

SUBJECT: ELIMINATION OF UNNECESSARY RADIATION EXPOSURES FROM COMPUTED TOMMOGRAPHY (CT)

The Radiation Advisory Committee is currently concerned about the unwarranted radiation (x-ray) exposures of patients by the over use of Computed Tomography (CT).

The rapid growth in the number of diagnostic CT examinations and newer, relatively high-dose CT equipment has increased the proportion of the yearly average medical radiation exposure to the United States population from about 15% in 1987 to 50% today and the medical use rate is climbing. The question is, "Will this increased use of CT cause an increased incidence of cancer in the future for patients?" The presumption is that it will.

The general public is not well informed regarding the differences between real and theoretical effects from radiation exposure. We see that you, the physician or provider, who is authorized to prescribe diagnostic CT exams, will be a major avenue of protecting patients from unnecessary radiation exposures by CT exams. The four areas we ask you to be concerned about are:

1. CT examinations of pregnant or potentially pregnant patients.
2. CT examinations of pediatric and adolescent patients.
3. Excessive CT examinations that are not medically justified.
4. Cumulative lifetime effects of radiation on bone marrow or reproductive organs.
 - Can medical radiation to a fetus cause a miscarriage or mutation? The possibilities of either of those risks may be questionable. However, the "perception of risk" is real for many people and must be discussed with them.
 - The physician should discuss the rationale for any requested CT exam and the possible harmful effects, as well as the potential consequences of not performing the exam.
 - The challenge is to order appropriate examination(s) and to provide the best care for those patients that will benefit from the study and not be adversely affected by the high radiation exposure.
 - In emergency situations, the provider has the responsibility to ensure that the CT exam is the best diagnostic tool available. Ultrasound, Magnetic Resonance Imaging (MRI), and conventional radiology should be considered as options for high-risk patients such as children and pregnant females.
 - The vast majority of professionals that have observed patients getting high radiation exposures to bone marrow or reproductive organs will answer that the exposures come from CT exams, which can have lifetime implications.

CONCLUSIONS:

The Radiation Advisory Committee to Oklahoma Board of Health is aware that radiation exposures from CT examinations is rapidly expanding, consequently there is increasing interest in reducing radiation dose from medical procedures. The possible hazards associated with radiation exposure have not been brought into clear focus by the public or by the medical community. We need the provider to help reduce the amount of radiation a patient receives from the use of CT scanning by asking: "Is this CT exam needed in order to help you provide the best care?", "Is this procedure necessary or can something else be done?" and "What is the medical radiation history of this patient, when was their last CT exam done, how many have they had done, and where were they done?"

The charts below and attached show comparisons between different general radiographic and CT procedures.

Comparison Radiation Risks from CT

COMPARISON OF RADIATION DOSES

<u>Procedure</u>	<u>Typical Effective Dose-mR (1)</u>
Radiographic Skull	7 mR
CT of Adult Head	200 mR
Chest x-ray	≤ 2 mR
CT of Adult Chest	800 mR
Radiographic Lumbar Spine or Abdomen	130 mR
CT of Adult Abdomen	1000 mR

(1) Comparison doses are from the FDA article “What are the Radiation Risks from CT?” published and last updated August 6, 2008. SI units of measurement convert to mRem for user convenience.

The Radiation Advisory Committee by statute (63 O.S. Section 1-1504.1) advises The Oklahoma State of Board of Health in the formulation and amendment of rules and regulations relating to the use of diagnostic x-ray systems. If you have any further questions for committee members, they can be reached by calling OSDH staff at (405) 271-5243.

Acknowledged Signed by:

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Attachments: Chart “Comparison of Radiation Exposures

References:

1. FDA paper on “Reducing Radiation from Medical X-rays”, February 19, 2009.
2. FDA paper on “What are the Radiation Risks from CT?” updated August 6, 2008
3. American College of Obstetricians and Gynecologists: *Guidelines for diagnostic imaging during pregnancy*. ACOG Committee Opinion No. 299. 2004

COMPARISON OF RADIATION EXPOSURES

Diagnostic Procedure	Typical Effective Dose (mRem)¹	Number of Chest X rays (PA film) For Equivalent Effective Dose²	Time Period for Equivalent Effective Dose from Natural Background Radiation³
Extremity (hands/feet)	0.1	<1	Less than 1 day
Chest x ray (PA film)	2	1	2.4 days
Skull x ray	10	5	12 days
Lumbar spine	150	75	182 days
I.V. urogram	300	150	1.0 years
Upper G.I. exam	600	300	2.0 years
CT Chest	800	400	2.7 years
CT head	200	100	243 days
CT abdomen	800	400	2.7 years

1. Effective dose in milliRem (mRem)

2. Based on the assumption of an average “effective dose” from chest x-ray of 2 mRem.

3. Based on the assumption of an average “effective dose” from natural radiation of 300 mRem per year in the United States.

Reference: Chart as compiled by Fred A. Mettler, Jr. et al., “Effective doses in Radiology and Diagnostic Nuclear Medicine: A Catalog,” Radiology Vol. 248, No. 1pp. 254-263, July 2008. SI units of measurement (mSv) convert to mRem for user convenience.