KOREA

Laid-Off Satellite Group Sets Up Shop

SEOUL—First Park Sung Dong got mad. Then he got even.

Park, an engineer at the Satellite Technology Research Center (SATREC) in Taejon, was furious when the Ministry of Science and Technology (MOST) decided that most of his university-based institute should be absorbed by a larger government contractor. But after threatening a mass resignation last month to protest the decision, Park and his 55 colleagues have vowed to show government bureaucrats just how valuable their work can be: They have started a company that will hire researchers as they are laid off from SATREC over the next 3 years and market their skills to developing countries.

SATREC was created in 1989 to develop Korean technical skills while doing exploratory research on microsatellites, those weighing about 100 kilograms. It is based at the prestigious Korean Advanced Institute of Science and Technology (KAIST), sometimes called Korea's MIT. But last summer MOST decided that much of SATREC's work overlapped with that of the Korean Aerospace Research Institute (KARI), which designs large commercial satellites costing several hundred million dollars, and that satellites should be developed at a government institute, not a university. Universities are places where professors teach students, officials explain, and the 20% that remains of SATREC will be better suited to filling a traditional educational role. "KAIST is not a research institute. It's a graduate school," says Choi Jong Bae, an assistant director at MOST.

Access to space is a priority for the Korean government, which last month announced a 5-year plan to build a rocket capable of launching small satellites. But SATREC workers feel that the government has a one-size-fits-all attitude toward satellites and is blindly consolidating two very different programs. "[KARI's] approach is to guarantee reliability and higher performance," says Choi Soong Dal, founder and director-general of SATREC. "We are doing small microsatellites for experimental purposes." Its third and most recent satellite, for example, cost just $10 million. It included experiments measuring Earth's magnetic field, solar particles, and the degradation of electric circuits from radiation in space.

Choi Soong Dal mounted a vigorous lobbying effort to fight off a similar attempt by MOST 5 years ago to eliminate his institute, but this time he says he's resigned to accept whatever happens. KARI officials declined to comment on the consolidation, which was proposed last summer after a new science minister took office. Given the frequent reshuffling of the Korean cabinet, sources speculate that opponents may be counting on the possibility that the plan may not outlive his tenure.

In the meantime, the first seven engineers to leave SATREC pooled $300,000 of their own money and on 11 January launched a venture company called Satrec Initiative. Their business plan targets developing countries with a limited budget and a hunger for technologies unavailable from advanced countries with laws that prevent certain tech transfers. They also hope to commercialize spin-off technology, says Park, noting that electro-optical systems for astronomy are similar to those used in semiconductor manufacturing and that materials shielding satellite circuits from radiation in space could benefit the nuclear power industry.

Park looks forward to cashing in on such technology. That incentive didn't exist for him as a fixed-salary employee at SATREC, which didn't pursue commercial applications. "I'd like all of our engineers to become millionaires," he says.

–MICHAEL BAKER

Michael Baker writes from Seoul.

MICROBIAL DISEASES

How Rotavirus Causes Diarrhea

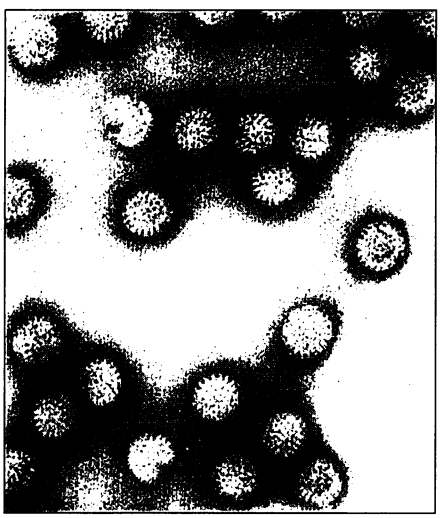
In a healthy adult, the diarrhea caused by common intestinal viruses such as rotavirus is largely an unpleasant nuisance. But to infants and toddlers, particularly those in the developing world where medical care may be scarce, rotavirus infections are a major cause of mortality, killing some 600,000 children worldwide. The virus is so deadly because it causes the intestine to secrete copious amounts of fluid, leading to death by dehydration in highly vulnerable infants. How rotavirus triggers the excess fluid secretion has long been mysterious, however. Now, on page 491, gastrointestinal physiologist Ove Lundgren at Göteborg University in Sweden and his colleagues provide a solution.

They've shown that, in mice, the virus activates the enteric nervous system, the nerves that control the intestine's movements and its fluid absorption and secretion. The activated nerves apparently stimulate cells of the intestinal lining to boost their water secretion, resulting in diarrhea. The toxins released by some bacteria, including the one that leads to cholera and pathogenic strains of *Escherichia coli*, cause diarrhea this way. But, says gastroenterologist Don Powell of the University of Texas Medical Branch in Galveston, "nobody knew this mechanism was involved in rotavirus diarrhea. It's a nice piece of work." Understanding what causes the excess fluid secretion in rotavirus diarrhea, he adds, is an important first step in figuring out how to block it with drugs.

Currently, there's no way to prevent the infections. A vaccine against rotavirus had to be withdrawn last fall from the U.S. market, the only place it was sold, because it caused serious intestinal blockages that killed a small number of children. Children who become infected are treated with oral or intravenous salt and sugar solutions to prevent dehydration. But the treatment does not halt the diarrhea itself. So a drug that does, and could be added to the rehydration therapy, would be a big advance, Powell says.

Despite the evidence of the enteric nervous system's role in the diarrhea caused by the cholera and *E. coli* toxins, few researchers considered the idea that the same mechanism might underlie virus-induced diarrhea. Then in 1996, Lundgren, whose own lab helped prove the case for cholera toxin, read a paper indicating that little was known about how rotavirus might produce abnormal fluid secretion in the intestine. So he teamed up with microbiologist Lennart Svensson of the Swedish Institute for Infectious Disease Control in Solna and several other colleagues to determine whether intestinal neurons might be involved.

The researchers applied three types of compounds known to block neurotransmission in the gut to rotavirus-infected intestines from newborn mice that they maintained in solution. All three compounds greatly suppressed fluid secretion by the infected mouse intestines. The researchers found, for example, that fluids from infected intestines had a higher concentration of an unabsorbed radioactive compound after treatment than before, indicating that the intestines were secreting less fluid. But the inhibitors had little, if



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Nerve irritant. Rotavirus particles such as these cause diarrhea by activating the enteric nervous system.