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DALLAS--Will zero gravity affect aging? Will it alter man's genetic makeup?

These are two of many questions asked by a complicated biological experiment designed for Skylab by scientists from the Dallas County Hospital District and The University of Texas Health Science Center.

Human lung cells will grow and divide under the gaze of automated microscope-camera systems in "Woodlawn Wanderer 9," an instrument package which is scheduled to ride into space with the Skylab astronauts Tuesday May 15.

In the experiment designed by Drs. P.O'B. Montgomery, Joseph Paul and Jim Cook of Dallas and Dr. Leonard Hayflick of Stanford, other systems will periodically fix and preserve the cultures of cells so that any alteration in structure can be studied back on earth after the 28-day orbital excursion.

"This is the most sophisticated biological experiment which has been flown for an extended period," said Dr. Montgomery, a pathologist who is principal investigator on the project.

One reason for looking at single cells is a curiosity whether weightlessness will affect what seems to be a built-in timing mechanism. These embryonic diploid lung cells are known to divide only about 60 times and then die.

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"What they will do in space could give us a clue to the aging process," said Dr. Montgomery.

When the cells are rqcovered they will be flown to Stanford University where Dr. Leonard Hayflick, a microbiologist who is co-investigator, will watch them to see if they deviate from the norm. The cells to be used divided ten times before they were frozen in supercold nitrogen 11 years ago. Hayflick expects they will remember to divide 50 more times before dying unless weightlessness upsets the timetable.

The cell cultures for Woodlawn Wanderer 9 will be flown to Cape Kennedy early Monday, May 14, where the cultures will be checked, selected, and put aboard the astronauts' command module some 14 to 15 hours before launch.

The project package is so named because it was built under contract from the National Aeronautics and Space Administration with the Dallas County Hospital District's Woodlawn Hospital Laboratories.

Another scientist who will be looking at what happens to the cells' chromosomes is Dr. Dean Stock of the M.D. Anderson Hospital of The University of Texas System Cancer Center in Houston.

During the 28-day mission, the Skylab astronauts will peridically check the Woodlawn package to see if it is operating normally. In order to provide a basis for comparison, two "sister" experimental packages will be operated on earth.

Stanford Investigator Hayflick comments: "This marks the first time that scientists will be able to assess the effects of prolonged space flight at the cellular level. We have no information regarding either subtle or perhaps even major effects that might take place at the cellular level."

There will be a number of medical experiments involving the Skylab astronauts. One of them, Dr. Joseph P. Kerwin, is an M.D., in fact.

But "you can't continuously monitor the astronauts' cells--you can't look at them with amicroscope while they are alive to determine rate of growth or see them divide. And you wouldn't want to take biopsies (slices of tissue)," explained Dr. Montgomery.

When the Woodlawn Wanderer's cells are brought back, they will be examined by electron microscopes both in regular and scanning modes and by microspectrophotometry. Some will be subcultured, again, with the question of what physical or aging changes are apparent.

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The question of what effect gravity--or the lack of it--has on living cells has long intrigued scientists. As far back as 1806, one experimentor used water-driven centrifuges to show that growth of plants is oriented by gravity. Turing frog's eggs udside down caused malformation in 1894, according to an investigator named Pflueger.

In the 1930s, scientists had decided that extra gravity, simulated by whirling specimens in a centrifuge, slowed down division of the cells of some forms of life.

And although scientists had ways of rotating specimens so as to equalize the pull of gravity, no true zero gravity environment was available until the advent of the space program.

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The Woodlawn Wanderer 9 may be the precursor of a number of experiments which will tell man how he might fare on long journeys to the other planets of the Solar System.

Officially dubbed Experiment S015, the Dallas-made package consists of two major systems:

The first is the photomicroscope system, consisting on one 20-power and one 40-power instrument. Each microscope is focused on its own specimen chamber and time-lapse photographs are made on 16 millimeter film at a rate of five frames per minute for 40-minute intervals twice each day through the mission.

The other major system is the cell growth curve module with 18 culture chambers. At pre-determined intervals, individual chambers will be injected with a fixative to kill and preserve the cells in that chamber for analysis after the package is returned to earth. Four of the chambers will be returned with live cells for subculturing.

The entire Woodlawn Wanderer 9, which has been in preparation since about 1965, weighs only about 20 pounds.

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