BIOPROCESSING

MICROGRAVITY WORKERS ADJUST TO DISASTER

NEW YORK—McDonnell Douglas Astronautics' (St. Louis, MO) plans to develop and market erythropoietin (EPO) produced aboard the space shuttle have ground to a halt. Discussions (often reported in the press as an agreement) between McDonnell Douglas and 3M's Riker Laboratories division (Northridge, CA) regarding EPO have been broken off: Riker Labs' spokesperson says that issues of timing and of competitive position forced this decision.

The space shuttle Challenger tragedy of January 28—and the ensuing investigations—will delay not only McDonnell Douglas' plans, but also the entire space bioprocessing program. The consensus is that, while all microgravity-based experiments will be delayed, they will not otherwise be affected—assuming that the hold-up does not exceed a year and that the basic internal design of the shuttle does not change. In fact, researchers say that they can take advantage of this extra "ground time" to refine or redefine experiments already in the planning stages and to analyze data from those experiments that have successfully completed a trip into space.

McDonnell Douglas probably has the most experience and investment in microgravity experiments. The company has already isolated a small amount of EPO by electrophoresis in space on a shuttle flight last spring. Electrophoresis in microgravity can isolate proteins 700 times faster and four times purer than conventional ground-based operations. The company originally had a marketing agreement with Johnson & Johnson's Ortho Pharmaceuticals division (Raritan, NJ), but Ortho dropped out of the project last fall in favor of Amgen's (Thousand Oaks, CA) bioengineered erythropoietin. McDonnell Douglas would like to gain Food and Drug Administration (FDA) approval for erythropoietin by 1988. Now, the company will have to rely on ground-refined drugs until it regains access to the space shuttle.

Charles Bugg (University of Alabama, Birmingham), a specialist in protein crystal structure and a payload principal investigator, says that his group sent up four experiments on protein crystal growth in microgravity during the past year. In fact, their latest flight was the one just prior to the disaster. Bugg says that they have accumulated a great deal of data; the last experiment was so successful that they hadn't planned to fly again until this summer anyway. They need time to analyze data and to make necessary changes in the experimental hardware.

Bugg's initial experiments concentrate on crystal growth of six well-characterized proteins—including bacterial purine nucleoside phosphorylase (a joint venture with Burroughs Wellcome, Research Triangle Park, NC), alpha-2 interferon (with Schering-Plough, Kenilworth, NJ), and human serum albumin (with Marshall Space Flight Center, Huntsville, AL). The long-term goals are to expand this list to 30–40 proteins.

Paul Todd, head of the Bioprocessing and Pharmaceutical Research Center (BPRC, Philadelphia, PA), says that, at the very least, the space bioprocessing programs will be postponed. What effect this postponement will have on individual experiments depends on what capabilities or specific areas of the shuttle the research uses. He says that the next mission—when it comes—is almost certain to be a trial mission, with minimal crew (two or three astronauts), and no heavy payload modules. If there *is* a payload on the next mission, it will call for uncomplicated operations that won't place heavy demands on the crew or systems.

Experiments being planned at the BPRC—on crystal growth, thin film deposition, and growth of a protozoan—won't fly until researchers can put a "get-away special" cannister on board. These cannisters, about the size of a 35-gallon drum, contain two-and-a-half to five cubic feet of usable space. The plans are to fly a bridge of 12 cannisters, configured to fit in the floor of the payload bay. There are eight cannisters ready to go now.

Dennis Morrison, head of NASA's bioprocessing lab at Johnson Space Center (Houston, TX), says that even significant delays in the program will not influence ground-based experimentation. He adds that they have a lot of work to do on the ground before they fly, anyway.

Alison Taunton-Rigby, vice president and general manager at Vivotech (Needham Heights, MA), says that Vivotech, in conjunction with the Canadian space program, is planning to encapsulate pancreatic islets in space. (See *Bio/Technology* **3:**853, Oct. '85). Their original plan was to fly with an all-Canadian experimental mission sometime in 1987. Taunton-Rigby says that the delay now imposed on all experiments will allow her team time to refine their own experiments.

She anticipates that capsules made in microgravity will be perfectly spherical and perfectly smooth. The sphericity may improve structural strength, and the smoothness may improve the *in vivo* lifetime of implanted capsules. The pancreatic islets will be frozen prior to flight; on board, they will be thawed, encapsulated, and then frozen again for their return to earth.

—Jennifer Van Brunt

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