enabled lighter-weight equipment, reducing fuel usage during maneuvering (fuel limitations have been blamed by some observers for at least one failed attempt by a manned Soyuz to dock with Salyut 6), and the attitude-control system is said to be more responsive. Most significant, however, appears to be a greatly improved on-board computer. Limitations in past computer designs for years kept cosmonauts so dependent on guidance and even on control from the ground that some U.S. manned spaceflight officials refused even to call the early Soyuzes "spacecraft," instead referring to them merely as "space capsules." The T-series computer, according to Shatalov, "will free cosmonauts to the maximum from performing routine operations." "Routine operations," in fact, may include even docking procedures, which have been performed automatically by computer on some recent unmanned supply flights and reportedly aboard Soyuz T-3 last week.

As Soviet manned spaceflights grow in number, duration and sophistication, the U.S. National Aeronautics and Space Administration is preparing for what will be the first spaceflight by American astronauts since the July 1975 ending of the U.S.-Soviet Apollo-Soyuz Test Project. At Kennedy Space Center in Florida, the winged, crew-carrying section of the U.S. space shuttle was recently transferred from its own "orbiter processing facility" to the huge Vehicle Assembly Building to be mated with its huge external fuel tank and strap-on rocket motors. Additional delays in the oft-stalled project are still possible, but NASA is now working toward an "internal date" of March 14, 1981, for the shuttle's first trip to orbit. □

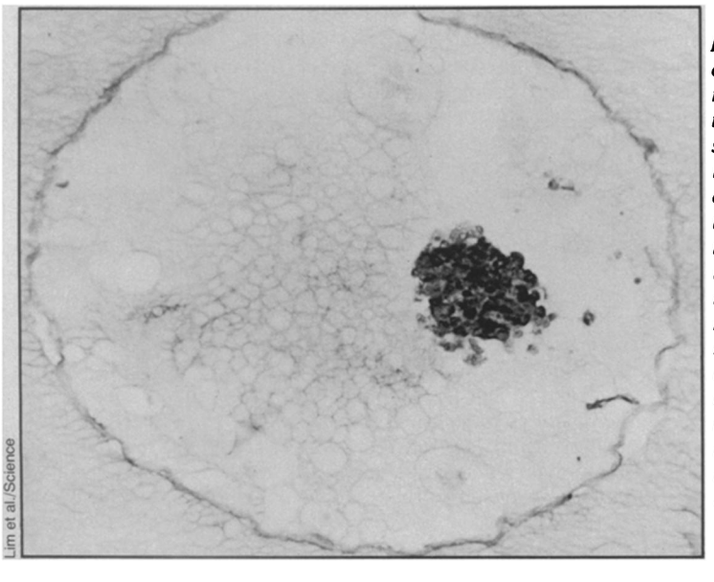
Artificial pancreas: Closer to reality

Insulin-dependent diabetics may be receiving dramatic new help several years from now in the form of an artificial pancreas, a number of which are now being developed. Such artificial organs would substitute for daily insulin injections.

In 1979 Clark K. Colton of the Massachusetts Institute of Technology reported that he and his colleagues had grown insulin-producing pancreatic cells from rats on the outside of semipermeable, tubular membranes and had implanted the membranes as a shunt between artery and vein in rats. Blood coursing through the tubular membranes provided oxygen and nutrients to the pancreatic cells, but immune cells in the blood could not cross the membranes and reject the pancreatic cells. The cells produced insulin and regulated host animals' glucose production (SN: 9/22/79, p. 200).

Last summer, Paul E. Lacy, Joseph M. Davie and Edward H. Finke of Washington University Medical School in St. Louis reported that they had incubated rat pancreatic tissue to kill immune cells surrounding the tissue, which are effective in triggering pancreatic tissue transplant rejection in an animal host. They had introduced the pancreatic tissue into the bloodstreams of diabetic mice, and had injected the mice with antibodies against immune cells to further prevent their immune systems from rejecting the foreign transplant tissue. The pancreatic cells lodged in the mice's livers and successfully controlled blood sugar levels in seven out of 10 of them. The levels were still under control after 16 weeks (SN: 7/19/80, p. 36).

And now still another promising artificial pancreas for diabetics is reported in the Nov. 21 SCIENCE by Franklin Lim of the Medical College of Virginia in Richmond and by Anthony M. Sun of Connaught Research Institute, Willowdale, Ontario, Canada. Lim and Sun have enclosed rat pancreatic cells in tiny semipermeable membrane capsules. The capsules allow insulin out, but will not let immune cells that can reject the foreign pancreatic cells in. Lim and Sun then transplanted the microencapsulated pancreatic cells into diabetic rats and found that they corrected the diabetes for two to three weeks.



Rat pancreatic cells (dark mass) contained in a semipermeable membrane capsule function for two to three weeks when injected into diabetic rats. Capsule lets insulin out but prevents reaction between pancreatic cells and immune system cells.

Investigators involved in this line of research generally take a favorable view of each other's approach toward the same goal. Colton, for instance, told SCIENCE NEWS that the various approaches are "worth pursuing," although only time will tell which one might prove helpful to human diabetics. Davie sees the tack of placing foreign pancreatic material into mechanical devices to keep the material from being rejected (as opposed to suppressing a host's rejection of the material) as "an interesting alternative." Lacy concurs. As for Lim, he says the work of Lacy and colleagues "sounds very exciting."

However, these researchers do have some criticism of each other's endeavors toward the same goal. Lim, for example, views the solution of Colton and company "as a very temporary thing" because he does not believe that it will be practical to implant a pancreatic shunt in humans for a long period of time. Lim also points out that the approach of Lacy and his coworkers has not been successfully duplicated by other scientists although a number have tried to do so. Davie confirms this observation. He is quick to stress, though, that an Australian researcher has achieved the same success his group has by using a slightly different culturing technique. Colton, in contrast, emphasizes that whereas Lim and Sun's approach is promising, it still has some areas in need of investigation. For instance, when pancreatic cells are encapsulated, a layer of fibroblast cells can form over them, which in turn might possibly create a barrier to insulin diffusion out of the pancreatic cells into a host. As for Lim and Sun, Davie contends, they need to extend the success of their technique beyond two or three weeks, which they will probably do with more research.

What progress have Colton and colleagues and Lacy and colleagues made since they reported their successes in 1979 and last July? Colton says that "ours is still looking good." Davie reports that his group has now gotten pancreatic tissue to be accepted by animals for up to a year instead of for only 16 weeks, and that they have also found that the immune cells surrounding pancreatic tissue that stimulate rejection of the tissue in a host are T cells and macrophages, not B cells. This finding, which surprised them, is in press with DIABETES.

The ultimate goal of these three scientific groups, of course, is to try out their versions of an artificial pancreas in human diabetics. Such clinical trials could come as early as two years from now, Lim estimates. "I already have a list of volunteers who would like to participate," he says. □