



Context

Positron emission tomography (PET) is a nuclear diagnostic imaging tool. PET scanners require a cyclotron or a positron emitter generator to manufacture the isotopes that are used in PET scans. PET represents a nuclear imaging alternative to single-photon emission computed technology (SPECT), which uses the medical isotope Technetium-99m (^{99m}Tc).

Approximately one-third of the world's supply of medical isotopes, including ^{99m}Tc , is produced by the National Research Universal (NRU) reactor at Chalk River in Ontario. The facility recently experienced a number of unanticipated and lengthy shutdowns,¹ resulting in a shortage of medical isotopes that impeded the delivery of health care services – specifically, diagnostic imaging tests.

Objectives

The purpose of this report is to provide a general overview of the number and location of PET scanners and cyclotrons in Canada, and their uses. This report will update information presented in a previous Environmental Scan on PET scanning, which was prepared in 2010.² The following questions will be addressed:

1. What is the number and location of publicly and privately funded PET scanners and cyclotrons in each Canadian jurisdiction?
2. Are PET scanners and cyclotrons being used for clinical and/or research purposes?

Findings

It is not intended that the findings of this Environmental Scan provide a comprehensive review of the topic. The results of this report are based on a limited literature search and communications with key informants. This report is based on information gathered as of December 2011.

Publicly funded

Since the last report, PET scanning and cyclotron capacity has increased slightly in Canada: Alberta and Quebec are anticipating two new PET scanners each, and Saskatchewan, New Brunswick, and Newfoundland and Labrador are anticipating PET scanners. Of the three cyclotrons anticipated in the 2010 report (British Columbia, Ontario, and Newfoundland and Labrador), one is now operational. Six additional cyclotrons are anticipated: two in Ontario, two in Quebec, and one each in Saskatchewan and Newfoundland and Labrador.

In British Columbia, there are two PET scanners and two cyclotrons. The PET scanners are being used for both clinical and research purposes. One of the cyclotrons is new and is used for clinical and research purposes; the other, a TRIUMF cyclotron at the University of British Columbia, is used exclusively for research purposes.

In Alberta, there are currently four PET scanners and one cyclotron. Two new PET scanners are anticipated. One PET scanner is used exclusively for research purposes, another is used exclusively for clinical purposes, and two are used for both clinical and research purposes. The

cyclotron is used for both research and clinical purposes.

In Manitoba, there is one PET scanner and one cyclotron; both are used for clinical and research purposes.

In Ontario, there are 12 PET scanners and three cyclotrons. Ten PET scanners are used for both clinical and research purposes, and two are used exclusively for research. The three cyclotrons are used for both research and clinical purposes. One new cyclotron is anticipated in Thunder Bay and another has been installed in Toronto but is not yet operational.

In Quebec, there are 16 PET scanners and two cyclotrons. Twelve PET scanners are used exclusively for clinical purposes, and four are used for both research and clinical purposes. The two cyclotrons are used for both clinical and research purposes. Two new PET scanners and two new cyclotrons are anticipated.

New Brunswick has a PET scanner at the Saint John Regional Hospital that is used for clinical purposes. The Dr. Georges-L.-Dumont University Hospital in Moncton is anticipating a PET scanner that will be used for clinical purposes.

In Nova Scotia, both the PET scanner and cyclotron at the Queen Elizabeth II Health Sciences Centre in Halifax are used for research purposes.

Planning is underway to introduce a PET scanning and cyclotron program in Saskatchewan, as well as in Newfoundland and Labrador. These programs are expected to be used for both research and clinical purposes.

The updated information regarding publicly funded PET scanners and cyclotrons is displayed in Table 1.

Table 1: Location of Publicly Funded PET Scanners and Cyclotrons in Canada (2010)
Revised and updated December 2011

Province	Hospital or Centre	City	Type (Number of Scanners)	Number of PET Cyclotrons	Uses of Equipment
British Columbia	BC Cancer Agency	Vancouver	PET/CT (2)	1	PET/CT scanners and cyclotron used for clinical and research
	UBC			1	TRIUMF operates principally for research
Alberta	Cross Cancer Institute	Edmonton	PET (1) PET/CT (1) Additional PET anticipated	1	PET scanner — research only PET scanner and cyclotron — clinical and research

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Alberta	University of Alberta Hospital	Edmonton	PET/CT (1)		PET scanner — clinical with some use for research
	Foothills Hospital	Calgary	PET/CT (1) Additional PET/CT scanner anticipated in 2012, although installation date not confirmed		PET scanner — clinical use only
Saskatchewan			PET/CT scanner anticipated	Cyclotron anticipated	Planning is actively underway to operate both a PET and a cyclotron The equipment will be used for both clinical and research purposes
Manitoba	Health Sciences Centre	Winnipeg	PET/CT (1)	1	PET/CT scanner and cyclotron used for clinical and research purposes
Ontario	Hamilton Health Sciences	Hamilton	PET (1)	1	PET scanner and cyclotron used for clinical and research purposes
	St. Joseph's Healthcare Hamilton	Hamilton	PET/CT (1)		PET scanner — research and clinical
	The Ottawa Hospital	Ottawa	PET/CT (1)		PET scanner — research and clinical
	University of Ottawa Heart Institute	Ottawa	PET/CT (1)	1	PET/CT scanner and cyclotron used for clinical and research purposes

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Ontario	Centre for Addiction and Mental Health	Toronto	PET (1) PET/CT (1) (both scanners used for brain research only)		PET scanners — research
	Princess Margaret Hospital	Toronto	PET/CT (2) (1 used for research only)	1 <i>(anticipated)</i>	PET scanner — research and clinical
	Sunnybrook Health Sciences Centre	Toronto	PET/CT (1)		PET scanner — research and clinical
	St. Joseph's Health Care	London	PET/CT (1)	1	PET scanner and cyclotron — research and clinical
	Hospital for Sick Children	Toronto	PET/CT (1)		PET scanner — research and clinical
	Thunder Bay Regional Health Sciences Centre	Thunder Bay	PET/CT (1)	1 <i>(anticipated)</i>	PET scanner — research, radiation planning, and clinical
Quebec	McGill University Health Centre (Montreal General Hospital)	Montreal	PET/CT (1)		PET scanner used for clinical purposes
	Montreal Neurological Institute and Hospital	Montreal	PET (2)	1	PET scanner used for research and some clinical purposes Cyclotron used mainly for research, but also some clinical purposes

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Province	Hospital or Centre	City	Type (Number of Scanners)	Number of PET Cyclotrons	Uses of Equipment
Quebec	Hôpital Notre Dame	Montreal	PET/CT (1)		PET scanner used for clinical purposes
	Hôtel-Dieu de Montréal (Centre hospitalier de l'Université de Montréal)	Montreal	PET/CT (1)	1 cyclotron anticipated	PET scanner used for clinical purposes Cyclotron anticipated to be used for research purposes
	Jewish General Hospital	Montreal	PET/CT (1)		PET scanner used for clinical purposes
	Hôpital Maisonneuve-Rosemont	Montreal	PET/CT (1)		PET scanner used for clinical purposes
	CHU Sainte-Justine Hospital	Montreal	PET/CT (1)		PET scanner used for clinical purposes
	Hôpital Charles Lemoyne	Greenfield Park	PET/CT (1) anticipated 2012		PET scanner to be used for clinical purposes
	L'Hôtel-Dieu de Québec (Centre hospitalier universitaire de Québec)	Quebec City	PET/CT (1)		PET scanner used for clinical purposes
	Université de Sherbrooke Hospital	Sherbrooke	PET/CT (2)	1 Second cyclotron anticipated in 2012	PET scanner and cyclotron used for research and some clinical purposes Anticipated cyclotron expected to be used mainly for research, but also some clinical purposes
	Hôpital Laval	Laval	PET/CT (1)		PET scanner used for clinical and research purposes

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Quebec	Cité de la Santé de Laval	Laval	PET/CT (1) anticipated 2012		PET scanner to be used for clinical purposes
	Centre hospitalier régional de Trois-Rivières	Trois-Rivières	PET/CT (1)		PET scanner used for clinical purposes
	Centre de santé et de services sociaux de Rimouski-Neigette	Rimouski	PET/CT (1)		PET scanner used for clinical purposes
	Centre de santé et de services sociaux de Chicoutimi	Chicoutimi	PET/CT (1)		PET scanner used for clinical purposes
	Centre de santé et de services sociaux de Gatineau	Gatineau	PET/CT (1)		PET scanner used for clinical purposes
New Brunswick	Saint John Regional Hospital (part of the Horizon Health Network)	Saint John	PET/CT (1)		PET scanner used for clinical purposes
	Dr. Georges-L.-Dumont University Hospital (part of the Vitalité Health Network)	Moncton	PET/CT anticipated		Planned for 2012 To be used following clinical practice guidelines
Newfoundland and Labrador	Bliss Murphy Cancer Centre, Health Sciences Centre	St John's	PET/CT (1) anticipated	(1) anticipated	PET and cyclotron would be used for clinical purposes, and potentially for research

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Province	Hospital or Centre	City	Type (Number of Scanners)	Number of PET Cyclotrons	Uses of Equipment
Nova Scotia	Queen Elizabeth II Health Sciences Centre	Halifax	PET/CT (1)	1	Equipment is used for research purposes, as it operates under a clinical trial

18-F = florpiramine; CT = computed tomography; PET = positron emission tomography; TRIUMF = Canada's National Laboratory for Particle and Nuclear Physics.

Privately funded PET scanners

Eight privately operated PET scanning facilities were identified in Canada. Four of these are located in Ontario (Toronto, Hamilton, London, and Mississauga), two in Quebec (Montreal), and two in British Columbia (Vancouver and Burnaby).

Conclusion

As of December 2011, there are approximately 31 centres performing publicly funded PET scans in seven Canadian provinces (British Columbia, Alberta, Manitoba, Ontario, Quebec, New Brunswick, and Nova Scotia). Most of these PET scanners are used for both clinical and research purposes, although there are some examples, especially in Quebec, where PET scanners are dedicated to either clinical or research use. Six new publicly funded PET scanners are anticipated (two in Alberta, two in Quebec, one in New Brunswick, and one in Newfoundland and Labrador). There are approximately eight centres performing privately funded PET scans in Canada (British Columbia, Ontario, and Quebec).

There are 10 centres with operational cyclotrons in five Canadian provinces (British Columbia, Alberta, Ontario, Quebec, and Nova Scotia). Eight of these centres use cyclotrons for clinical and research purposes, and two centres use cyclotrons exclusively for research purposes (British Columbia and Quebec). Six new publicly funded cyclotrons are anticipated: two each in Ontario and Quebec, and one each in Saskatchewan and Newfoundland and Labrador.

References

1. CBC. CBC News [Internet]. Ottawa: CBC; c2011. Chalk River reactor idled to late 2009 or longer; 2009 Jul 8 [cited 2011 Dec 5]. Available from: <http://www.cbc.ca/news/canada/story/2009/07/08/chalk-river-nuclear-reactor008.html>
2. Morrison A. Positron emission tomography in Canada 2010 [Internet]. Ottawa: Canadian Agency for Drugs and Technologies in Health; 2011. Report No.: Environmental Scan issue 22. [cited 2011 Dec 5]. Available from: http://www.cadth.ca/media/pdf/PET_in_Canada_2010_es-22.pdf

Cite as: Hanrahan, C and Morrison, A. *PET Scanning – Revised and Updated Report* [Environmental Scan issue 32]. Ottawa: Canadian Agency for Drugs and Technologies in Health; 2011.

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Production of this report is made possible by financial contributions from Health Canada and the governments of Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland and Labrador, Northwest Territories, Nova Scotia, Nunavut, Prince Edward Island, Saskatchewan, and Yukon. The Canadian Agency for Drugs and Technologies in Health takes sole responsibility for the final form and content of this report. The views expressed herein do not necessarily represent the views of Health Canada or any provincial or territorial government.

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Canadian Agency for Drugs and Technologies in Health (CADTH)
600-865 Carling Avenue,
Ottawa, Ontario K1S 5S8