Naturally-occurring "background" radiation

We are exposed to natural sources of radiation all the time. According to recent estimates, the average person in the U.S. receives an effective dose of about 3 mSv per year from natural radiation, which includes cosmic radiation from outer space. These natural "background doses" vary according to where you live.

People living at high altitudes such as Colorado or New Mexico receive about 1.5 mSv more per year than those living near sea level. A coast-to-coast round trip airline flight is about 0.03 mSv due to exposure to cosmic rays. The largest source of background radiation comes from radon gas in our homes (about 2 mSv per year). Like other sources of background radiation, the amount of radon exposure varies widely depending on where you live.

To put it simply, the amount of radiation from one adult chest x-ray (0.1 mSv) is about the same as 10 days of natural background radiation that we are all exposed to as part of our daily living.

Effective radiation dose in adults

Here are some approximate comparisons of background radiation and effective radiation dose in adults for several radiology procedures described on this website.

	Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
ABDOMINAL REGION 	Computed Tomography (CT)–Abdomen and Pelvis	10 mSv	3 years
	Computed Tomography (CT)–Abdomen and Pelvis, repeated with and without contrast material	20 mSv	7 years
	Computed Tomography (CT)–Colonography	6 mSv	2 years
	Intravenous Pyelogram (IVP)	3 mSv	1 year
	Barium Enema (Lower GI X-ray)	8 mSv	3 years
	Upper GI Study with Barium	6 mSv	2 years

BONE

Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
Spine X-ray	1.5 mSv	6 months
Extremity (hand, foot, etc.) X-ray	0.001 mSv	3 hours

CENTRAL NERVOUS SYSTEM

Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
Computed Tomography (CT)–Head	2 mSv	8 months
Computed Tomography (CT)–Head, repeated with and without contrast material	4 mSv	16 months
Computed Tomography (CT)–Spine	6 mSv	2 years

CHEST

Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
Computed Tomography (CT)–Chest	7 mSv	2 years
Computed Tomography (CT)–Lung Cancer Screening	1.5 mSv	6 months
Chest X-ray	0.1 mSv	10 days

DENTAL

Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
Dental X-ray	0.005 mSv	1 day

HEART

Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
Coronary Computed Tomography Angiography (CTA)	12 mSv	4 years
Cardiac CT for Calcium Scoring	3 mSv	1 year

MEN'S IMAGING	Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
	Bone Densitometry (DEXA)	0.001 mSv	3 hours

NUCLEAR MEDICINE	Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
	Positron Emission Tomography–Computed Tomography (PET/CT)	25 mSv	8 years

WOMEN'S IMAGING	Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
	Bone Densitometry (DEXA)	0.001 mSv	3 hours
	Mammography	0.4 mSv	7 weeks

Note for pediatric patients: Pediatric patients vary in size. Doses given to pediatric patients will vary significantly from those given to adults. For more information on radiation safety in pediatric imaging, visit http://www.imagegently.org/Roles-What-can-I-do/Parent.

***** The effective doses are typical values for an average-sized adult. The actual dose can vary substantially, depending on a person's size as well as on differences in imaging practices.

Please note that this chart attempts to simplify a very complex topic. If you have questions about radiation risk, talk to your medical physicist and/or radiologist and ask about the benefits and risks of radiologic care.

The International Commission on Radiological Protection (ICRP) Report 103 states: "The use of effective dose for assessing the exposure of patients has severe limitations that must be considered when quantifying medical exposure," and "The assessment and interpretation of effective dose from medical exposure of patients is very problematic when organs and tissues receive only partial exposure or a very heterogeneous exposure which is the case especially with x-ray diagnostics." In other words, effective dose is not always the same for everyone. It can vary based on a person's height and weight, how the procedure is performed and the area of the body being exposed to radiation.