Martin Abeloff surveyed 35 women with breast cancer. They found that the women who expressed a high degree of anger toward not only their disease but their doctors lived longer than those who were pliant and cooperative. Arbitrarily setting 1 year as the dividing line for survival, the doctors found that the women who were good at "externalizing negative affects" did better even though that group, had, if anything, a poorer prognosis than those who succumbed quickly. "I was cynical about there being any difference," says Derogatis, but it did appear that the fighters had a better chance.

A pioneer in the field of cancer and personality is New York psychologist Lawrence LeShan. LeShan is pretty much a lone wolf, and is regarded as something of an extremist even by those who respect his ideas. Nonetheless he is perhaps unique in the degree to which he has been involved with the emotional lives of cancer patients. LeShan conducted a study lasting from 1952 to 1964 of more than 400 cancer patients (the only major types of cancer he did not encounter were those of blood and lymph, he says), using various psychological tests and interviews. In addition, he did more than 100 hours of psychotherapy apiece with 71 of the patients. He found that 72 percent of the patients had suffered the loss of a central relationship in the period ranging from 8 years to a few months prior to the onset of the disease—compared to 10 percent in a control group of people in psychotherapy for other reasons. And, unlike the controls, most of the cancer patients evinced a profound sense of "despair"—feelings of futility and isolation that were beyond emotion—that he claims they had lived with for many years before they got ill.

Currently, Klaus Bahnson, a psychologist and psychoanalyst at Eastern Pennsylvania Psychiatric Institute, is one of few researchers to be studying cancer from a predominantly psychoanalytic viewpoint. He has proposed a theory of

Briefing

U.S. Semiconductor Lead Threatened, Officials Say

Oscar Wilde's disdain on seeing the wonder of Niagara Falls ("It would be more spectacular if it flowed the other way"), resembles that of the Department of Defense (DOD) in criticizing the U.S. semiconductor industry—which since 1970 has revolutionized myriad civilian and military activities—for not moving fast enough.

Specifically, a study conducted for the DOD by the Rand Corporation concluded that the United States is unlikely to move as rapidly as other countries at the cutting edge of the technology, which is to make a single silicon chip perform many more complex calculations than it can today. Both the Advanced Research Projects Agency (ARPA) and the Office of the Undersecretary for Defense Research and Engineering are considering sponsored research programs to do this, on the argument that industry, by and large, is not addressing advanced DOD needs.

Since the late 1960's, the mass production of these silicon chips has made possible many things, from precision weapons to real time imaging by reconnaissance satellites, to the ubiquitous pocket calculator.

But other countries such as Japan, coming later into the game, could in the future produce superior devices because they would begin with a more advanced technology base. Meanwhile, the U.S. industry may have too heavy a capital investment in existing techniques to be willing to convert to the new ones. "It's like General Motors' reluctance to convert its production plants to building compact cars," says one Defense official. Some officials are even of the opinion that Japan's technology in the field is already superior to ours, but this point is debated.

The Rand study, conducted for ARPA, surveyed the U.S. industry and found that industry officials were planning only incremental improvements in semiconductor technology in the next decade or so.

The amount of brains a chip has, so to speak, depends on the density of the pattern of wires, switches, and logic that can be mass printed on the tiny chips. At present, on a single silicon wafer 4 inches in diameter, it is easy to print tens to hundreds of chips.

Using light beams to write on the wafers, U.S. industry now prints lines from 3 to 5 micrometers wide. An advanced chip, today, might have 10,000 gates, or switches, on it which perform the and-or, yes-no, on-off logic functions.

By the 1980's, officials say, the industry, using ultraviolet light beams, may perhaps move to tracing narrower lines, as low as 0.5 micrometers wide. As a result, far more circuits could be added to a single chip, making it "smarter" in a sense.

(When first introduced, the mass-produced chips were considered revolutionary if they had as many as ten gates on a chip.)

But ARPA information processing expert Robert E. Kahn would like to see the industry—and if not industry then the research community—try for feature sizes a quantum jump smaller. Perhaps, with the use of electron-beam, x-ray, or focused ion-beam methods, lines could be drawn that would be 0.1 micrometer wide, and this drastically reduced size could permit from 1 to 25 million gates on a single chip.

Kahn notes that this would raise many major uncertainties and problems. One would be the limit of the materials themselves; such narrow lines, conducting electricity, could be chemically unstable. Silicon itself, may not be the best chip material under these circumstances. Another problem is that of designing the architecture of the chips, he says. A single human designer can now work out the functions for a 10,000-gate chip; but a computer will have to enter the process if a million or more gates are involved.

One dramatic advantage of these improvements, Kahn and other experts say, is greater speed. If the curcuits are smaller, they can operate faster and at lower voltages. Both may be important advantages in a number of applications.

White House to Study Industrial Innovation

The White House has launched a 13-agency study of industrial innovation in the United States and of ways the federal government can work to improve national industrial productivity. The study will take 14 months to prepare policy recommendations to the President, according to a plan now circulating among the agencies and authored by the President's special assistant for domestic affairs, Stuart Eizenstat. It appears to be a broader, more formalized version of an examination of

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"complementarity" between somatic and emotional disorders: in some people, he believes, irresolvable conflicts may build to the extent that the only way out is psychosis, while in others, cancer is the ultimate route. In a test in which cancer victims and others were asked to assign adjectives to various neutral sounds (a sort of auditory Rorschach test), he found that cancer patients used more benign and positive adjectives than did others. This was construed as evidence that cancer victims are more likely to repress negative emotions.

The kinds of investigations cited above hold considerable attraction for psychologists and psychiatrists but they do not even begin to take into account the differing etiologies of different kinds of cancers, or the vast range of genetic, environmental, viral, age-related, and other factors that have been identified with cancer. Omitted from any of these studies is an attempt to identify mediating mechanisms—immunological or endocrinological—that might translate emotions into neoplasms. And as Fox pointedly remarks, in a lengthy paper discussing the problems of research in the field, psychological examination of people who already have cancer (whether or not the diagnosis is known at the time) is almost tautological. "To the researchers who claim to have shown differences between cancer and well patients, I say that you are all probably right." Says Fox, "Cancer patients *are* different." But the psychological differences may be ascribable to hormonal changes associated with the disease.

Therefore, what is needed, on the one hand, are biochemical studies linking immunological and hormonal events to particular emotions; on the other hand is a requirement for data that can only be gained through long-term prospective studies of large populations.

The NCI in 1975 issued a request for proposals on projects related to personality, stress, and cancer. Two studies were funded as a result.

Briefing

the problem that has been going on for the last year in the office of Frank Press, the Science and Technology Adviser to the President.

Among the concerns is "increased private-sector R & D emphasis in recent years on low-risk, short-term projects directed at incremental product changes, and decreased emphasis on the longer-term research that could lead to new products and processes." This is alleged to be a trend in several industries, including even the semiconductor field where the United States is thought to be a world leader (see briefing on p. 1364).

Lack of venture capital to small firms, low productivity in manufacturing, and increased imports of certain classes of basic goods will also be examined. Finally, the plan will look at one of the favoriate gripes of industrial leaders, namely, that federal regulation is throttling the R & D budgets and high-risk inventiveness of U.S. industry. The Eizenstat memo, however, phrases this problem more delicately, saying the study will examine "The changed direction of industrial innovation in recent times resulting from the diversion of corporate effort from developing new products to meeting other social goals."

In launching the study, the Carter Administration is borrowing a leaf from the book of the Republicans who preceded him. Under the Nixon Administration, former supersonic transport advocate William M. Magruder led such a "technology initiatives" effort from the White House. President Ford appointed a pair of blue-ribbon committees, one chaired by industry magnate Simon Ramo, the "R" of TRW Inc., and the other headed by William O. Baker, of Bell Telephone Laboratories, that looked at these problems, among others. What is not clear is whether the Democrats can implement corrective policies, in what will be the third year of the President's term, that will make much of a difference.

Colorado Professor Fired over False Accounts

Eugene Haas, a sociology professor at the University of Colorado, has been fired after a committee of his peers found that his conduct "fell below minimum university standards of professional integrity." Haas was charged with having falsified travel vouchers so that he could use National Science Foundation (NSF) grant funds to pay for a female associate to travel with him to Hong Kong on a vacation.

For the first time in campus history, the Faculty Privilege and Tenure Committee recommended the firing of a tenured professor, indicating that at the hearing held to adjudicate the case, Haas' version of the story just didn't wash with his fellow professors. Haas had already pleaded guilty in U.S. District Court, he said at the time, not because he was guilty but to avoid more serious felony charges. The matter had become a federal case because NSF money was involved. Over the years, the NSF awarded Haas more than $2.65 million in his university capacity and as president of his private firm.

The faculty committee's report concluded that to forgive Haas for falsifying the documents (another witness testified that a completely false itinerary for his companion was drawn up and submitted to the university, exactly equal to what it cost to go to Hong Kong), was to say that auditors, rather than the faculty, are responsible for the financial integrity of university activities.

"A system of meticulous University oversight into details of research activity could pose a threat, ultimately, to freedom of the individual investigator.

"Complete honesty in the documents submitted to the University is an indispensible element in the preservation of that freedom . . . [A]sking faculty members not to file false documents is one of the least exacting demands that the institution can make on its faculty."

Off the record, some university colleagues of Haas say that what was most aggravating about the case was his continued denial that he had done anything wrong. He never admitted to having falsified the documents—although the travel agent contradicted this, and when confronted with such testimony he continued to maintain his innocence. "I've seen other people in similar situations" one person on the university staff told *Science* "who just admitted what they had done and were contrite about it. But he didn't." Haas testified at the hearing held by the faculty committee that in the period after the Hong Kong trip, he had been under great emotional stress and had forgotten to pay back the university for the travel of his companion.

The NSF is completing a final audit of Haas' activities. The foundation has declined new proposals for research that Haas had submitted to NSF before he was fired. Haas could not be reached at his home or office to discuss the decision or his future plans.

Deborah Shapley