

Back in the 1920's — a year before the Great Depression, in fact — a physician named George N. Papanicolaou developed a test that has since become one of the most successful of cancer prevention-early detection techniques. It was the Pap smear, a procedure in which cervical cells are taken from a woman to see whether she has early noninvasive, and hence curable, cervical cancer.

Indeed, millions of women in the United States and other countries have had the Pap test in recent years. And according to

Although progress has been made in cancer prevention and early detection, the best is probably yet to come

plements. "Such an experiment," Bruce explains, "is simple in design and could be applied to other nutrients and other kinds of cancers than just colon cancer."

Still other cancer prevention-early detection advances are probably around the corner. Screening persons at high risk for lung cancer, for instance, may become routine provided it is found to save lives, and various groups of scientists are exploring this possibility. Myron R. Melamed and colleagues at Memorial Sloan-Kettering Cancer Center in New York City are

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a recently concluded National Institutes of Health Consensus Development Conference on Cervical Cancer Screening, the Pap smear test has reduced both the number of cases of invasive cervical cancer and the number of deaths from the disease. Similar testimony was provided by speakers in Chicago last April at the American Cancer Society's National Conference on Cancer Prevention and Detection. About the only thing Pap smear authorities don't agree on is which women need the Pap test and how often those who need it should have it. The ACS recently changed its recommendation that all women have the Pap smear annually to one that says all women between the ages 20 and 65 years, as well as younger, sexually active women, have the test only every three years—provided two exams a year apart have been negative. The NIH consensus conference members decided the test should be performed on all sexually active women anywhere from once a year to once every three years.

Although the Pap smear is probably the major success story of modern cancer prevention-early detection, other advances in this area have been made as well. For instance, the electron microscope and scanning electron microscope have greatly boosted doctors' abilities to detect precancerous breast tissue, reports Eileen B. King of the University of California Medical Center at San Francisco. During the past decade there has been a virtual explosion of rapid, relatively inexpensive *in vitro* assays which may some day be used to determine which of the 60,000 chemicals in widespread use and which of the 1,000 new chemicals introduced annually can cause cancer, reports I. Bernard Weinstein of Columbia College of Physicians and Surgeons. The widely used Ames assay, for instance, provides a useful indication of whether a substance is likely to

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be a carcinogen or a noncarcinogen. Women who examine their breasts regularly for cancer have been found to have a greater survival rate from breast cancer than do those who do not, points out Thomas Carlile of Virginia Mason Research Center in Seattle. A low-fat diet seems to protect against not only breast cancer but against colon cancer, suggest Anthony B. Miller of the University of Toronto and LaSalle D. Leffall Jr. of Howard University College of Medicine, because breast cancer has been found to be lowest in countries where fat consumption is lowest, and because persons who eat high-fat diets have been noted to be more prone to colon cancer than those who do not. Since colon polyps have been found to give rise to colon cancer, their removal appears to be another way to prevent colon cancer, asserts Louise C. Strong of the M.D. Anderson Hospital and Tumor Institute in Houston.

Vitamin C and vitamin E supplements may eventually be recommended for persons at high risk of colon cancer provided the supplements are found to ward off this cancer. One group of scientists exploring this possibility is W. Robert Bruce and co-workers at the Ontario Cancer Institute in Toronto. Five years ago they found that mutagens (presumably chemical carcinogens) in the colon were correlated with colon cancer and that vitamin C and E supplements could lower the incidence of mutagens. They are now testing whether 400 mg. per day of vitamin C and 400 mg. per day of vitamin E can lower the risk of colon cancer in persons who have had colon polyps removed, compared with persons who have had polyps removed but who are not getting these sup-

pleting 10,000 male cigarette smokers over 45 years of age to see whether routine screening with chest X-rays or sputum tests can reduce lung cancer deaths. William F. Taylor and co-workers at the Mayo Clinic in Rochester, Minn., have been periodically screening 4,600 male heavy smokers over 45 years of age during the past decade to see whether such screening can reduce lung cancer deaths. Although so far there is no statistically significant difference between the rate of lung cancer deaths for this group and for a control group not being screened, Taylor and his team are optimistic that such a difference may still show up over the next three years.

Another cancer prevention approach that may be imminent is an antibody test to see whether carcinogens become attached to the genetic material of persons working around known chemical carcinogens. Weinstein and colleagues at Columbia, in collaboration with investigators at the National Cancer Institute, have developed antibodies against certain chemical carcinogens attached to DNA molecules and are now testing whether the antibodies can be used to detect the same carcinogens bound to DNA in humans as a result of environmental or occupational exposures.

But the greatest cancer prevention-early detection advances probably lie in the future, ACS cancer prevention conference speakers tended to concur, because cancer prevention-early detection is really frontier science compared with many other areas of cancer research. In fact, in the opinion of Saul B. Gusberg, ACS president, the United States is moving into an era of cancer prevention. And in July the new NCI director, Vincent DeVita, said that the institute — a major source of cancer research funds — will be placing more emphasis on cancer prevention. □