

**Adult CT Procedures\*: Estimated Effective Dose and Risk Characterization**

Risk Level	Approximate theoretical increase in risk of fatal cancer occurring years to decades after adult CT examination:
Minimal:	1 in 100,000 to 1 in 10,000--which is equal to-----0.001% to 0.01%
Very Low:	1 in 10,000 to 1 in 1,000----which is equal to-----0.01% to 0.1%
Low:	1 in 1,000 to 1 in 500 ----- which is equal to -----0.1% to 0.2%

Note: The theoretical increase in cancer risk from low dose radiation (less than 100 mSv) is estimated conservatively and represents a very small addition to the average person's risk of dying from cancer which is approximately 23% or ~1 in 5. However lifestyle choices have a profound impact on cancer risk. For example at age 45 the risk of dying from cancer for a population of male smokers and non-smokers is ~28% and 16% respectively. The increase in cancer risk at low dose is estimated from the observed cancer increase in human populations exposed to higher radiation doses. The small increased risk estimated to occur at low dose has not been established to exist in human populations studied to date and it is possible that the actual risks are lower than are estimated here.

CT Procedure	Typical Effective Dose (mSv) †	Risk Characterization	Difference in Background Radiation Exposure Living at 5,000 feet (e.g. Denver, Co) vs Sea-level (e.g. Sacramento) for ‡:	Average Lifetime Cancer Mortality Risk Before-CT	Theoretical Lifetime Cancer Mortality Risk After-CT
<b>ABDOMINAL REGION</b>					
Virtual Colonography	10	Very Low	2 Years	23%	23.05%
Abdomen / Pelvis	12	Very Low	2 Years	23%	23.06%
Abdomen/Pelvis, with & without contrast	24	Low	5 Years	23%	23.11%
<b>CENTRAL NERVOUS SYSTEM</b>					
Head	2	Very Low	5 Months	23%	23.01%
Head, with & without contrast material	4	Very Low	9 Months	23%	23.02%
Spine	6	Very Low	1 Year	23%	23.03%
<b>CHEST</b>					
Chest	7	Very Low	1.5 Years	23%	23.03%
Chest -Low Dose Screening Exam	1.5	Minimal	4 Months	23%	23.01%
<b>HEART</b>					
Coronary CT Angiography (CTA)	12	Very Low	2 Years	23%	23.06%
Cardiac CT for Calcium Scoring	3	Very Low	7 Months	23%	23.01%



\* **Note for older and younger patients:** While cancer risk per unit dose may be greater in young children than for adults because they have a longer lifetime for the cancer risk to be expressed, the opposite is true for older patients. For example the risk of a chest CT for an average adult patient is about 1 in 10,000 (Very Low) while the risk for a patient 70 years old would be about 1 in 100,000 (Negligible) and the risk to an infant would be about 1 in 1,000 (Low).

† These values are averages. Your value may be higher or lower due to exam modifications necessary for your specific medical condition or anatomy.

‡ Comparable to the difference in the average annual natural background radiation received in Colorado (8.0 mSv/yr) compared to California (2.7 mSv/yr):  $8.0 - 2.7 = 5.3$  mSv/yr.

### **References:**

1. "The Measurement, Reporting, and Management of Radiation Dose in CT: Report of AAPM Task Group 23 of the Diagnostic Imaging Council CT Committee." April 3, 2008.
2. "Radiation Dose in X-Ray and CT Exams." [http://www.radiologyinfo.org/en/safety/index.cfm?pg=sfty\\_xray#part3](http://www.radiologyinfo.org/en/safety/index.cfm?pg=sfty_xray#part3). Accessed November 14, 2013.
3. B F Wall, R Haylock, J T M Jansen, M C Hillier, D Hart and P C Shrimpton., HPA-CRCE-028 -*Radiation Risks from Medical X-ray Examinations as a Function of the Age and Sex of the Patient*, ISBN: 978-0-85951-709-6, October 2011.
4. Bushberg JT, Seibert JA, Leidholdt Jr. EM, Boone JM. *The Essential Physics of Medical Imaging* 3rd Edition. Wolters Kluwer, Lippincott Williams and Wilkins, Philadelphia, PA. 2012
5. CJ Martin, Effective dose: How should it be applied to medical exposures?, *Brit J Radiol* 80(956), 639-0647,2007.