Major Clinical Breakthrough at the Centre de recherche du CHUS in Sherbrooke, Quebec, Canada
A clinical study demonstrates that technetium produced in a cyclotron is equivalent to that produced in a nuclear reactor.

Sherbrooke, February 16, 2015 – Researchers at the Centre de recherche du Centre hospitalier universitaire de Sherbrooke (CRCHUS) unveiled today the results of a clinical study demonstrating equivalency between cyclotron-produced technetium (Tc-99m) and that produced in a nuclear reactor. The result of many years of research, this major clinical breakthrough will significantly affect the quality and safety of care delivered to patients. Based on the study's findings, not only are the CRCHUS's medical-imaging research positioned as leaders in this area, they are demonstrating that tomorrow's supply of medical isotopes can be produced with a promising green technology.

On hand for the announcement were the Minister of Natural Resources Canada, the Honourable Greg Rickford, and the MNA for Saint-François, Guy Hardy, representing the Honourable Gaétan Barrette, the Minister of Health and Social Services.

"We are proud to present the preliminary results of this clinical study carried out in patients with thyroid disorders," stated Éric E. Turcotte, MD, nuclear-medicine physician at the CHUS, researcher at the CRCHUS and Professor in the Université de Sherbrooke's Faculty of Medicine and Health Sciences. "We received Health Canada's approval for this study in July 2014. The images for the first patient were taken in September 23, 2014; to date, a total of eleven patients have been injected with cyclotron-produced Tc-99m in the context of a medically indicated diagnostic testing. I want to thank them for having consented to take part in our study and having participated with such enthusiasm."

Dr. Turcotte views the results as conclusive. "The images obtained with Tc-99m produced by our cyclotron are equivalent to those produced with Tc-99m from a nuclear reactor. They enabled us to make accurate diagnoses. As expected, none of the patients experienced side effects. We now intend to use this Tc-99m for more complex nuclear-medicine tests, in particular, assessing myocardial contractility and possibly ventilation studies in investigating pulmonary embolism."

Promising Green Technology
Tc-99m is used in more than 85% of nuclear-medicine diagnostic tests, such as cardiac imaging, bone scintigraphy to detect cancers, and many other tests to determine the functioning of various organs. The worldwide demand for Tc-99m is currently estimated at about 40 million doses per year, but scientists predict a 15% increase over the next ten years due to the aging of our populations. This means that the future supply of medical isotopes must be ensured.

Cyclotron-production of Tc-99m can offset these needs. The process does not produce nuclear waste, making it a promising green technology. It is also less expensive compared to the investment required to build a nuclear reactor.
"We have to bank on this technology, especially since the five main nuclear reactors producing close to 80% of the Tc-99m needed worldwide have been in service for more than 50 years (see below). Several are approaching the end of their service lives," explained Dr. William D. Fraser, Scientific Director of the CRCHUS and Professor at the Université de Sherbrooke's Faculty of Medicine and Health Sciences. "The expected closure of some reactors in the near future will impact on the supply chain, and we must be ready to respond to the growing need for patient diagnostic tests."

The Honourable Greg Rickford, Canada’s Minister of Natural Resources is delighted with this achievement "The announcement of today’s latest breakthrough in medical isotope production is outstanding news. We congratulate the Centre de recherche du CHUS in Sherbrooke and the University of Alberta on this impressive milestone. Our government's investment in scientific research is resulting in the production of a reliable, daily supply of life-saving medical isotopes while supporting high-quality jobs here in Quebec and across Canada."

"This technology will eventually make it possible to produce isotopes on a larger scale to supply our hospitals," stated Guy Hardy, MNA for Saint-François, conveying the thoughts of the Honourable Gaétan Barrette, the Minister of Health and Social Services. "It could also extend to other research centers and university establishments with cyclotrons, which would increase the autonomy of our health-care system with respect to isotopes, significantly benefiting the province's population," further related Mr. Hardy, who represented the minister at the press conference.

Marketing Tc-99m in Quebec

This clinical study represents an initial critical step towards marketing Tc-99m," stated Brigitte Guérin, researcher at the CRCHUS and Professor in the Faculty of Medicine and Health Sciences at the Université de Sherbrooke. "We have demonstrated the process's feasibility and confirmed the bioequivalency of Tc-99m produced in a high-performance cyclotron compared to that produced in a nuclear reactor. Our efforts are currently focused on implementing production on a larger scale and a system for distributing isotopes to regional and provincial hospitals in 2016."

On hand for this announcement, the Chair of the CHUS Board of Directors, Jacques Fortier, saluted the expertise and leadership of researchers at the CRCHUS and the Université de Sherbrooke. He went on to say: "Today, our researchers are pushing back the boundaries of science. They are showing us that basic science research, when translated into clinical care can result in tangible benefits for patients. Through to this scientific breakthrough, the CHUS and CRCHUS have taken the lead necessary to remain competitive nationally and internationally. In this regard, support from the Quebec and Canadian governments will be essential in maintaining our leadership in this field."

This project was made possible through a grant from Natural Resources Canada, which invested $2.9M in the CRCHUS via the Isotope Technology Acceleration Program (ITAP). This funding was complemented by $600,000 from the Ministère de la Santé et des Services sociaux du Québec (MSSS), $400,000 from the Fondation du CHUS, and $70,000 from the MITNEC (Medical Imaging Trial Network of Canada) consortium funded by the Canadian Institutes of Health Research (CIHR). The ITAP project is being conducted at the CRCHUS in collaboration with a team of researchers from the University of Alberta and Advanced Cyclotron System Inc., a cyclotron manufacturer.
The CRCHUS researchers have access to two cyclotrons for producing medical isotopes, namely, a TR-19 (19 mega-electrons volts or MeV) and a TR-24 (24 MeV) with higher output used to produce Tc-99m. This array of equipment stands out internationally in the field of medical imaging.

**Information and interview coordination**
Sylvie Vallières, CHUS      Nathalie Poirier, CRCHUS
819-346-1110, extension 22572 or 819-679-0705  819-346-1110, extension 12871
svallieres.chus@ssss.gouv.qc.ca    napoirier.chus@ssss.gouv.qc.ca

About the Five Nuclear Reactors
- NRU, Chalk River (Ontario, 1957)
- OSIRIS (France, 1966)
- Petten HFR (Netherlands, 1961)
- BR2 (Belgium, 1961)
- SAFARI (South Africa, 1965)

About the CRCHUS
An approach combining fundamental, clinical, epidemiological, and evaluative research is the distinguishing feature of the Centre de recherche du CHUS (CRCHUS). Some 220 top researchers and their teams devote their efforts to six research axes, which address major health concerns: Cancer: biology, prognosis, and diagnosis | Diabetes, obesity, and cardiovascular complications | Health: populations, organization, practices | Inflammation - Pain | Medical imagery | Mother and child. The CRCHUS provides ground-breaking scientific and technological leadership nationally and internationally. Its breakthroughs invariably result in improved care and services.

About the CHUS
Quebec’s fourth largest hospital, the Centre hospitalier universitaire de Sherbrooke (CHUS) has a triple role. It is the local hospital for residents of the Sherbrooke, Haut-Saint-François, Val-Saint-François, and Coaticook regions. It also provides specialized and ultra-specialized care to the entire population of the Eastern Townships. In addition, it provides specific ultra-specialized care, notably in cardiology, neurosurgery, oncology, and neonatology, to residents of the Centre-du-Québec and part of the Montréal regions. Its niches of excellence are: cerebral chemotherapy through the transient opening of the blood-brain barrier, neurosurgery using the gamma knife, advanced 3-D MRI-guided neurosurgery, colorectal cancer screening, and the cyclotron production of radioisotopes (at its research centre). Some 10 000 people at the CHUS are dedicated to the health and well-being of the population.