Good, bad news on cancer survival

A report released last Thursday by the National Institutes of Health shows that the five-year survival rate for cancers diagnosed and treated between 1970 and 1973 is up dramatically from the five-year survival rate found in cancers diagnosed between 1960 and 1963. That's the good news. The bad news is that the increase for black persons did little to close the gap between the widely different cancer survival rates of blacks and whites.

Researchers Max H. Myers and Benjamin F. Hankey analyzed survival data from cancer registries at hospitals in California, Connecticut, Iowa and Louisiana. Only these four centers had kept the needed records. Only two of the four registries had enough black patients to analyze, and there were only enough meaningful data for the most common cancers.

Significant increases in survival were seen in 17 of 35 types of cancer in white males. The increase included a rise from 50 to 63 percent in prostate cancer, the second most frequent cancer among men (excluding skin cancer). In the most common cancer, lung cancer, the numbers were not encouraging — the rise was only from seven to nine percent. Little change was seen in cancers of the stomach, pancreas and brain, while survival improved in bladder, rectal, larynx, colon and kidney cancers, non-Hodgkin's lymphoma, Hodgkin's disease and lymphocytic leukemia.

Of the 10 cancers studied in black men, significant survival increases were seen in prostatic, esophageal, colon and stomach cancer. The increase in the five-year survival rate for prostatic cancer rose from 35 percent in the 1960 to 1963 period to 55 percent in the 1970 to 1973 period, an encouraging figure until compared with 63 percent survival in white males.

In white women, five-year survival rates increased in 17 of 37 types studied, including a rise from 63 to 68 percent in breast cancer, from 44 to 55 percent in colon cancer and from 48 to 69 percent in Hodgkin's disease. In black women, survival increases were seen in four of 13 cancers monitored, including a jump from 47 to 61 percent in cervical and from 46 to 51 percent in breast cancer. Again, despite the increase, the 51 percent survival rate for breast cancer in blacks is still considerably below the 68 percent rate in whites. The types of cancer in which there was little difference between black and white survival were those with notably poor prognoses.

The data showed one reason to explain some of the disparity — 78 percent of the white males and 72 percent of the white females were diagnosed and treated while their cancers were still localized, compared with 61 percent of black males and 56 percent of black females. □

Auxiliary nitrogen fix: No molybdenum

A back-up system for nitrogen fixation has been discovered in common, free-living soil bacteria. The reserve process differs dramatically from the previously known methods for converting free nitrogen from the atmosphere into ammonia and then into the organic compounds required by plants and animals.

All previously investigated nitrogen fixation relies on an enzyme called nitrogenase that contains molybdenum as well as iron. Nitrogen fixation, and therefore crop growth, is limited in the southeastern United States, Brazil and other areas where, because of the acid soil, sufficient molybdenum is not available to bacteria. But the system discovered in *Azobacter vinelandii* bacterium requires no molybdenum. So transfer of the appropriate genes from it into *Rhizobium,* the bacterium that populates nodules of leguminous plants, may someday free farmers from the need to add molybdenum (or lime) to their fields.

The *Azobacter* system was discovered by "a stroke of luck," says Paul E. Bishop of the U.S. Department of Agriculture Soybean and Nitrogen Fixation Laboratory in Raleigh, N.C. He was examining some strains of *Azobacter* in which mutations had destroyed the known nitrogen fixation enzyme when he found a set of proteins that seemed to be a nitrogenase, but not the conventional one. Bishop speculated that he had switched on genes responsible for a second, molybdenum-free nitrogen fixing system.

The second nitrogen fixing system functions in normal *Azobacter* under special conditions, Bishop finds. When the bacteria are grown in a medium lacking molybdenum, they produce the four proteins that operate the back-up system. And mutated bacteria that cannot fix nitrogen when molybdenum is present can use the back-up nitrogenase and fix nitrogen perfectly in the absence of molybdenum. Using a heavy isotope of nitrogen, Bishop confirmed that the second system actually converts atmospheric nitrogen to the useful form rather than simply promoting incorporation of nitrogen already fixed.

Rhizobium, the bacterium in legume nodules, has no alternative molybdenum-free system, Bishop finds. Thus, the plan to transfer *Azobacter* genes. Bishop and co-workers are now trying to purify the newly discovered nitrogenase and to identify its genes. They already have found different mutations that knock out each nitrogen fixation system. In other research Bishop transferred genes from *Rhizobium* to *Azobacter* and he expects no special problems going the other way. □

Low-cal sweeteners: Win, place and show?

In the race to decide the fate of three artificial sweeteners, it's aspartame and saccharin taking an early lead, battling neck and neck, while the longshot cyclamate trails the pack. Crossing the wire in this race means approval for the U.S. market.

Aspartame drew away from the pack in 1974 when the U.S. Food and Drug Administration approved its use, and it looked like it would maintain a safe margin. But FDA imposed a stay on its approval the following year, shattering all hopes of a strong aspartame finish.

Now it's aspartame — a dipeptide composed of the amino acids phenylalanine and aspartic acid — being checked by a first-of-its-kind Public Board of Inquiry set up by FDA to decide the sweetener's fate. The board, consisting of three scientists appointed by FDA, recently concluded that aspartame should not be approved for use in foods. The conclusion, announced in the Oct. 21 FEDERAL REGISTER, was based on "scientific data suggestive of aspartame's potential for causing brain tumors in laboratory rats." Still, reports the board, further studies are needed to completely resolve the issue.

The board's recommendations will be reviewed by FDA, which in turn will issue a final decision either approving or disapproving the use of aspartame. G. D. Searle & Co. of Skokie, Ill. — which recently introduced in Belgium and Luxembourg an aspartame-containing sweetener — is one company fighting for U.S. approval of the sweetener.

Although it is not likely that aspartame soon will be coming into the home stretch of the U.S. artificial sweetener controversy, saccharin's position in that race is far from a serious threat to it: FDA again can take steps to ban saccharin in June of 1981, when a congressional moratorium on any saccharin ban ends. This war horse of the sugar substitutes would have been banned in 1977 but Congress temporarily stopped that FDA regulation pending further studies. The statistical analysis of one of those "further studies" — published in the March 14 SCIENCE — is criticized in the Oct. 24 SCIENCE by Irwin D. J. Bross (often the subject of controversy himself) of the Roswell Park Memorial Institute in Buffalo, N.Y. But the authors of that study counterattack in the same SCIENCE issue, and saccharin neither gains nor loses ground in this rather monotonous race.

But wait. The dark horse cyclamate has taken a fall. Abbott Laboratories, the only U.S. producer of cyclamates, recently surrendered a seven-year-long battle when it decided not to appeal the FDA's decision to prohibit that firm from remarketing the artificial sweetener. Cyclamate is out of the running. What a race, folks. □