Beagle 2, ready by the end of the year for integration into Mars Express. But tests of Beagle 2's balloons, which cushion its landing, did not go as expected, says Rudi Schmidt, ESA's Mars Express mission manager.

At the Jet Propulsion Laboratory (JPL) here, workers are attempting to solve a similar set of daunting technical problems involving the two rovers that are the centerpiece of the $800 million mission slated to be launched by NASA next summer. Recent tests on the airbag designed to cushion the fall proved successful, but the parachute to decelerate the speeding capsule has failed ground tests. Tests on three new parachute designs are slated for October. "If we don't have a parachute, we're not going to fly," says Chris Jones, JPL's planetary projects director.

Principal investigator Steven Squyres of Cornell University in Ithaca, New York, says he's philosophical about Mars exploration. He's confident that the NASA team will be able to solve the parachute problem and that the long-term issues will sort themselves out. Mars missions have "always been extremely difficult," he says. "But believe it or not, we have a more stable situation than anytime in the past 15 years." –ANDREW LAWLER

With reporting by Alexander Hellemans in Naples, Italy, Judy Redfearn in Bristol, U.K., and Daniel Clery in Cambridge, U.K.

CANCER IMMUNOTHERAPY

Select T Cells, Given Space, Shrink Tumors

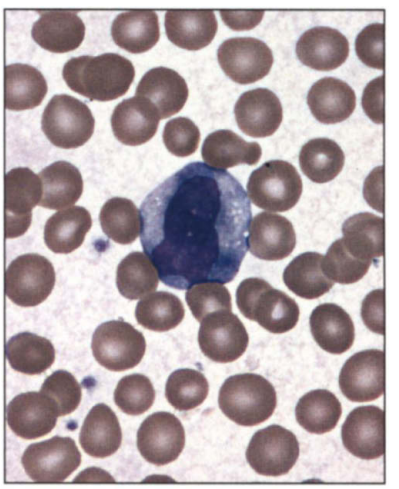
Tumors normally fend off any attacks by the immune system. But now scientists have found a way to give immune cells an edge, thereby shrinking tumors throughout the body, from the skin to the liver. The work, reported online by *Science* this week (www.sciencemag.org/cgi/content/abstract/1076514), breathes life into cancer immunotherapy, a field that has struggled to achieve success in humans.

For nearly 2 decades, immunologist Steven Rosenberg and his colleagues at the National Cancer Institute (NCI) in Bethesda, Maryland, have sought to fight tumors with T cells, the immune system's first line of defense. They have extracted cells from a patient's body, selected or modified them to improve their potency, and reinfused them. But the T cells often disappeared with little effect.

Rosenberg's new protocol, which incorporates a blast of chemotherapy and a more refined selection of immune cells than before, has had dramatically better results in a group of patients with metastatic melanoma. Although the therapy failed in some patients, in others it shriveled tumors. Of 13 volunteers, all of whom were expected to die within a few months, 10 remain alive 6 to 24 months after the first treatment.

"It's essentially what all of us have been striving for in immunotherapy," says James Mulé, an immunologist at the University of Michigan Medical School in Ann Arbor. Still, "it's really hard to predict how this will turn out" in the longer term and in larger groups of patients.

Unlike foreign intruders such as bacteria, tumor cells are the patient's own and hence are less viciously attacked by the immune system. However, the tumor surfaces of certain cancers have antigens, molecules that awaken the immune system and induce it to respond. Melanoma is one of these.



Top gun. A tumor-fighting T cell (center), surrounded by red blood cells, proved to be a vicious attacker of melanoma.

The researchers obtained tumor samples from each patient and searched for T cells that had infiltrated the tumors. Collecting as many as 50 T cell samples from a single tumor, they tested each against another tumor sample from the same patient. Rosenberg's team handpicked the two or three T cell samples that most effectively killed cancerous cells, and allowed the top T cells to multiply.

The NCI group decided that, to be effective, the selected T cells would have to make up the bulk of cells in each patient's immune system, at least temporarily, and persist long enough to act. The team administered chemotherapy to wipe out substantial numbers of existing immune cells and then reinfused the highly aggressive T cells.

Unlike many previous studies, this one not only relied on a type of T cell called a CD8 cell, which recognizes antigens and reacts, but also used CD4 cells. These "helper" T cells might have enabled the CD8 population to expand and retain its cancer-killing capacity.

In six patients, all tumors decreased in size by at least 50%: One 18-year-old remains disease-free 2 years after his treatment. The NCI group saw some tumor shrinkage in four others. Cells infused into two middle-aged men survived at unexpectedly high levels 4 months later; in one of the men, 97% of all immune cells were, for a brief time, the type infused. "[Rosenberg's] got numbers that nobody's seen before," says Bernard Fox, an immunologist at the Earle A. Chiles Research Institute in Portland, Oregon.

Still, although the treatment reached metastases buried in the lungs and liver, it didn't work well for everyone, and Rosenberg doesn't know why. "We have an enormous effort now trying to answer that question," he says. Another challenge is monitoring side effects: Four volunteers experienced a loss of skin pigmentation, and one suffered inflammation in the eye, signs that the therapy was attacking not only cancerous cells but normal pigment-producing cells as well. And it remains unclear whether one of the therapy's successes—enabling infused cells to persist—will have untoward effects.

Despite the hefty challenges that remain, Rosenberg and others hope this improved protocol can be adapted for other cancers and possibly even immune disorders such as AIDS. Offering infused T cells some elbowroom and handpicking only those most likely to succeed might improve the odds in battling once intractable diseases.

–JENNIFER COUZIN

CREDIT: S. ROSENBERG/NCI

BIOTERRORISM

NAS Censors Report on Agriculture Threats

When the U.S. Department of Agriculture (USDA) wanted to know if terrorists could disrupt the U.S. food supply, it turned to the National Academy of Sciences (NAS). This week, an academy panel made public its analysis—or at least most of it. Missing from the panel's report are eight hypothetical case studies that the academy excised because the material was