the federal research-dollar pipeline. In addition to the threat of debarment, NIH officials say they have now built into their vast computer network an alert system so that NIH administrators are warned if an investigator applying for a new grant is himself under investigation for cheating. Flagged so far by this system are Straus, Soman, and a third, unidentified researcher who is currently under investigation.

Is it important? Perhaps the emerging issue of fraud represents a small, seamy side of science that warrants nothing more than a cursory glance before being tossed onto the pile of passed-over issues. One might argue that the major cases are few, and the minor ones are just that, minor. Science is above it all. Nobel Prizes are awarded and greatness is measured not on the basis of "honesty," but insight. Newton and Mendel may have finagled, but their theories are today committed to memory by every high school student.

In a sense, all this is correct. It is also true that fraud in the literature wastes the time and money of researchers who pursue leads only to find them wrong. Simpson spent 1 year untangling the cytochrome *c* mess, and, because of this unanticipated chore, lost a priority battle in a different area of biochemistry. Similar amounts of time are probably wasted in other fabrication episodes. Further, in a profession where "organized skepticism" is meant to be the rule, the emergence of a type of fraud not detected by this self-correcting mechanism may prove especially corrosive to community ideas. This mechanism did not and could not deter data fabricators at Boston University, with the result that patient safety was probably jeopardized. And the fact that immunity from scrutiny often seems to supersede any kind of "organized skepticism" can only lead to the discouragement of the young, who tend to be far from immune. In the case of the imbroglio at Yale, it was a 29-year-old NIH researcher who brought charges against Soman, an assistant professor, and Felig, a professor with an endowed chair. "I just found it hard to believe that Felig had engaged in any hanky panky," said an appointed NIH auditor who, after a wait of 6 months, decided not to investigate the data of Soman and Felig. During this noninvestigation, the young researcher quit NIH and research in general.

No matter why they come forth, the recent cases illuminate much. They disclose a gap between the ideal and the real, between reliance on automatic self-policing and the fact that mechanisms such as immunity from scrutiny often prevail. They hint at support of philosophical views that say finagling of one sort or another may be endemic to the research enterprise. Perhaps further study of the dark side will disclose more about the structure of science. At the very least, the recent cases illustrate that "organized skepticism" and the self-policing nature of science need themselves be taken with a little more skepticism.—WILLIAM J. BROAD

Interferon: No Magic Bullet Against Cancer

It may be medically and commercially more important in fighting viral infection

Daytona Beach, Florida.—Interferon as an anticancer treatment has not lived up to expectations; however, its ability to fight off viral infection may prove to be very important both medically and commercially, according to Frank J. Rauscher, Jr., senior vice president of research of the American Cancer Society, at a meeting for science reporters here.

Interferon does not appear to be any better than available chemotherapeutic agents in treating non-Hodgkin's lymphoma, multiple myeloma, breast cancer, or melanoma, said Rauscher. Of the 82 patients tested thus far in the cancer society's program, only about 25 to 40 percent responded favorably. These responses ranged from stabilization to complete remission in a few patients. The reasons why the remaining 60 percent of the patients failed to benefit warrant further research, he said.

Some of the treated patients relapsed 6 months after remission, although a few remained in remission 8 months after treatment was started. "If there's anything discouraging about interferon, it's that remission doesn't seem to last," said Rauscher, a former director of the National Cancer Institute.

The investigators had hoped that interferon might be free of the side effects associated with the most cytotoxic drugs currently used in cancer treatment. But the fact is, Rauscher said, interferon has side effects similar to those of other medications, although to a much lesser degree. Interferon-treated patients have suffered hair loss, nausea, bone marrow depression, and sudden fever of about 102°F. The most severe side effect has been lethargy, experienced most often by elderly women in the later stages of breast cancer.

The toxicity seems to be the same even with interferon that is now 1000 times more pure as a result of recombinant DNA techniques. Less pure interferon was previously extracted from leukocytes. This suggests that the molecule itself, rather than the impurity of the preparation, is the toxic substance. The side effects might be avoidable because as many as eight to ten genes have been pinpointed which all code for interferon. The interferon expressed by the various genes might have different effects in the body. It is not known whether the several companies producing recombinant DNA interferon have been splicing the same gene or not.

Remissions don't seem to last

Frank Rauscher of the American Cancer Society

Only in the past year has interferon been in great enough supply to begin clinical trials. A year ago, the main supplier of interferon was a laboratory in

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Finland. Since then, about a dozen companies in the United States have been producing interferon from leukocytes, fibroblasts, and lymphoblastoids, and by recombinant DNA techniques. The cost of producing enough interferon to treat one patient ranges from $20,000 to $30,000. As more interferon is produced by the genetic method, the price should drop to $200 to $300.

"You've got to go for broke," says Rauscher.

Even though interferon has shown only modest success in treating cancer, all is not lost for the millions of dollars invested so far, according to Rauscher, who has played an important role in the cancer society's decision to push interferon. Interferon is showing significant activity against both RNA and DNA viruses, which could give the substance equal, if not greater, commercial value over its use as an anticancer agent. The side effects of interferon, when given for viral treatment, are almost nonexistent in studies thus far, because the interferon is administered in much lower doses than in anticancer protocols. A number of investigators believe that interferon could prove to be therapeutic in the treatment of herpes virus diseases, for instance.

"I never thought interferon was a magic bullet for cancer treatment, but you've got to go for broke," Rauscher said. Scientists still have to experiment extensively with it to ascertain its ability to enhance a combination of other medications or its ability to stimulate the body's immune system after a patient has gone into remission.

"The jury is still out on interferon," Rauscher said. "There are many things yet to try with it."

The cancer society has nearly spent $6.8 million to purchase interferon, whereas the National Cancer Institute has spent about $11 million. The institute began phase I trials in mid-February to determine dosage regimens for patients. The NCI–phase I studies will include about 150 patients and will continue for 9 months to a year. Trials with leukocyte interferon will be carried out at Stanford, the Sidney Farber Cancer Institute, and Georgetown University. Lymphoblastoid studies will be conducted at the University of California at Los Angeles and at Duke University Medical Center. Leukocyte interferon produced by recombinant DNA will be tested at NCI, the National Naval Medical Center, and the National Institutes of Health Clinical Center. Studies with interferon produced by Hoffmann–La Roche were recently started at Stanford and the M. D. Anderson Clinic of the University of Texas.

—MARJORIE SUN

Califano Tells Tales of the Top Post at HEW

Carter's controversial cabinet member says that special interests have stymied the government's ability to confront tough issues

Joseph Califano, Jr., in his new book, *Governing America*,* tells an amusing anecdote about his tenure as the Secretary of Health, Education, and Welfare (HEW) under President Carter. "In 1977," he writes, "evangelist Oral Roberts asked to see me about a hospital and medical school he wanted to build at Oral Roberts University," in Tulsa, Oklahoma. Roberts complained that the Oklahoma health planning agency, which is funded by HEW, had opposed his project because there were already too many hospital beds in the area. "Because Roberts had been a former law client of mine, I disqualified myself. The next evening, Oklahoma congressman Jim Jones . . . asked urgently that I just say hello to Roberts, which I agreed to do."

Jones and Roberts arrived later, along with several of Jones's congressional aides. When Roberts repeated his desire to talk with Califano about the hospital, Califano again said no. Roberts "rose from the couch, a towering figure looking down at me. 'Well, you're not disqualified from praying for us, are you?' His left hand firmly clasping my right hand, the electricity of a powerful preacher gripping us all, we stood . . . [with] our heads bowed. Oral Roberts prayed for the construction of the hospital and medical school."

As Secretary of the largest federal agency, Califano found himself in awkward circumstances with special pleaders on more than one occasion. Interests groups, he writes, have proliferated in number and are strangling the ability of the government to confront controversial issues such as civil rights, abortion, and health care. "Such issues spark conflicts among the biases, economic interests, political ambitions, and personal values that divide the country"—conflicts so severe, he says, that meaningful action can no longer be taken without substantial changes in the structure and process of government. "The boundless challenge of the Secretary's job was to try to deal fairly with these issues, to promote social justice, and to persuade, educate, cajole and plead with the people, the Congress, and the public servants"—a challenge he was eager to accept but which he only partially discharged.

Califano recounts that he was initially tapped by Carter for reasons having little to do with his administrative skill and legal acumen. As a presidential candidate, Carter needed an emissary to the Catholic community, a spokesman who could transmit his own strong opposition to abortion. Califano agreed to play the part in hopes of eventually being appointed HEW secretary, an ambition he had harbored, he says, since leaving Lyndon Johnson's staff in 1969. Even though he believed the post was "the most treacherous turf in Washington," next to the White House, Califano wanted an opportunity to implement the Great Society programs he had helped craft for Johnson. When picked, he said, "I thought you'd never ask, Mr. President."

Controversy surrounded his activities from the start. His opposition to federally funded abortions, although shared by the President, alienated several con-

*J. Califano, Jr., *Governing America* (Simon and Schuster, New York, 1981).

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