

'Endeavour' to carry out experiment today that crashed with Ilan Ramon 8 years ago

• By JUDY SIEGEL

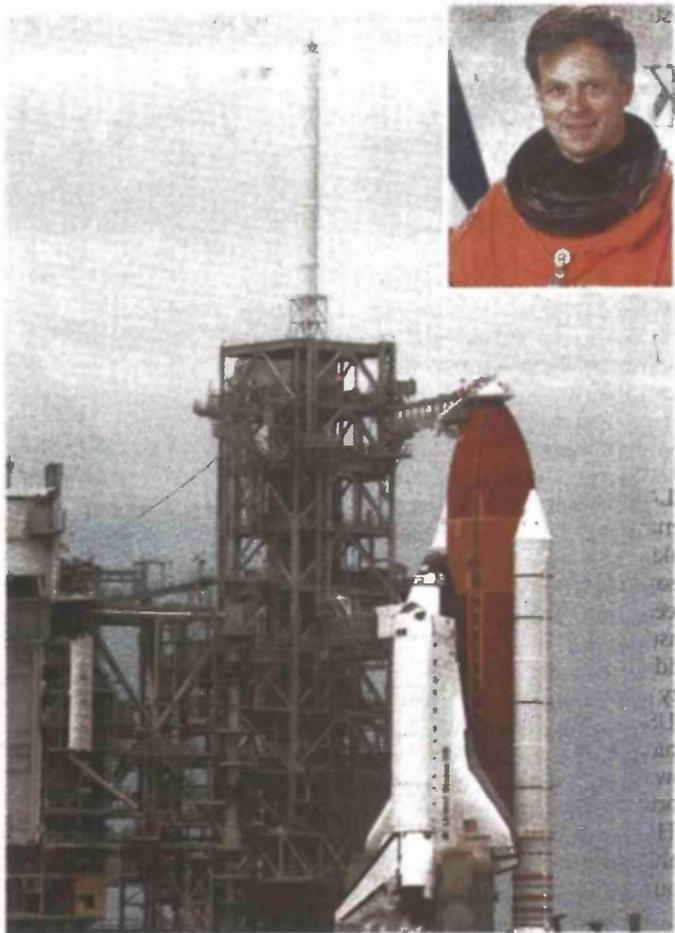
A test on adult stem cells to study the influences of weightlessness on bone cells and resultant osteoporosis that was to have been performed by Israeli astronaut Col. Ilan Ramon on the ill-fated space shuttle *Columbia* in 2003 will finally be performed on Monday by the *Endeavour* – on the penultimate mission of the US National Aeronautics and Space Administration's shuttle program.

The *Endeavour* mission will close a circle for Prof. Dan Gazit of the Hebrew University's skeletal biotechnology laboratory, who planned and developed the original experiment for Ramon.

On the flight with Ramon – who was a good friend of Gazit's – was a cell culture device that contained adult stem cells. Gazit's work focused on the regeneration of skeletal tissue by converting adult stem cells into skeletal tissue through genetic engineering. Since it is known that astronauts quickly lose bone mass while in space – in effect developing osteoporosis – the object of the project was to identify those genes that are either active or suppressed in the cells that generate bone and therefore are responsible for the phenomenon, the professor explained.

The experiment was to include a comprehensive analysis of thousands of genes within the cells that were on the *Columbia* shuttle and their comparison to those grown in the HU lab. The results would have implications not only for the health of the astronauts but also for elderly persons suffering from osteoporosis and others confined to bed rest for extended periods who also lose bone mass.

After the loss of the cells on board due to the crash over Texas that killed all seven abroad eight years ago, Gazit – who went to the US to observe the experiment from the ground – Dr. Gadi Pelled and colleagues in the HU



THE SPACE SHUTTLE 'Endeavour' will perform an experiment on bone loss that was to be performed by Israeli astronaut Ilan Ramon (inset) on the 'Columbia' 8 years ago. (Reuters, NASA)

lab used an alternative technology to mimic weightlessness on Earth.

Working on the Hebrew University-Hadassah Medical School campus in Jerusalem's Ein Kerem, they used a dynamic cell culture system that rotates around its axis, generating free-fall conditions for the cells growing inside it as if they were in a state of no gravity in space. The results of that research, published in the scientific journal *Tissue Engineering*, showed that the weightlessness caused the stem cells to change into fat cells and prevented their being converted into bone cells. These results explained why lack of movement or weight can lead to loss of bone mass.

"We took the same adult stem cells that were on the *Columbia*, grew them in our lab as if they were floating in space and performed an analysis of some 20,000 genes that

worked or not compared to those under conditions of gravity," Pelled told *The Jerusalem Post*.

The *Endeavour* will replicate the experiment in space for the Fisher Institute for Air and Space Strategic Studies, established in Herzliya by the Israel Air Force Association. The institute, named after the late philanthropists Zachary and Larry Fisher, connects former air force personnel to facilitate public discussion in Israel about aviation and space issues.

Gazit's group is now working on the development of new treatments based on the use of adult stem cells for rehabilitation of the spine for osteoporosis patients. This method is based on getting the body's own repair cells to reverse loss of bone mass and to repair the damage from which these patients are suffering, such as spine fractures.