

The flying doctor from Pointe-Claire

Dave Williams met his wife-to-be when she joined the swimming class he taught at the neighbourhood pool. Later, it would make sense for Cathy Fraser, an Air Canada pilot, to teach Williams, a young physician, her own skill in return.

She did a pretty good job. Williams, who heads the enormous Space and Life Sciences Division at the National Aeronautics and Space Administration's (NASA) Johnson Space Center in Houston, can fly T-38 jets in formation and has flown aboard the space shuttle *Columbia*.

The flying doctor from Pointe-Claire, Que., is also a leading light in space medicine. Want to know why half of astronauts become nauseous in space? Or why they are clumsier up there? Williams knows things like this because he's a researcher and also because he was one of the shuttle crew members to cover himself with electrodes and sensors in 1998 so that he could be a guinea pig at 27 000 km an hour.

Williams had long dreamed of being an astronaut but felt too young and inexperienced to apply when Canada's original call for trainees went out in 1983. Instead, the 1983 McGill graduate interned at Ottawa's Civic Hospital. However, outer space still beckoned, and he pursued activities he thought would help: he learned to fly an airplane and to parachute. Later, during a dinner at a small Ottawa flying club, he heard Marc Garneau speak about the fun of being an astronaut.

In 1992, while he was working as an emergency physician in Toronto, Canada opened another round of applications for potential astronauts, and Williams was 1 of 4 people selected.

Williams hopes to return to space some day, but for now he's content to be the first foreigner — NASA politely refers to him as an "international partner" — to hold such a high management job at the space agency. He currently oversees a US\$200-million budget, and his staff of 1000 deals with all medical aspects of human space flight.

NASA is especially interested in how a healthy human body changes in space, with an eye to using this information to treat parallel ailments in ordinary earthlings. For instance, astronauts lose 1% to 1.5% of their bone mass every month in space, which closely parallels osteoporosis-related bone

loss on Earth. With no weight to support, their muscles — including heart muscles — waste away.

Astronauts also suffer from sleep disorders and experience the same balance disorders found in the elderly. "The immune system is suppressed in long-duration space flights," adds Williams. "We're trying to determine what to do about that. What we're hoping is that the solutions we develop for astronauts can be implemented terrestrially to help improve the care we provide for patients."

Astronauts didn't worry too much about the health effects of flying because shuttle flights rarely lasted more than 2 weeks. Suddenly, however, the job has changed: there's an International Space Station nearly 400 km above the Earth and the crew members generally stay there for 3 to 4 months at a time.

"We're developing space medicine — essentially a new clinical discipline providing health care in orbit," Williams says. "Space medicine has to deal with the superposition of illness or injury on top of altered physiology of astronauts in space. So we're very much trying to develop this clinical practice."

So far the focus is on "microgravity," the near absence of gravity found in a space shuttle or orbiting space station. However, what happens when the astronauts leave Earth far behind and travel to a place with some gravity, such as the moon or Mars? NASA hopes to send astronauts on the 2-year journey to Mars within a generation. "That whole area will demand the development of new technologies," Williams says. One of those challenges is trying to figure out how to extract oxygen from the carbon dioxide atmosphere on Mars.

Only one person ranks higher than Williams at the Johnson Space Center, and that's the director. In addition to his post as research boss, Williams is also deputy associate administrator of NASA's Office of Space Flight, which is a policy-making position based in Washington. That job also deals with crew health and safety but focuses more on budget setting and developing priorities for research personnel.

NASA is already a partner with the National Space Biomedical Research Institute, a network of 12 American medical schools, and Williams, ever conscious of his earthly ties, also hopes to build partnerships with more Canadian researchers. — *Tom Spears, Ottawa*



NASA photo

Dr. Dave Williams in the cockpit of a T-38