



The strange world inside Canada's only level-4 containment laboratory

David Square

From the outside, the building that houses Canada's only level-4 containment laboratory looks like an upscale condominium: lush green lawns, pink tea roses, yellow potentilla and ash trees line a circular drive leading to a 5-storey edifice clad in white tile. An atrium trimmed in brushed aluminum plays counterpoint to a lobby comprised of Tyndall stone, polished granite floors and plate glass doors designed to withstand a terrorist attack. The only hint of the building's true nature is a small sign: The Canadian Science Centre for Human and Animal Health, 1015 Arlington Street, Winnipeg, Manitoba.

Inside the \$200-million building — the price tag includes its state-of-the-art equipment — security is tight. The 120 staff members must show a security badge and enter a personal identification number on keypads mounted at the front and rear entrances; visitors must sign in at a front desk manned by 2 guards, who watch surveillance monitors. The guards are polite but stern; one of them took my driver's licence and locked it in a steel drawer.

Do I look like a terrorist? "Don't worry," he said, apparently reading my mind. "It's routine. You'll get it back when you sign out."



Doug Dealey

Daryl Dick (front) and Dr. Heinz Feldmann, chief scientist for the level-4 program



David Square

Dr. Wendy Johnson (right) and technician Kelly Robinson work with pathogens in a level-2 containment area

I'm tempted to ask a few questions about the 24-hour security system but the guard has no time for chitchat. After all, the level-4 area of this laboratory could eventually house some of the bad boys from the world of virology: Ebola, Marburg, Lassa, herpesvirus B, as well as Omsk and Crimean-Congo hemorrhagic fever, and the prions responsible for mad cow disease in animals and new variant Creutzfeldt-Jakob disease in humans.

Dr. Wendy Johnson's secretary met me at the security desk and escorted me to a sparsely appointed conference room. Johnson, a clinical microbiologist with Health Canada's Health Protection Branch for 25 years, is now acting director of the Laboratory Centre for Disease Control (LCDC), the Canadian equivalent of the Atlanta-based US Centers for Disease Control and Prevention. "The origin of our group was the old laboratory of hygiene established in Ottawa in the late 1940s," said Johnson, "so we can claim we have been in existence for 50 years."

Over the past 2 years, Johnson and about 80 specialists and technical staff have gradually moved from Ottawa to Winnipeg to form the Bureau of Microbiology within the LCDC. Only the HIV/AIDS lab remained in Ottawa. The Winnipeg facility officially opened in June.

The Bureau of Microbiology shares the building with the newly formed Canadian Food Inspection Agency (CFIA), a component of Agriculture and Agri Food Canada until 2 years ago. In fact, this is the world's first facility to combine human and animal health disease research. In



Winnipeg, CFIA will concentrate on its Foreign Animal Disease Program, and Johnson said this will include the study of level-3 and some level-4 animal pathogens. "To this point we don't have a lot of overlapping programs, but I expect they will develop as common interests from being located in the same facility." CFIA occupies about 30% of the building, Health Canada 70%.

Microbiology's supreme court

The Bureau of Microbiology is a national reference facility, with large culture collections held in trust for provincial laboratories across the country. "When these labs have a difficulty they refer work to us because we have a higher level of diagnostic services. . . . We're the Supreme Court of clinical microbiology in Canada," Johnson said.

The Winnipeg facility is expected to expedite the diagnosis of viruses brought into the country by illegal aliens, tourists and Canadian travellers. "Sending specimens to the CDC in Atlanta takes too long," said Johnson. "We need a centrally located Canadian lab that can diagnose specimens quickly and accurately, before they have a chance to spread in the human population." She said the facility has also been given specific initiatives from Health Canada to enhance food and blood safety in areas such as hepatitis research.

To this point, a limited number of level-3 agents such as *Brucella* and *Mycobacterium tuberculosis* have been transferred to the Winnipeg lab, but as yet there are no level-4 agents in the building.

"We'll be ready to proceed with enhanced level-3 and level-4 research by this fall," said Johnson. "We still have a few problems with operations and maintenance that need to be ironed out before we are fully functional at all bio-containment levels." Indeed, a recent discharge of several thousand litres of untreated level-2 waste into the Winnipeg sewer system caused concern among researchers and Winnipeg citizens alike. "It's the kind of problem you have to catch before your facility is deemed completely functional," said Johnson. There are about 15 level-4 facilities around the world and there has never been a case where level-4 agents have escaped into the human population, she



Grant Kennedy

Aerial view of the Canadian Science Centre for Human and Animal Health

added. "We have a young staff with families and they are just as concerned about their safety as the rest of the community."

The lab recently hired Dr. Heinz Feldmann of Germany to conduct studies on the level-4 Marburg virus, a deadly and contagious filoviridae with similarities to the Ebola virus. Only 8 scientists and technicians will have security clearance to the level-4 containment area. Johnson said the facility has the capacity to grow from the present 120 to 160 employees when new research programs require additional personnel.

On my way out of the facility, I got a bird's-eye view of a group of employees. Johnson and I were 2 stories above on a gangway that overlooks the skylit cafeteria; below us young men and women were eating, drinking and, perhaps, discussing infectious diseases over the dinner table. I couldn't help but think of the much smaller inhabitants who will soon live in this place.

David Square is a Winnipeg journalist.

Different levels of concern

Most of the space at Winnipeg's new Canadian Science Centre for Human and Animal Health is devoted to level-2 laboratories. **Level 2** means a lab can handle pathogens that cause human or animal disease but are unlikely to pose a hazard to lab workers. Food-borne pathogens are an example. **Level 3** refers to labs in which work is done with agents that can cause serious

human or animal disease, or can have serious economic consequences. Staff working here must leave personal clothing outside the area and must shower before leaving the lab. Hantavirus would be dealt with here. **Level 4** is the place where science fiction movies would be shot. Workers here deal with "dangerous and exotic agents" that produce serious and often

untreatable illnesses in humans or animals, and are readily transmitted from one person to another. Staff here must wear positive air-pressure protective suits connected to filtered air lines. The air-filtration system removes particles that are 85 times smaller than the smallest known disease-causing agent. The Ebola virus would be handled at this level.