# Double Duty Cells in Human Immune System

Teamwork between cells has been considered essential for the immune system to eliminate undesirable invaders. White blood cells called helper T lymphocytes recognize a foreign substance, proliferate and produce a chemical signal that prompts other white blood cells, killer T lymphocytes, to attack and destroy the intruder cell. But now scientists have discovered that some T lymphocytes can both proliferate in response to foreign material and attack it. Originally these cells were called helper cell-independent cytotoxic T lymphocytes, which was abbreviated $HIT_c$. Soon the abbreviation led to the more graphic name of HIT ("hit") cells.

"It's exciting that a single cell can do what two other cells do. It's like a hermaphrodite," Fritz H. Bach of the University of Minnesota in Minneapolis told SCIENCE NEWS. "These cells may well function in some situations when the other cells won't function — for example, against a tumor."

Bach described recent work on HIT cells during the American Red Cross Annual Scientific Symposium, held in Washington. Discovery of these autonomous killer cells required techniques that allow investigators to grow a line of cells — a clone — derived from a single cell. "Ability to clone T lymphocytes is a major advance. You can start with a single cell and have, in a few months, a gram of identical cells," Bach says. "It would have been extremely difficult to establish the existence of the HIT cell without cloning."

The HIT cell was first demonstrated in the mouse immune system by Bach and Michael B. Widmer. Looking at the cells of individual T-lymphocyte clones, the scientists found that some proliferated in response to a foreign target but did not kill cells; others killed but did not proliferate and a few could both proliferate and kill. These HIT cells, like helper cells, produced and released a chemical factor that could drive killer cells requiring helpers.

More recently human HIT cells were demonstrated by Bach and colleagues Siew-Lin Wee, Li-Kuang Chen and Gideon Strassmann. They found HIT cells among the white blood cells of a normal donor and a patient with malignant melanoma, a skin cancer. The investigators observed that the HIT cells kill the same cells that stimulate them to proliferate. Thus the two functions of the cell are triggered by the same target, although it is not yet known what specific chemicals make up those targets.

HIT cells are not equally prominent in all types of immune response, the scientists find. "HIT cells predominate in certain situations, but we still need to work out which," Bach says. In two cases, so far, human HIT cells made up 3 percent and 74 percent of the clones studied.

"This supports the concept that HIT cells play a differential role," Bach says. While the scientists do not yet know what is responsible for the frequencies of cell types, one possibility is that HIT cells preferentially respond to modified native cells, such as tumor cells.

Because HIT cells can kill tumor cells without the aid of helpers, Bach envisions potential application of HIT cells for tumor treatment. He says the recent findings "add a cell to the immune repertoire."

*—J.A. Miller*

# Homing in on the Basin and Range

Cornell University

*COCORP trucks inch along the nation's roads. They send vibrations through the earth and record the echoes as the seismic waves encounter layers in the crust.*

As the fleet of trucks used by the Consortium for Continental Reflection Profiling (COCORP) inches across selected areas of the United States, scientists gradually are working out details of the earth's crust. The latest efforts have been focused in the Basin and Range province in western Utah where the crust, the uppermost portion of the earth, is becoming thinner. The seismic data show that three enormous slabs of crust are stacked up, scraping over each other along faults with shallow slopes extending for more than 120 kilometers. The findings are helping geologists to understand how surface features relate to movement deep in the crust, and also are raising fundamental questions about the nature and evolution of the Moho (Mohorovičić discontinuity), the transition between the crust and the underlying mantle.

The long horizontal faults are called detachment planes, meaning that the slabs are stretching out — the opposite of processes believed to build mountains. Movement along these faults may help explain the puzzling topography of the Basin and Range where, for thousands of square kilometers, mountain ranges protrude at intervals, separated by broad flat expanses of land. In 1982, a COCORP survey was conducted in a 170 km line from the Snake Valley near the Nevada-Utah border, across to the Sevier Desert. The data showed faults similar to those noted elsewhere on the continent.

The Utah COCORP findings were presented last week in Salt Lake City at the meeting of the Geological and Seismological Societies of America by Richard W. Allmendinger and colleagues of Cornell University in Ithaca, N.Y., and Robert B. Smith of the University of Utah in Salt Lake City.

It has been known that the crust in the Basin and Range is 25 km to 30 km thick, relatively thin compared to the crust in the Sierra Nevada range to the west, which is about 50 km thick. Jack Oliver of Cornell, director of the COCORP program, explains that one way to understand how the crust is being pulled apart is to learn what happens at depth to faults seen at the surface. There are three basic models to explain the stretching. One model is that as the Basin and Range is pulled apart, it breaks into blocks that are bounded by steeply dipping faults that continue throughout the crust. A second model is that the faults dip steeply until they blend into a zone where material, under high temperature and pressure, begins to flow. The third model, which the recent survey supports, describes a long horizontal fault with blocks sitting on it, sliding and gradually rotating.

The authors report that the present stretching began in the last 65 million years. There is evidence, they say, that in the preceding geological period the motion was in the opposite direction, with the slabs being thrust over each other along the same gradually sloping faults. Thrusting has occurred repeatedly in the Appa-