Richard R. Treffers, Uwe Fink, Harold P. Larson and T. N. Gautier III of the University of Arizona used Kitt Peak National Observatory's Fourier transform spectrometer to study this source, which appears to be a cool supergiant star. In the Nov. 1 ASTROPHYSICAL JOURNAL LETTERS they report that the data are consistent with the infrared source being in orbit around a dense galactic core.

Towards an EUV laser

An important development in the procession towards an X-ray laser would be a laser in the extreme ultraviolet, very near the X-ray region. In the Nov. 8 PHYSICAL REVIEW LETTERS R. J. Dewhurst, D. Jacoby, G. J. Pert and S. A. Ramsden of the University of Hull in England report an EUV population inversion they think can actually be the basis of a laser.

To get the lasing effect, the population inversion is necessary, that is, a condition has to be created in which more atoms of the lasing substance are in a higher energy state than in a lower. This is a reversal of ordinary conditions. Usually in physics everything tends to the lowest energy state it can occupy.

The population inversion is produced by the expansion and cooling of a fully ionized plasma. As the electrons and nuclei recombine during the cooling, the reestablished atoms start out in a high energy state, and this constitutes the population inversion. The plasma is made by irradiating a carbon fiber with light from a neodymium-glass laser. The wavelength emitted as the inverted population drops to a lower energy state is 182 angstroms.

Unlike other cases where EUV population inversions have been demonstrated, the Hull experimenters believe that a laser of one megajoule or so in energy could be made with this system.