remain for Apollo 17. As a result of many of the unexpected returns from Apollo 15, "everything is up in the air," says Schmitt. This includes time lines—what the men do on the surface, new scientific instruments to fly, and even the landing site itself.

"Apollo 17 belongs to a lot of people," says Cernan. "It is the last flight in the program, but . . . we look at it as the end of the beginning . . ."

The guys in the backroom agree. "Now the time is ripe for a scientist," says Dr. Leon T. Silver of Caltech, "and Jack Schmitt is a good one." □

IMPROVED KIDNEY DIALYSIS

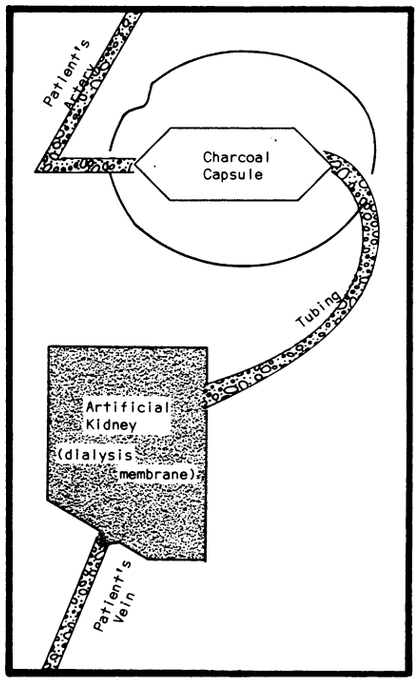
Coating the charcoal

Kidney dialysis—cleansing of the blood of patients with defective kidneys on an artificial kidney machine—can easily take eight to ten hours, three times a week. Aside from causing more than a few patients physical stress and psychological anguish (psychopathologic reactions associated with chronic hemodialysis can be so serious that some patients become self-destructive, Dr. Paul Lefebvre of the University of Montreal reports), dialysis membranes are often not selective enough to catch all the waste molecules that should be screened out of the patient's blood. Dialysis is even more of a problem with infants, who are generally more sensitive than adults to the rigors and difficulties of the procedure.

Now Dr. Joseph Andrade of the University of Utah has come up with a technique, based on extensive work at that university in chemically improving prosthetic devices (SN: 4/11/70, p. 376), which should make kidney dialysis both speedier and more effective.

Hundreds of prosthetic devices are being used by people today for medical and cosmetic purposes, but with varying success. Rejection of such devices by the human body, chemists believe, is not due to immune response, as it is with organ transplant rejection, but to interactions between hydrophobic (water-hating or resisting) molecules in the devices and hydrophilic (water-loving, or absorbing) molecules in living tissue. Hydrophobic materials are being widely used in prosthetic devices because they are inert and do not degrade in the body. But gels (chemicals in a state between hydrophobic and hydrophilic) are often chemically grafted onto the devices, to serve as buffers between them and living cells and tissue. Although Dr. Andrade, Dr. Donald Lyman, also at the University of Utah, and other chemists have designed gel-buffered prosthetic devices that work reasonably well, they are now coming up with chemical materials for prosthetic devices that could even surpass the prosthetic-gel buffer approach.

Nonetheless the buffered prosthetic device concept gave Dr. Andrade ideas on how to improve kidney dialysis. Several investigators had tried using activated charcoal to capture waste molecules that ordinarily would not be trapped by the dialysis membrane. Blood from an artery was passed through a capsule containing carbon and then returned, partially cleansed, to the patient's vein. The carbon indeed captured the intended waste molecules, but charcoal, being hydrophobic, damaged the patients' blood cells, which are hydrophilic, as they passed through the



E. Cherry Doyle

Dialysis membrane—with a bonus.

charcoal capsule. Dr. Andrade tried refining this technique by encapsulating the carbon molecules with a gel. Experiments with animals show that waste molecules diffuse easily through the gel and adsorb to the charcoal surface, yet the blood cells are not hurt by the charcoal because the gel acts as a buffer.

The gel Dr. Andrade has had the most success with is albumin, a blood protein. "Because it is floating around in the blood, it should be compatible with blood," he says.

The next step now, says Dr. Lyman, is to do more animal studies to see how the improved dialysis technique changes blood chemistry and to determine whether it makes any long-term systemic changes in the animals. Once the technique has been proved both competent and safe on animals, says Dr. Lyman, opportunities for clinical testing should come. Perhaps it would be with an infant, in critical need of quick and safe dialysis. Dr. Lyman is confident that Dr. Andrade's improved dialysis technique will eventually find widespread acceptance in medical practice, and especially help infants in need of kidney dialysis. □

FIGHTING LEPROSY

The armadillo helps

Contrary to common opinion, leprosy is far from a defunct Biblical disease. Some 15 million people throughout the world, and 3,000 in the United States, have the disease in a mild or a progressive form. Although drug treatment to fight the leprosy bacilli can keep the disease reasonably well under control, no treatment has been successful in curing the disease. Patients must take heavy doses of drugs daily for the rest of their lives if they wish to keep the bacteria under control and prevent skin lesions, loss of muscular function and severe limb deformity. Clinicians also find it exceedingly difficult to estimate the right amount of drug dosage to prevent the bacteria from building up resistance to the drug.

Although a few animals have contracted diseases similar to leprosy, none had been successfully infected with human leprosy, necessary in using animals as models for conquering the disease. Now, however, Dr. W. P. Kirchheimer of the U.S. Public Health Service Hospital in Carville, La., has succeeded in infecting an armadillo with human leprosy.

The armadillo developed leprosy about a year after infection. It died four months later from the disease. Dr. Kirchheimer believes other armadillos can now be successfully infected with the disease, and they should prove to be ideal experimental animals for several reasons. They are mammals, with long life spans, which would allow observation of a slowly incubating and recalcitrant disease such as leprosy. They would prove ideal for the testing of various drugs, to find one that in moderate doses would not only control leprosy but also kill the bacteria swiftly. Armadillos also have the unique property of giving birth to four genetically identical babies in each litter (derived from one egg and sperm). An inbred, genetically pure line of infected animals could thus be built up quickly. The inbred line might also allow researchers to determine whether susceptibility to leprosy bacteria is due to a genetic defect in immune response.

The armadillo would also provide a ready source of bacteria for study. Although the leprosy bacillus was discovered in 1873, no one has succeeded in culturing it, and purification of the bacilli is required before a leprosy vaccine can be developed. □