CEA news: The good and the bad

When scientific hopes are dashed, they sometimes produce consolation prizes. Such appears to be the case for the carcinoembryonic antigen (CEA), which was acclaimed a decade ago as a promising diagnostic marker for colon cancer. Both the good and bad news were among the conclusions of a recent National Institutes of Health consensus development conference on CEA.

The eight-member conference panel, led by David M. Goldenberg of the University of Kentucky Medical Center, included both basic and clinical investigators of CEA. Their task, over a three-day period, was to review all data on CEA as a cancer marker and to provide physicians and the public with guidelines on when the antigen should and should not be used to manage cancer.

Among their comments about CEA, the panel noted that although elevated levels of the antigen in the blood at first appeared to be specific for colon cancer (SN: 4/4/70, p. 346), it has since become apparent that elevated levels can also be found in patients with other kinds of cancers, especially of the gastrointestinal tract, pancreas, ovary, lung and breast; patients with ulcerative colitis, Crohn's disease, pancreatitis, liver disease, lung infections and other inflammatory disorders; patients with benign neoplasms; and cigarette smokers. Thus, the panel concluded, elevated CEA levels should not be used to screen an asymptomatic population for colon cancer or for any other cancer. Nor should CEA be used to independently diagnose colon cancer or any other cancer in a symptomatic population, the scientists said.

The panel noted, however, that CEA monitoring is valuable for determining whether colorectal cancer retreats or spreads during the course of therapy. In fact, the panel members agreed, CEA is "the best presently available noninvasive technique" for this purpose. On the other hand, they cautioned, it is too soon to say whether CEA monitoring is valuable for tracking other cancers during the course of therapy.

The conference members also identified some areas for future research that may improve the value of CEA in managing cancer, such as studying CEA in combination with other tumor markers, and seeing whether CEA in fluids other than blood is more specific as a marker for various cancers than is the presence of CEA in the blood. □

HDL's: Possible role in cancer

Sometimes the public can't seem to win where disease prevention is concerned. This appears to be the case with the blood components known as high density lipoproteins (HDL's). During the past several years evidence has been accumulating suggesting that HDL's help prevent heart disease (SN:2/4/78, p. 72; 4/22/78, p. 244). Now, according to a report in the Sept. 20 LANCET, HDL's appear to be only a modest preventive against fatal heart attacks. What's more, they appear to be a risk factor for cancer. These disclosures come from Ancel Keys of the University of Minnesota School of Public Health in Minneapolis.

In 1947 Keys and his colleagues launched a long-term, prospective study of heart attack risk factors. They gave 284 business and professional men detailed physical examinations, kept track of the men over subsequent years to see which died from heart attacks, then looked to see whether the heart attack victims had shared certain physical characteristics while young. If the difference between the two groups on a particular physical factor was statistically significant, then it was probably not due to chance, and the investigators could conclude that the factor helped predispose the victims to their heart attacks.

One of the factors for which subjects had been measured was blood levels of HDL's. Now, a quarter-century later, 55 of the subjects have died from heart attacks, and Keys has determined that their mean HDL level when they were young and healthy was 43.38 milligrams per deciliter, whereas the mean HDL level of subjects who are still healthy was 45.97 mg/dl. Thus, the HDL's of the men who died from heart attacks had been lower than those of still-healthy subjects. However, the difference in mean HDL's between the heart attack victims and still-healthy subjects is not statistically significant, suggesting, contrary to previous studies, that if HDL's protect against fatal heart attacks at all, their protection is modest at best.

But the data from this long-term prospective study have revealed an unexpected link between HDL's and cancer. The mean HDL level when young of the 30 men who died from cancer was 49.71 mg/dl, compared with 45.97 mg/dl for still-healthy subjects — a statistically significant difference. In contrast, 48 men in the study died from accidents, strokes, pneumonia, emphesema or causes other than heart attacks and cancer, and their mean HDL levels when young measured 46.84 mg/dl, compared with 45.97 mg/dl for still-healthy subjects — a nonsignificant difference. Thus, whether high levels of HDL's protect against fatal heart attack or not, they definitely seem to be a risk factor for cancer, and Keys concludes that their presence thus, "may be a mixed blessing for long-term survival." □

Particle shower sprays upward

In an attempt to observe neutrinos reaching earth from cosmic sources, detectors were placed deep in a mine in the Kolar Gold Fields in India. These detectors have recorded a phenomenon that is quite startling, according to a report by Gaurang B. Yodh of the University of Maryland to the Wisconsin Miniconference on Neutrinos with Mass, held recently at Cable, Wis., Yodh is not a participant in the work, but is acquainted with the people doing it. Krishnaswamy et al. and Achar et al. are the main groups, he says.

The surprise is so-called anomalous cascades. These are huge showers of particles appearing in the detectors, sometimes more than 1,000 different particles per shower, all diverging from a common point of origin. This suggests that something very energetic struck an atomic nucleus in the rock to produce the cascade.

That something has to have a great deal of energy, upwards of a trillion electronvolts (1 TeV). The cascades tend to enter the detector horizontally, and at least one came vertically from underneath. It seems only neutrinos have the penetration to pass through the whole earth like that to generate the cascade. So interesting are these phenomena that a detector now operating in the Baksan Valley in the USSR will look for them, and another is planned in the Homestake Mine in South Dakota. However the cascades may affect the questions about neutrinos now agitating particle physicists, they are themselves, as Yodh says, "a challenge to theorists to explain." □

Microelectronics: Job boon or peril?

Like it or not, the world has embarked on a microelectronic revolution that is expected to surpass the industrial revolution in the breadth and speed of cultural and technological changes it carves. A report by the Worldwatch Institute in Washington outlines the potential sweep of its influence, including what jobs may get swept under the carpet in the streamlining of our society.

Spawned by the development of the transistor in 1947, microelectronics first began to make their mark in 1959 with the introduction of the integrated circuit (IC) —a packaged batch of transistor circuitry wired together on a small silicon chip. In time, other electronic components such as diodes and resistors made their chip debut. But a major breakthrough came in 1971 when the firm Intel Corp. ushered in microprocessors that essentially offered the entire central processing unit of a computer — complex circuitry to process

data and handle computations—on a silicon chip.

Today the most densely packed ICs feature nearly 100,000 components on a chip five millimeters across, wired together with aluminum conductors roughly 30 times thinner than a human hair. Colin Norman sums it up in his Worldwatch paper: "In three decades, a roomful of vacuum tubes, wires, and other components has been reduced to the size of a cornflake. And the process is not over yet ... [C]hip manufacturers are confident that by 1990 they will be able to produce integrated circuits containing at least one million components."

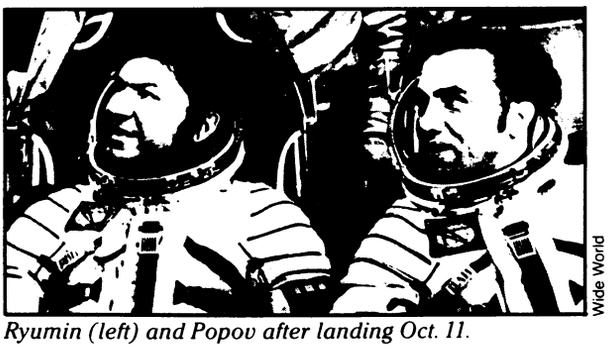
In an April 14 interview with BUSINESS WEEK, Intel's founder and vice chairman, Robert N. Noyce, described the microelectronics era as the second industrial revolution. "We are just at the beginning of mechanizing ... intellectual activity," Noyce adds. Norman suggests that this, in fact, marks the profound difference between the microelectronic and industrial revolutions. "The development of industrial technology largely enhanced human physical capabilities," he says, "enabling people to harness more energy, process and shape materials more easily, travel faster, and so on. But the development of microelectronics extends mental capabilities ... and it enables electronic 'intelligence' to be incorporated into a broad range of products and processes."

In fact, no technology in history has had such a broad range of potential applications. Increasingly sophisticated computer-controlled robots are invading industry to slash production costs, time and labor requirements. Reprogramable machinery now makes it economically feasible to automate processes involving short production runs and frequent changes in machine settings, which, Norman claims, constitute the majority of manufacturing processes. "Intelligent" microprocessor-based office machines portend the elimination of filing and routine clerical work as the electronic—and perhaps one day paperless—office becomes the norm. Even the highly skilled toolmaker is in jeopardy. What's more, Norman says, "if, as most experts are predicting, the chief impact of microelectronics is felt in offices, women workers are the ones who will bear the brunt of the new technology."

Resistance to microelectronics will ultimately prove counterproductive, however, says Norman, because "failure to adopt the new technology courts the risk of massive job losses as domestic industries decline." But simply hoping that the unemployment problem will disappear is not a feasible policy either in the current period of slow economic growth and rapid technological change, he says.

What is needed, Norman emphasizes, are both "early warnings" for workers whose jobs are now in jeopardy, and a voluntary retraining of those workers for tomorrow's jobs. □

Cosmonauts land after record flight



Wide World

Ryumin (left) and Popov after landing Oct. 11.

Appearing healthy and happy, Soviet cosmonauts Leonid I. Popov and Valery V. Ryumin returned to earth Oct. 11 from a record-setting 185 days in space aboard the orbiting station Salyut 6, the Soviet news agency Tass reported. The six-month flight surpasses by 10 days the previous Soviet record—in which Ryumin also participated — and far outstrips the U.S. record of 84 days, set in 1974 by Gerald Carr, William Pogue and Edward Gibson. Intended in part as an investigation of the effects of weightlessness on human function, the 185-day space sojourn seemed to have no ill effects on the health of the cosmonauts, Tass reported. In fact, the agency said, Popov gained about 6½ pounds and Ryumin gained about 11 pounds. Their condition differed significantly from that of previous record-holders Ryumin and Vladimir Lyakhov who had difficulty walking and talking after their 175-day flight (SN: 8/25/79, p. 132). Soviet mission scientists attributed Ryumin and Popov's well-being to a careful regimen that included eating normal foods and exercising. The cosmonauts also made observations of the earth's land and ocean surface and experimented with the manufacture of crystals, metal alloys and other materials in a gravity-free environment. Such experiments were intended to determine if materials manufactured free of gravity would have exotic properties that might be important for industries on earth. □

Toxic shock: Questions and suggestions

Toxic shock syndrome is still a conundrum, but suggestions are being made that might help women avoid the sometimes-fatal disease.

The puzzle has to do with the cause. Some researchers suggest that toxic shock syndrome is simply a new name for an old disease (as appears to have been the case with Legionnaires' disease) and that it has nothing to do with tampons (victims have included women who did not use tampons and some men). The Center for Disease Control in Atlanta, Ga., however, is sticking with the tampon theory. CDC officials told a Food and Drug Administration panel last week that so far this year there have been 408 cases of the syndrome linked to tampon use, and 40 of the victims have died. This is an abrupt increase in the incidence of the disease over previous years.

"It is unlikely that this syndrome represents a new observation of an old disease," say four physicians from Massachusetts General Hospital in a letter to the editor in the Oct. 9 NEW ENGLAND JOURNAL OF MEDICINE. "The dramatic nature of the presenting symptoms in otherwise healthy women," they explain, "seems to exclude previous lack of recognition." They propose, instead, that "the appearance of the toxic shock syndrome in recent years may be related to a change in tampon design and construction." Newly designed tampons expand severalfold and can block the vaginal opening completely. The physicians, Arlan F. Fuller Jr., Morton N. Swartz, John S. Wolfson and Ronnie Salzman, suggest that this blockage of the vaginal outlet can cause a reflux, or backflow, of toxin-containing menstrual blood from the vagina through the fallopian tubes into the peritoneal cavity where the toxin can be absorbed rapidly and cause toxic shock syndrome. This sequence of events, explains Fuller, would result in toxic shock syndrome only if the blockage of the vagina and subsequent reflux were accompanied by a toxin-causing bacterial colonization (for example, by *Staphylococcus aureus*, the suspected organism).

Whether or not this answer solves the riddle remains to be seen. In the meantime, the FDA continues to take steps toward preventing the disease. The agency has already put a stop to the sale of the heavily implicated Rely tampons (SN: 9/27/80, p. 198) and is considering requiring that manufacturers put warning labels on the packaging of all tampons.

The American College of Obstetricians and Gynecologists makes even stronger recommendations. Last week they advised women to stop using all superabsorbent tampons until more research is conducted. They further suggest that women change tampons every six to eight hours and alternate tampons with sanitary napkins or minipads. Should a woman who is using tampons experience the symptoms of toxic shock she should discontinue tampon use and consult her physician immediately. The symptoms include high fever, vomiting, diarrhea, loss of blood pressure, a sunburn-like rash and, in some cases, shock. □