

**Risk From X-Ray Exposure
 A Day In The Sun?**

A lot of people compare the risk from a diagnostic x-rays to the risk of “A Day In The Sun.” This is not a valid comparison as the sun exposes only the skin and not sensitive internal organs. Consequently, another comparison is necessary.

Everyone in the US is exposed to naturally occurring radiation every day of their lives. This comes from radon, cosmic radiation, naturally occurring terrestrial radiation, and from internal radiation (naturally occurring radiation from within our own bodies such as from potassium). The exposure level is about 300 mrad per year, on average. This level is higher in some parts of the US, such as Colorado, but on average we are exposed to 300 mrad per year or about 0.82 mrad per day.

The risk from an x-ray examination is based upon the effective dose the patient receives. The effective dose takes into account the risk of all organs developing cancer from exposure to radiation for that examination.

The following table provides the effective doses for four common x-ray examinations. *In addition, it provides the number of days of background radiation one would need to receive to be at a similar risk for developing cancer from the x-ray examination. It is easy to see that the risk of many x-ray examinations is much higher than “A Day In The Sun” or from a day’s exposure to naturally occurring background radiation!

	Effective Dose* (mrad)	Days of Background Radiation
Chest	2	2
Lumbar Spine	150	183
Chest CT	700	854
Intraoral dental film	5	6

Now let’s look specifically at dental x-ray exposures.

One Bitewing

5 mrad is the effective dose for a single bitewing exposure. So...6 days of naturally occurring radiation is the same as one bitewing radiograph. Sorry...dental x-rays are no day in the sun—more like a week in the sun.

One Exam □4 bitewings

Dose is cumulative so the effective dose from 4 bitewings is equal to 24 days in the sun. A full-mouth survey is 20 films—100 mrad and is equal to 122 days in the sun.

Cumulative Lifetime

And, we must assume dose is cumulative over time. So...5 mrad per year times 4 bitewings per year is 20 mrad per year. If you have films taken once per year from age 10 to age 70 (60 years), you get a cumulative dose of 1,200 mrad which is about the same effective dose as two chest CTs.

This equals 1,460 days in the sun over a lifetime from dental x-rays.

Joel E. Gray, Ph.D.
Professor Emeritus
Mayo College of Medicine
And
President and Consulting Medical Physicist
DIQUAD, LLC
JoelGray@DIQUAD.com
Ph 708-703-0260

*Mettler FA, Huda W, Yoshizumi TT, Mahadevappa M. Effective doses in radiology and diagnostic nuclear medicine: A catalog. Radiology 248:254-265, 2008.