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Evidence Updated: Updated
Bottom Line: No change
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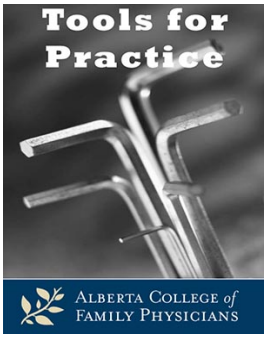

CT scans and other forms of low-dose ionizing radiation – What is the risk of cancer?

Clinical Question: Is there an increased incidence of cancer in patients who undergo CT scans?

Bottom-line: Individual risk estimates related to CT use are real but small, and depend on a number of factors including CT type, age, sex and number of CT scans. Alternative imaging methods with lower or no radiation dose should be used when possible, particularly in children and young adults.

Evidence:

- Modeling studies extrapolating from observations of atomic bomb survivors.[1-4]
  - BIER VII.[4]
    - Ten mSv confers a lifetime risk of cancer of one in 1,000.
    - Example one exposure would increase lifetime risk from 420 (baseline risk) to 421 per 1,000.
  - Applied to a retrospective cross-sectional study (1,119 pts) to estimate radiation doses:[5]
    - Number Needed to Scan (NNS) to cause one additional cancer:
      - Ex: 40 year old female.
        - Routine head = 2 mSv, NNS=8,100.
        - Routine CT chest = 8 mSv, NNS=720.
        - Multiphase abdomen and pelvis CT = 31 mSv, NNS=460.
      - Risks for those 20 years of age are ~doubled.
      - Risk for those 60 years of age are ~halved.
- Retrospective cohort studies: Dose dependent increase in the risk of cancer with radiation exposure.
  - Cardiac imaging in patients with recent myocardial infarction (82,861 patients):[6]
    - Hazard Ratio (HR) per 10 mSv increase in radiation = 2.8% [1.028 (1.018–1.039)].
  - Head CT in pediatric patients (24,418 patients).[7]
    - Increased risk of brain tumor. HR = 2.56 (CI 1.44-5.54).

Context:

- Many modeling studies but very few cohort studies evaluating the risk of cancers with radiation exposure.
- Population wide modeling studies have to be analyzed with care given that the risk of death from the underlying morbidity is often much higher than death from radiation induced cancer.[8]
- Dose of radiation varies widely depending on area scanned, institution, protocol, age and sex – healthy children at higher risk due to their size and life expectancy.[9]
- CT imaging has increased more than 25 fold in the US in the last 30 years.[10] Risk models estimated that 29,000 future cancers could be related to CT scans in the US in 2007.[11]

Original Authors:
Christina Korownyk MD CCFP, Edward Wiebe MD FRCPC

Updated:
Emélie Braschi MD PhD

Reviewed:
G Michael Allan MD CCFP

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Tools for Practice is a biweekly article summarizing medical evidence with a focus on topical issues and practice modifying information. It is coordinated by G. Michael Allan, MD, CCFP and the content is written by practising family physicians. If you are not a member of the ACFP and would like to receive the TFP emails, please contact subscribetfp@acfp.ca to be added to the distribution list. Archived articles are available on the ACFP website.