



Features

Chroniques

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Frustrated by lack of job opportunities in Canada, MD moves to US space-medicine program

Lynne Sears Williams

In brief

A CANADIAN PHYSICIAN-ENGINEER who had difficulty finding suitable work in Canada is now employed by an American company that is helping develop the medical systems that will serve astronauts. Dr. Douglas Hamilton thinks research in space medicine will have applications on earth.

En bref

UN MÉDECIN INGÉNIEUR CANADIEN qui n'arrivait pas à trouver un emploi convenable au pays travaille maintenant pour une société américaine qui perfectionne les systèmes médicaux destinés aux astronautes. Le D^r Douglas Hamilton estime que la recherche en médecine spatiale aura des utilités sur terre.

A Canadian internist who had a hard time finding suitable work in Canada has been recruited by an American company to design medical facilities and procedures for space travel.

Dr. Douglas Hamilton, 40, a Calgary physician with a PhD in cardiovascular physiology, left Canada in September to join a team of specialists who will design, build and test medical equipment and simulators for a NASA sub-contractor, KRUG Life Sciences of Houston.

"KRUG's job is to support medical operations for NASA [National Aeronautics and Space Administration]," Hamilton noted. "If NASA has any special equipment or procedures that need to be made flight certifiable, KRUG does it." The medical-operations team specializes in designing systems and protocols for handling potential health problems that could occur in space.

KRUG recently won an \$82-million dollar contract from NASA to provide medical hardware and support for the Space Shuttle and International Space Station. Construction of the latter, which is to begin this summer, will be a co-operative effort involving the US, Russia, Japan, Europe, Brazil and Canada.

Hamilton will also be helping to design medical systems and procedures for NASA's advanced space projects, particularly the next lunar mission and the manned mission to Mars. "KRUG has been involved in designing life-science experiments and medical-support technology since the Gemini and Apollo projects," he said. "It is involved in every aspect of medical support for the Shuttle and Station."

Hamilton, who holds 5 undergraduate and postgraduate degrees, including a master's degree in electrical engineering, confirms that he left Canada because employment opportunities were in short supply for a physician with both engineering and medical skills. He had been making ends meet in Calgary by practising engineering and through regular postings in cardiac and intensive care units. He also visited outlying communities that needed an internist's attention and regularly supervised patients undergoing cardiac rehabilitation.

Hamilton, a married father of 2 children who used to dedicate about half his time to engineering projects, currently holds a Canadian patent on a photovoltaic electrical power conversion system and has applied for 4 others, including 3 for systems used for medical monitoring and control.

"I couldn't get a job in Calgary in telemedicine or medical informatics. Most



Hamilton: lessons from space that can be used on earth



Canadian medical academic teaching centres want doctors doing more clinical work but also want them to be teachers and academics who publish high-quality, peer-reviewed research. You can't expect everything in one package." He said the University of Calgary's Department of Internal Medicine wants physicians with a primary interest in clinical epidemiology and "I don't fit the bill."

During his residency training Hamilton was told that because he also pursues engineering-related goals, his dedication to medicine wasn't strong enough. "Nothing could be further from the truth," he maintains. "We need more physician-engineers to prevent the art and science of medicine from being trampled by technology."

Hamilton, who has published numerous papers and abstracts, has been an instructor in space life sciences at the International Space University, an international gathering of scientists who specialize in space technology. They gather annually for 3 months of intensive training in aeronautics, informatics, space law, space-propulsion systems and space medicine.

He was also a featured lecturer at the annual American Heart Society meetings and was short-listed by the Canadian Space Agency (CSA) for its astronaut-recruitment program in 1992. He placed in the top 20 among 5300 applicants and is presently on the waiting list after the national competition selected 4 astronauts.

"I still keep in contact with the CSA," he noted. "I think Canada is a very important participant in the International Space Station Program and we can be proud of the country's achievements. Our contributions to the space station are quite impressive when you consider the size of our space-program budget. Some day Canadian astronauts will live in the space station. If they get sick or need emergent life support, perhaps my medical-equipment designs will help them."

Hamilton's new job, landed after an international search by KRUG, will put him on space medicine's cutting edge. "If a person is going to have a heart attack on the Space Station or Mars Mission, what do we do?" he asked. "We start by simulating the problem and figuring out the procedures to follow, designing the equipment to support the caregiver working in microgravity. The zero-gravity environment poses many technical problems. . . . How do you interpret x-rays? How do you do surgery?"

An intriguing issue for the KRUG team is the design of systems to support astronauts as they are descending to Earth in escape pods — an expansion of the work done through the Russians' *Mir* space program. One of the primary problems is building escape pods large enough to hold 6 astronauts and the emergency life-support equipment they may need to support a disabled crew member.

However, that is only one of many technical problems Hamilton will address. "We look at all sorts of medical issues — radiation, cardiovascular deconditioning, bone

loss, neurological disturbances, multicultural and psychosocial interaction among crews . . . to name a few."

Hamilton will help design simulators that replicate medical facilities in space, and then use them to train astronauts and flight surgeons. Because not all space flights have a physician on board "we have to design medical protocols that any flight crew can follow."

The computer systems he will help develop will provide a link with medical specialists on earth, who will be able to provide advice on problems ranging from hang-nails to cardiac arrests.

KRUG's eventual goal is to produce systems that can be used on Earth too. For instance, the effect of weightlessness on bone density is a medical issue that may hold implications for the treatment of osteoporosis. "We'll also be testing some telemedicine flight hardware that can be used on Earth on the Shuttle this year."

Hamilton will undertake his own flight training in NASA shuttle and space station mock-ups in order to gain firsthand experience with the living conditions astronauts face.

His first experience with technical wizardry and the space program occurred shortly before the Apollo 11 astronauts walked on the moon. Though still in grade school, Hamilton reassembled his family's new colour television just in time to watch the ground-breaking "giant leap for mankind." Earlier in the day he had taken the set apart to see how it worked. "My mother was fairly upset. I was under a lot of pressure, but I had the TV up and running in time for the moon walk."

Hamilton, who is philosophical about the lack of job opportunities in Canada, thinks tighter provincial licensing restrictions are the main barrier. "I could be an engineer in any province but I can't practise medicine," he commented. "It's ludicrous. . . . Why can't a person who is trained in Alberta practise in British Columbia? They wrote the same exams. We can't blame the government. It's us, the physicians, causing this problem. But the real loss is to the general public."

Hamilton said his move to the US will fulfil a lifelong dream. "Space is man's next destiny and I want to be part of it. Most aspects of space do not respect national boundaries: there is no Canadian or Russian territory. If humankind can't unify its efforts towards a purely technical, nonterritorial and nonpartisan project like the international space station, then there is not much hope for solving [other issues] on earth."

Hamilton, who noted that many remote Canadian communities are further from emergency care facilities than astronauts in the *Mir* Space Station, said medical practice in Canada, particularly telemedicine, has much to gain from the space program. "The astronauts can be in an acute care centre within a few hours of leaving the station. I hope to apply the advances in medicine in space to improve health care delivery in Canada." ?