

Medical Radiation Fact Sheet

The typical American is exposed to about 3.0 mSv (milli Sieverts) per year from natural background radiation. People living at high altitude, for example in Denver, Colorado are exposed to a higher level ionizing radiation of about 4.0 mSv per year from natural background radiation.

An average mammogram results in approximately one half of a mSv (0.5 mSv) radiation dose to the breasts, with no significant scatter to other organs. The dose is higher if less compression is used, more views are needed, or the breasts are very dense; even so **a mammogram is less than the natural background radiation absorbed in just a few months**. There is no significant radiation of the thyroid or any organ other than the breasts from mammography.

Ultrasound, Thermography, and MRI (magnetic resonance imaging) do not use ionizing radiation. All of these are increasingly used for breast cancer detection and evaluation of breast problems detected by mammography or physical examination, but are not in widespread use for screening for a variety of reasons. Thermography cannot diagnose cancer, and is more an early warning test than a cancer screening test. MRI is prohibitively expensive and requires an intravenous injection of contrast agent. Ultrasound *is recommended* for screening in women with dense breast tissue, but does not detect microcalcifications; microcalcifications are only imaged by mammography and are frequently the only sign of early breast cancer.

There is legitimate concern about medical procedures that carry much higher radiation doses than mammography, for example abdominal CT (approximately 5 to 10 mSv, or 100 times more radiation than a mammogram), PET scan (3 to 5 mSv), and other nuclear medicine procedures. For every 10 mSv exposure cancer risk is estimated to be 1 per 1000 exposed individuals, and the risk of fatal cancer 1 in 2000. Cancers caused by radiation generally develop a decade or more after the exposure. High dose procedures such as CT and nuclear medicine studies should therefore be used sparingly, with a clear indication of the expected benefit from performing the test. The effects of radiation are greatest in children, adolescents, and pregnant women.

The cancer risk from annual mammography in middle-aged and older women however, is insignificant, especially when compared with the risk of undetected breast cancer. Breast cancer occurs in one in eight American women, and is potentially fatal if not detected early. In screening trials, where tens of thousands of women were randomized to “mammography” or “no mammography” groups, no difference between groups has been found in the *number* of breast cancers. Many of these trials have follow-up for twenty or more years, and the significant difference between the women who had mammograms and the women who did not is fewer deaths from breast cancer in the women who had mammograms. **There is no difference between “mammography” and “no mammography” groups in the number of cancers that occur, so it is reasonable to conclude mammography does not cause breast cancer.**