Research Update • Le point sur la recherche

Blast off for osteoblast experiment

A study to determine why astronauts lose bone mass while in space was launched — literally — last November by a senior medical student in the Faculty of Medicine at the University of Manitoba.

Kevin Forkheim's osteoporosis experiment was on board the space shuttle *Columbia* as part of a joint Canadian–Israeli initiative to study the metabolism and morphology of osteoblasts in microgravity.

Forkheim says studies show that astronauts can lose up to 17% of their bone mass, depending on the duration of a mission. "The osteoporosis that occurs in microgravity is similar to the osteoporosis that occurs on Earth," says Forkheim, whose experiment compared bone cells exposed to microgravity with those subjected to similar conditions on Earth.

Treating osteoporosis-related fractures costs the North American health care system an estimated $10 billion annually. Insights into the cause of osteoporosis may lead to a better understanding of the disease and more effective methods of treatment, according to Rick Knoll of Instrumentation Technology Associates, Inc., the US company that sponsored the osteoporosis experiment through its student-outreach program. Results of the experiment are not yet available.

Forkheim's study was proposed at a meeting of the International Space University Summer Session Program, held in Vienna in 1996. Forkheim worked in collaboration with Dr. Eran Schenker, director of the Israel Aerospace Medicine Institute. — *D. Square*

High-flying research: Kevin Forkheim (left) of the University of Manitoba and Eran Schenker of the Israel Aerospace Medicine Institute prepare to see their osteoporosis experiment take flight

TB or atopy? That is the question

There is new evidence that exposure to tuberculosis inhibits atopy later in life. This could provide an explanation for the skyrocketing rates of asthma — a major atopic disorder — as the prevalence of TB exposure wanes.

Researchers in Japan and England conducted a study of 867 Japanese schoolchildren, which looked at their responses to tuberculin tests and their atopic symptoms. Results were published in *Science* (1997;275:77). The investigators were testing the hypothesis that childhood respiratory infections such as measles, whooping cough and TB modify the developing immune system. They found that children with positive results from tuberculin tests had one-third the rate of atopic symptoms of children with negative results.

Atopy is the allergic response to house dust mites and plant pollens; it underlies asthma, hay fever and eczema. The allergic response is mediated by IgE; a set of cytokines derived from a subset of T lymphocytes (T_H2) are central to mediating IgE production and causing immediate hypersensitivity. Animal experiments have shown that infectious agents such as *Mycobacterium tuberculosis* strongly promote T_H1 lymphocytes and cytokines, which can inhibit T_H2 cytokine functions. Hence, absence of such infections could release T_H2 immune mechanisms and promote atopy.

Study coauthor Julian Hopkin of the Churchill Hospital in Oxford, England, says no data are yet available on other types of respiratory infections and their connection with atopy in developed countries.

The research may lead to clinical applications. "Our data point to the possibility that immunization with harmless bacteria related to tuberculosis might help in preventing or treating allergy," says Hopkin. Studies to test this idea are in the works. — *C.J. Brown*