

Radiation Emissions From Computed Tomography: A Review

Context

Computed tomography (CT) is a medical imaging technology used for the screening and diagnosis of medical conditions. It involves taking numerous X-ray images of a body area or organ and then processing these images using a computer to create cross-sectional pictures.

The use of CT has increased over the past decade. In 2011-2012, 4.4 million CT exams were performed in Canada, representing an increase of 2.7% each year since 2003. With the rise in the use of CT scans, radiation exposure has become an important public health concern — each exposure is thought to increase a patient's risk of cancer.

Technology

CT imaging results in an exposure of 2 millisieverts (mSv) to 30 mSv of radiation, depending on the area being scanned. To put this into context, a person is typically exposed to an average of 3 mSv of radiation each year from naturally occurring, or “background,” radiation. Current evidence suggests that doses between 5 mSv and 125 mSv may cause a small but statistically significant increase in cancer risk. Furthermore, frequent radiation exposure leads to high cumulative doses of radiation.

Issue

A review of the evidence on the risk of cancer associated with CT exposure and the guidelines regarding a safe threshold of CT radiation will help inform decisions about this imaging technology.

Methods

A limited literature search was conducted of key resources, and titles and abstracts of the retrieved publications were reviewed. Full-text publications were evaluated for final article selection according to predetermined selection criteria (population, intervention, comparator, outcomes, and study designs).

Key Messages

- Exposure to ionizing radiation from CT imaging may increase the risk of cancer in children.
 - The younger the child, the higher the risk appears to be.
 - The risk appears to increase with each exposure.
 - These findings are based on low-quality evidence.
- No guidelines containing explicit recommendations on a safety threshold of radiation from CT were found.

Results

The literature search identified 466 citations, with no additional articles identified from other sources. After screening the abstracts, 44 were deemed potentially relevant and 7 met the criteria for inclusion in this review — 1 systematic review, 3 non-randomized trials, and 3 guidelines.

DISCLAIMER: The information in this Report in Brief is intended to help health care decision-makers, patients, health care professionals, health systems leaders, and policy-makers make well-informed decisions and thereby improve the quality of health care services. The information in this Report in Brief should not be used as a substitute for the application of clinical judgment in respect of the care of a particular patient or other professional judgment in any decision-making process nor is it intended to replace professional medical advice. While CADTH has taken care in the preparation of the Report in Brief to ensure that its contents are accurate, complete, and up-to-date, CADTH does not make any guarantee to that effect. CADTH is not responsible for any errors or omissions or injury, loss, or damage arising from or as a result of the use (or misuse) of any information contained in or implied by the information in this Report in Brief.

CADTH takes sole responsibility for the final form and content of this Report in Brief. The statements, conclusions, and views expressed herein do not necessarily represent the view of Health Canada or any provincial or territorial government. Production of this Report in Brief is made possible through a financial contribution from Health Canada.