

Title **Computed Tomography and Its Carcinogenic Effects in Children and Youth in Québec: Scope of the Issue and Proposed Strategies**

Agency INESSS, Institut national d'excellence en santé et en services sociaux
1195 Lavigerie Ave, suite 60, Québec, QC, G0S 1E1;
Tel: 418 643-1339, Fax: 418 643-8220; inesss@inesss.qc.ca, inesss.qc.ca

Reference ETMIS 2011 7(8) Printed French edition 978-2-550-63721-9
http://www.inesss.qc.ca/fileadmin/doc/INESSS/Rapports/Oncologie/ETMIS_2011_Vol7_No8.pdf English summary (PDF) 978-2-550-63720-2
http://www.inesss.qc.ca/fileadmin/doc/INESSS/Rapports/Oncologie/INESSS_Summary_ComputedTomography_EN.pdf

Aim

This report was prepared at the request of the Direction québécoise du cancer (DQC), to address the cancer-related risks of diagnostic CT in children and young adults, imaging alternatives, and possible steps to reduce CT-related risks. It summarizes the literature on the link between ionizing radiation and cancer, presents relevant concepts and measurement units, estimates harms associated with CT imaging, and suggests strategies that might limit harms while retaining most of the benefits.

Conclusions and results

In 2009, 888 000 CT scans were performed in Quebec; 3.7% of these scans were on children and youth below the age of 20 years. We estimate that these scans are likely to lead to about 286 new cancer cases and 184 cancer deaths, including 24 cancer cases and 11 deaths from scans done on children and youth. This is less than 1% of all cases occurring in Quebec in 2009. CT scans account for about a quarter of radiation exposure in Quebec, as do other medical procedures (mostly nuclear medicine), radon, and other natural environmental exposures.

It is more difficult to measure the morbidity and mortality that these CT scans may have prevented, from earlier or more accurate diagnoses of serious diseases, but these benefits exist nonetheless. Major strategies are to make sure that radiation levels are as low as possible (optimization) and that expected positive effects of CT outweigh negative effects for each clinical indication (justification).

Recommendations

Quebec's health care system should adopt measures found in the medical literature, including:

- providing professional training and awareness about the issues;
- producing information to help physicians make decisions about the use of CT scans;
- developing dose-rate standards;
- developing guidelines on the indications for the different imaging techniques; and
- implementing quality-assurance measures in clinical and radiology facilities.

Methods

We performed a literature search in the databases containing primary scientific articles and systematic reviews published from 2000 to 2010, with special attention to studies addressing CT-related radiation in children and youth. Estimates of different exposures to natural radiation sources were obtained based international, Canadian and Québec data. A similar estimate was produced for artificial radiation sources, primarily from medical procedures. Data was supplied by the RAMQ for 2009. A standard dose-effect relationship model (BEIR VII) was used to estimate the number of new cancer cases and cancer-related deaths expected during the lifetime of those exposed to CT radiation.

Written by

Wilber Deck and Aimé-Robert LeBlanc, INESSS, Canada