
Breast tumors guide treatment strategies

Within ten years of surgery, half of all breast cancer patients return with cancer spread throughout the body. Drug therapy after mastectomy may prevent some of these recurrences. But how can physicians decide which patients to treat and what type of medication to use? William L. McGuire of the University of Texas in San Antonio reports recent advances in using sound biochemical principles to determine treatment strategies both after mastectomy and for advanced breast cancer.

Cancerous cells infiltrating the axillary lymph nodes at the time of mastectomy are a well-recognized sign that the patient is likely to have a recurrence. McGuire told science writers at the Endocrine Society Seminar in New York of an additional predictive tool. Patients whose breast tumors lack estrogen receptors, and thus the ability to bind and be regulated by that hormone, have a higher probability of cancer recurrence than those whose tumors do bind estrogen. Thus, McGuire says physicians should treat with chemotherapy mastectomy patients whose tumors lack estrogen receptors and whose axillary nodes are tumor infiltrated.

Estrogen receptors on tumor cells can also be important indicators of treatment strategies for advanced breast cancer. Hormone (or endocrine) manipulation is in some cases an effective alternative to chemotherapy. In the past, hormone levels were lowered by removing ovaries, pituitary or adrenal glands. A drug recently approved by the Food and Drug Administration will probably replace such drastic surgery. Tamoxifen, an anti-estrogen marketed by Stuart Pharmaceutical in Philadelphia, paralyzes breast tumors sensitive to estrogen. Early indications are that the effect is specific to tumors. Women taking tamoxifen have normal menstrual cycles, although their tumors regress.

With a simple hormone therapy available, endocrine treatment will probably become more important. McGuire reports two new indications of when such treatment is advisable for advanced breast cancer. Earlier research showed that only patients who have tumors with estrogen receptors are likely to respond to hormone manipulation. Most major medical centers now test breast tumors for those proteins. "The new message this year is the importance of the quantitative relationship," McGuire says. In his studies, only 6 percent of women whose tumors had a few receptors responded to hormone treatment, while 46 percent with intermediate receptor levels and 81 percent with high receptor levels responded.

An even better predictor of success of endocrine therapy is the presence of another type of hormone receptor in

breast tumor cells, McGuire reports. Because estrogen stimulates synthesis of progesterone receptors, their presence indicates that estrogen not only binds but also exerts its normal cell control. In experimental studies, McGuire finds response to endocrine therapy in 25 percent of patients with estrogen receptors only, but in 80 percent of patients with both estrogen and progesterone receptors. McGuire thus recommends endocrine therapy for patients with tumors having both receptors, and trials of both endocrine treatment and chemotherapy for patients whose tumors have only estrogen receptors. □

Antarctic yields Triassic treasures

Antarctica yields yet more treasures. A cache of 116 fossil vertebrate specimens, including several previously unreported species, is making the long journey from the icy continent back to its discoverers at Wayne State University. Combined with geological data from an accompanying Ohio State University team, the find may provide the most detailed picture yet of Antarctica 230 million years ago.

The fossils represent four groups of Lower Triassic amphibians and reptiles — no birds or mammals because none existed in that age. Nine are complete or nearly complete skeletons; another nine are nearly complete, well preserved skulls. Their good condition, plus the four to five newly discovered species, makes these fossils particularly valuable for describing Antarctic Triassic ecology, says expedition leader John W. Cosgriff.

According to Cosgriff, the unreported species belong to the group *Therapsida*, mammal-like reptiles believed to be the ancestors of mammals. Some of the fossils are the size of a deer or a calf, he estimates. A second major group includes labyrinthodont specimens, some as large as a crocodile. These amphibians, named for their intricately folded teeth, resembled present-day frogs and salamanders. Though therapsids and labyrinthodonts dominate the find, specimens representing members of *Cotylosauria*, the oldest known group of fossil reptiles, and *Eosuchia*, ancestors of modern lizards, were also found.

The Antarctic species were found in the Cumulus Hills, about 450 miles southeast of McMurdo Station, the United States' main scientific post, and 300 miles north of the South Pole. The same species have been found in Africa, Australia and India, indicating that these land masses were joined during the Triassic period and supporting the continental drift theory. By correlating faunal data from other countries, researchers hope to establish the global distribution of these Triassic species and determine where barriers to mi-

gration may have existed.

The Cumulus Hills site was spotted during a much broader 1970 Ohio State University venture. Having a general picture of the era, the Wayne State-Ohio State team thus knew just where to go to fill in the details, explains James W. Collinson of Ohio State's geology department. Collection of the samples was easy pickings because the area is made of dissected plateaus that expose the continent's stratified geologic history. Collinson and his team, Kenneth O. Stanley and Charles Bavra, simply scaled the cliffs, picking surface samples on their way. Cosgriff, graduate students William Hammer and John Zawiskie and Noel R. Kemp from the Tasmanian Museum in Australia collected the fossils during seven weeks of field work.

Preliminary work indicates that the area was a floodplain or braided stream deposit. (A braided stream is one that doesn't completely fill its channel and breaks up around bed deposits.) According to Cosgriff and Collinson's faunal and geological data, the area was temperate to subtropical, though not very humid, during the Triassic period. Considerable vegetation grew along the stream bank where only scattered lichens are prevalent now. The cold-blooded species could not have survived the Antarctic cold and six dark months without food, so the researchers believe the South Pole was not close to the area at the time. Fresh volcanic evidence also leads Collinson to believe mountains and volcanoes lay somewhere to the west of the Cumulus Hills area. □

Viking orbiter 2: Nearing the end?

In the design of the Viking 2 orbiter, as in that of its Viking 1 twin, it was specified that the Mars-bound craft should have an operating lifetime of at least 510 days, including 370 for the flight from earth. It is now approaching 1,000, and there are plans to use it all the way into 1979. But there is trouble: The doughty vehicle has been beset by a succession of leaks in its supply of steering gas. The result could be its abrupt and untimely demise.

Without the gas to fuel the jets that control its orientation in space, the orbiter would no longer be able to keep its solar panels aimed at the sun for power, its scientific instruments aimed at Mars, or its antennas aimed at earth and Mars for communications. It could only drift uselessly, unable to fulfill its mission, report on its condition or even respond to commands to help itself.

The orbiter has two control-gas systems, which were being used in tandem until last November, when a leak in the yaw axis of system 2 prompted flight controllers to entrust the craft to system 1 alone. Then leaks began to appear in *that* system (SN: 3/11/78, p. 149), but they were

successfully "worked around" until March 15, when a major leak developed in the system 1 roll axis. The orbiter was switched back to system 2, but its yaw-axis leak suddenly grew until it had drained the system dry, necessitating a return to the leaky system 1.

Typical gas-use rates, plus the leak, would use up the last of the gas in 7 to 10 days. Thus controllers were planning early this week to deactivate the leaky roll jet, letting the orbiter drift in that axis until it is decided to reactivate the full system for a last, brief scientific fling. Then orbiter 1 will have to handle the whole load, including relaying messages for lander 2, which can no longer signal earth directly on its own. Orbiter 2's last scientific accomplishments are likely to be a north polar water-vapor survey and/or the completion of northern mid-latitude photomapping. □

Super-centenarians demoted

Persons living to 125, even 150 years of age purportedly live in three areas of the world—the Andes Mountains of Ecuador, the Caucasus Mountains of the Soviet Union and the province of Hunza in Kashmir. The only records that really seemed to document such claims to longevity, however, were to be found in the Andes. And now the reliability of even those records is being called into question by a study reported at a recent National Institutes of Health workshop.

Several years ago, Alexander Leaf, a gerontologist from Harvard University, began to suspect that great claims to longevity in the Andes weren't all they were cracked up to be. For instance, in the village of Vilcabamba, Ecuador, Leaf met a man said to be 122. When he returned there in 1974, he was told that the man was 134. Richard B. Mazess, a radiologist at the University of Wisconsin at Madison, and Sylvia H. Forman, an anthropologist at the University of Massachusetts, have now taken a close look at baptismal, marriage and death records for older residents of Vilcabamba. They conclude that no one in Vilcabamba is older than age 96, because baptismal records for elderly in the village are often confused with those of their forefathers having identical names. The way the investigators showed that the records are confused was by asking the elderly for the names of their godparents. The godparents were obviously not the same as those of the forefathers, thus revealing whose baptismal records belonged to whom.

Nor does Vilcabamba have an excess of old people because villagers are doing something to live to a lusty age, the investigators' findings suggest. Rather, the village has many old people because most of its young people are migrating away. □

Wet worlds and dry

A little water can go a long way. The existence of life on earth, as well as the face of the planet itself, is largely due to vast quantities of the stuff, but far smaller quantities of water can have major impacts. The same spacecraft that failed to find canals or vegetation on Mars have revealed what some scientists believe to be widespread signs of past erosion by water, for example, and there is even a hypothesis that water may exist as permafrost beneath the polar regions of the moon.

The "outgassing" of water from the interior of an evolving planet can help provide an atmosphere, produce oceans, build new rocks and wear away old ones. Yet water's myriad world-shaping roles are far from fully understood, and some of what remains to be learned may be of major significance in the growing science of the comparison of worlds.

As little as one percent of water in a young planet's mantle can lower the temperatures needed for melting by as much as 600°C, says Jeffrey L. Warner of the NASA Johnson Space Center in Houston. The same amount of heat, whether from gravitational effects, radionuclides or other sources, can then produce more melting, and the result is "a lengthening in time of the highly active and volcanic tectonic stages." One consequence, as he told the recent Lunar and Planetary Science Conference in Houston, is that a wet planet's molten outer portion may be substantially thicker throughout its evolution.

Wagner suggests that this reasoning may be particularly relevant to Venus, about whose interior virtually nothing is directly known. Recent radar studies of Venus have revealed what may be a huge volcano (SN: 5/14/77, p. 313), larger than the state of New Mexico and possibly taller than any volcano on earth. To support such an object, Warner calculates, the planet's lithosphere must be at least 140 kilometers thick, far thicker, he says, than earth's.

His inference, which at first might seem unconnected, is that Venus is, and has ever been, a truly dry world. "If Venus is dry," he says, "then it would develop more rapidly and have a thicker [post-molten] lithosphere at any given time than would an equivalent wet planet such as the earth. Whereas the earth is still in its active tectonics stage, Venus appears to be in its volcanic stage."

Warner's Venus reasoning proved somewhat controversial at the conference, but it is part of the modeling of a little-understood planet. Somewhat farther along is another controversy, which one scientist has labeled "The Martian Water War." Some scientists disagree with what seems to be the majority view that liquid water in the past contributed to

various features on the surface of Mars. One such dissenter is James A. Cutts of the Planetary Science Institute in Pasadena, who feels that the idea of flowing water, given today's dry Mars, should be treated as the Viking biologists have treated the possibility of Martian life: as a hypothesis of last resort.

Cutts, a member of Viking's orbiter imaging team, has calculated that various channels, "islands" and other features might be attributable to lava, wind or other factors rather than to water. At the Houston meeting, he reported that a number of large channels leading to Chryse basin (the Viking 1 landing site), attributed by some researchers to ancient catastrophic flooding, may instead be the results of millions of years of unrelenting erosion by coarse, wind-driven sand. In fact, he says, the channels do not end at Chryse at all, but extend perhaps 1,000 km farther north to the plains of Acidalia. From that single outlet, he adds, the cutting sand has been spread by circumpolar winds to form what is now the vast sea of dune fields that girdles the Martian north pole.

Indeed, it has been calculated that "saltating particles" — grains sent hopping across the ground by wind — may have 10 times the momentum and 100 times the kinetic energy on Mars that they do on earth. And even some of the more "water-tolerant" Viking researchers such as Harold Masursky of the U.S. Geological Survey have said it is difficult to tell whether some of the smaller Martian channels are due to water or lava. Yet it has also been calculated that meteorite impacts could generate "temporary lakes" from the presumed permafrost reservoir, and Carroll Ann Hodges of the uscs told the meeting that Mars shows signs of "widespread sub-glacial volcanism that failed to reach the surface" through "hundreds to thousands of meters" of ice.

The Water War waxes. □

Hepatitis: New viral type?

The number of cases of post-transfusion hepatitis (PTH) has declined due to reliable blood tests for hepatitis A and B and decreased use of paid-donor blood. Even so, as many as 150,000 cases still occur each year. Now, work by two teams of researchers, headed by Harvey J. Alter of the National Institutes of Health and Edward Tabor of the Food and Drug Administration, confirms suspicions that "non-A, non-B" PTH may be caused by a virus or virus-like agent. In the March 4 LANCET, they report producing non-A, non-B hepatitis in chimpanzees by injecting blood from either non-A, non-B PTH cases or hepatitis A- and B-negative donors whose blood has caused PTH. This evidence gives researchers an animal model to help identify the agent or agents and to develop a screening test. □