Biomedicine

An interferon gets FDA nod

The U.S. Food and Drug Administration (FDA) last week approved the marketing of bacterially manufactured human alpha-interferon, making it the first member of the interferon family to be commercially available in the United States. Though it was approved only for use against hairy cell leukemia, a rare white blood cell cancer, physicians can, on their own, prescribe FDA-approved drugs for any condition.

Estimates on the incidence of hairy cell leukemia vary, but there are an estimated 1,000 patients, primarily middle-aged men, in the United States. In international trials on more than 2,000 patients, the drug caused remission in about 90 percent of the cases, though its exact mechanism of action is unknown. Without alpha-interferon, hairy cell leukemia usually kills within several years of diagnosis. Both companies that manufacture the drug have expressed optimism that it will also prove useful against other cancers of the same cell.

Child as father of infection

Parents of toddlers often get to go through a second childhood of sorts, suffering right along with their children a seemingly endless onslaught of infections. Robert F. Pass and his colleagues at the University of Alabama School of Medicine in Birmingham have identified one factor: day care centers. In the May 29 NEW ENGLAND JOURNAL OF MEDICINE, they describe a study of three day care centers with a high rate of cytomegalovirus infection. (Some day care centers have a higher rate of infection than others; transmission can be prevented by hand-washing after touching an infected child.)

Cytomegalovirus, or CMV, is a herpesvirus that generally causes, at most, coldlike symptoms and can be spread by contact with infected saliva or urine. It is very common, and is of concern only in pregnant women, who can pass it to their fetuses, and in individuals with suppressed immune systems. About 10 percent of the 36,000 CMV-infected infants born in the United States each year will have hearing loss, impaired vision or neuromuscular abnormalities.

For about a year and a half, the researchers observed parents of children in the day care centers, the children themselves and socioeconomically matched parents and children not associated with a day care center. Children of 46 of 67 initially CMV-free parents of day care attenders shed CMV during the study, and 14 of the parents (21 percent) became infected. In the home-care group, children of just 3 of 31 parents shed CMV, and none of the parents developed the infection.

"Our results indicate that children who acquire CMV in a day care center frequently transmit the virus to their mothers," report the researchers. The next step, they say, is to evaluate preventive measures.

Stay tuned for the Embolism Bowl

Need a good reason to stay away from those interminable end-of-season bowl games? Consider the case of a bartender described by Massachusetts General Hospital physicians in the May 15 NEW ENGLAND JOURNAL OF MEDICINE. The bartender, a previously healthy 40-year-old man, suffered sharp, left-sided chest pain on Jan. 2, 1986. At fault was a pulmonary embolism, a blood clot lodged in the lung that is treated with drugs or surgery. Such a clot can be due to blood-clotting abnormalities, recent surgery or prolonged lack of movement. The physicians were able to pin the clot on the man's New Year's Day activities, when he "awoke at noon, . . . lay down on his sofa, watched three consecutive football games on television, and then went back to bed. For a period of more than 40 hours, he did not leave his home, and he stirred only occasionally for refreshments." Such bowl-game watching, they note, may be a previously unrecognized blood-clot risk factor.

Mathematics

Breaking up factoring problems

That an 81-digit number has now been factored isn't particularly surprising, although this sets a new record for the largest "hard" number yet cracked by a general-purpose factoring method. Rapidly improving computers and factoring algorithms made this inevitable (SN: 3/30/85, p. 202). The surprise is that it was done using eight linked microcomputers rather than a supercomputer or a factoring machine.

To find all the factors of $2^{269} + 1$, mathematician Robert D. Silverman of the Mitre Corp. in Bedford, Mass., used a new version of the "quadratic sieve" factoring algorithm. His version, based on mathematical ideas suggested by Peter Montgomery of Systems Development Corp. in Santa Monica, Calif., breaks the problem down into several independent parts that can be run in parallel on separate computers. Silverman describes his method in an upcoming issue of MATHEMATICS OF COMPUTATION.

Using this enhanced method, eight Sun microcomputers took about 150 hours each to come up with a solution. Moreover, the computers completed the computations in their spare time, working in the evenings and on weekends.

Although a supercomputer could have done the job more quickly, the use of microcomputers shows that large numbers can be factored reasonably quickly using inexpensive equipment. This may threaten the security of secret codes that rely on the difficulty of factoring large numbers (SN: 1/14/84, p. 20).

A linear programming race

Linear programming, or "planning," problems involve things like finding the cheapest way to manufacture a product, or the shortest route for distributing goods to a dealer network, or the fastest way to link long-distance telephone calls. Such problems may include thousands of variables and constraints that must be satisfied.

Two years ago, Narendra Karmarkar of AT&T Bell Laboratories in Murray Hill, N.J., invented a new mathematical technique that seemed to solve such problems much more quickly than a widely used technique known as the "simplex" method (SN: 12/22 & 29/84, p. 408). However, because details of how Karmarkar implemented his algorithm as a computer program were not released, no one could easily check his results.

Furthermore, competing algorithms are difficult to compare. The results depend on the nature of the problem, the type of computer and the particular version of the algorithm used. Many different implementations of the simplex method are in use, and even for the much newer Karmarkar technique, several versions now exist.

Recently, Ilan Adler and his colleagues at the University of California at Berkeley successfully implemented the Karmarkar algorithm and tested their implementation on a set of 30 special problems. In 25 cases, the Karmarkar method found the answer faster than a version of the simplex method running on the same computer. The Karmarkar method ran significantly faster on larger problems, but even for small problems and in a few special cases, this method was only a little slower.

At AT&T, the method is being tested on a practical problem that concerns overseas communications networks. This network planning project involves about 42,500 variables and 15,000 constraints. Results so far show that the AT&T implementation of the Karmarkar method computes the answers at least 10 times faster than a simplex software package.

Writing in the current issue of AT&T's RECORD, Karmarkar and his colleagues report, "Although [the algorithm's] full capabilities and limitations are still being explored, its ability to greatly reduce computation times for some large practical problems has already been demonstrated." However, AT&T has thus far refused to make its implementation public.