Paediatric Computed Tomography
Patient Information

Southern Health
Diagnostic Imaging

Your doctor has recommended that your child have a CT examination. Your doctor has explained that the information provided by CT at this time is very important for the care of your child.

In recommending a CT for your child your doctor has explained the risks below and in discussion with you concluded that the immediate benefits of CT far outweigh the risks. The radiologists at the Royal Children's Hospital and Southern Health will conduct the CT with the lowest possible radiation.

Information for Doctors and Parents

CT employs radiation to obtain an image of the body's organs. CT is an extremely useful way of diagnosing particular diseases, but it is associated with the risks of fatal malignancy developing in later life.

The Department of Human Services Chart on the reverse shows the radiation dose for various imaging tests. The data show for adults that a head CT delivers about 100 times the dose of a chest x-ray but is about the same as one year of natural background radiation. It is now known that the effect of the radiation dose in children is about 10 times that in adults because children are more sensitive to radiation.

The risk of fatal malignancy from a single CT examination in a young child, is about 1 in 1,000. The risk from radiation exposure of this magnitude is considered to be low when compared with other everyday risks and the knowledge that the average expectation of dying from cancer (independent from any radiation exposure) is about 250 in 1000.

Hence, it is important that the benefits to your child's health be understood and the examination be carried out in a facility where the protocols have been specially designed to reduce the radiation to children.

Reference: J Paediatric Child Health 2003 Aug;39(6):399-400
De Campo JF, Lau KK, de Campo MP
Is informed consent necessary for paediatric computed tomography?

DHS Website:
www.dhs.vic.gov.au/phd/radiationsafety
March 2003

"Respect, communication, involvement"

The staff of Diagnostic Imaging want to make sure that you have understood the information that we have provided personally, as well as the information contained in the information sheet. We believe your understanding about why and how we are planning to assist you is very important.

Approved by Director: November 2004
Date of Revision November 2005.
Revision due November 2007.

The attached table shows effective doses for various normal activities and various imaging tests. In adults the risk of malignancy relates directly to the dose, but in children the risk is higher because they are up to 10 times more sensitive.

NEWS (Ionizing Radiation)

COMPARISON OF RADIATION DOSES

It is interesting to compare the radiation exposures from some typical medical procedures and other everyday radiation exposures. Well-performed dental radiography is at the low end of the dose scale at approximately 2 μSv. This could be compared to the 6 μSv effective dose that would be received on a flight from Melbourne to Perth. This radiation dose is due to cosmic radiation.

A plain film chest X-ray gives an effective dose of approximately 20 μSv. A flight from Melbourne to London would be comparable to about two chest X-rays giving an effective radiation dose of approximately 50 μSv. This dose is again due to cosmic radiation.

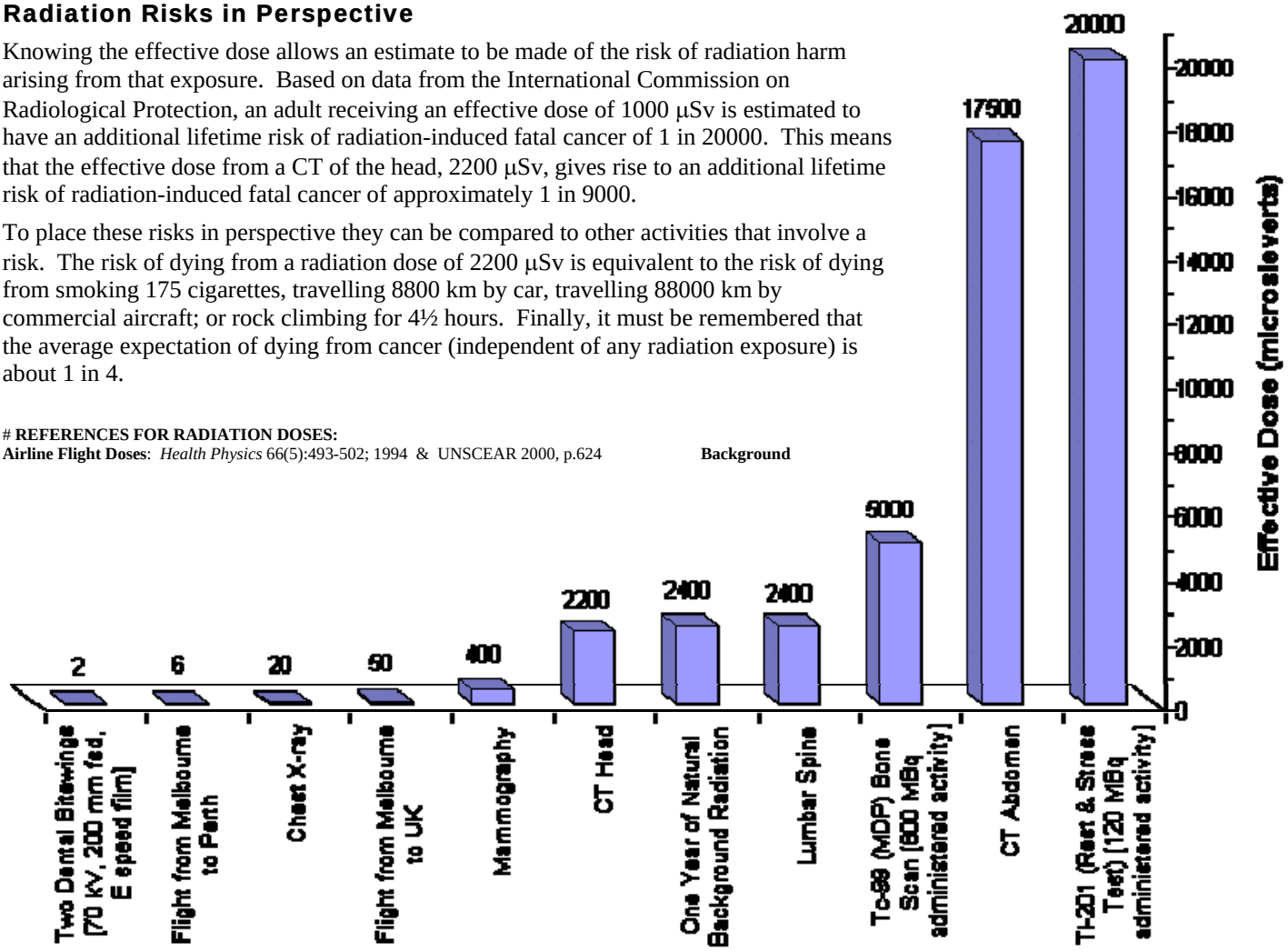
The effective dose from a mammography procedure is approximately 440 μSv. While a CT (computer tomography) scan of the head delivers approximately 2200 μSv and a Lumber spine procedure approximately 2400 μSv. These doses could be compared to the yearly dose from natural background radiation of 2400 μSv (world average). Natural background radiation is due to natural sources of radiation occurring in the earth's crust, in the human body, in the atmosphere and from cosmic radiation. The background radiation level in the Melbourne area is approximately 2200 μSv, slightly lower than the world average.

Bone scans involving the intravenous administration of approximately 800 MBq of technetium-99m (MDP) result in an effective dose to the patient of approximately 5000 μSv. Bone scans are used for imaging orthopaedic trauma and staging of metastatic tumours. A CT of the abdomen procedure involves an effective dose of approximately 17500 μSv. A rest and stress test for cardiac imaging involving the intravenous administration of approximately 120 MBq of thallium-201 results in an effective dose to the patient of approximately 20000 μSv.

Radiation Risks in Perspective

Knowing the effective dose allows an estimate to be made of the risk of radiation harm arising from that exposure. Based on data from the International Commission on Radiological Protection, an adult receiving an effective dose of 1000 μSv is estimated to have an additional lifetime risk of radiation-induced fatal cancer of 1 in 20000. This means that the effective dose from a CT of the head, 2200 μSv, gives rise to an additional lifetime risk of radiation-induced fatal cancer of approximately 1 in 9000.

To place these risks in perspective they can be compared to other activities that involve a risk. The risk of dying from a radiation dose of 2200 μSv is equivalent to the risk of dying from smoking 175 cigarettes, travelling 8800 km by car, travelling 88000 km by commercial aircraft; or rock climbing for 4½ hours. Finally, it must be remembered that the average expectation of dying from cancer (independent of any radiation exposure) is about 1 in 4.



Typical Effective Radiation Doses from Medical Procedures and Other Activities

 # REFERENCES FOR RADIATION DOSES:

Airline Flight Doses: *Health Physics* 66(5):493-502; 1994 & UNSCEAR 2000, p.624 **Background**

Radiation: UNSCEAR 2000, p.5

CT Doses: *Radiation Doses from Computed Tomography in Australia*, ARL/TR123 (1997) Dental: *Documents of the NRPB*, Vol 5, No 3, 1994, p. 8

Mammography: *Survey of Doses in Screening Mammography*, Austral Phys Eng Sc Med, 19 (1996) 207-216

Nuclear Medicine Procedures: *Radiation Protection in Australasia*, 2000, 17:2-14. **Radiography Doses**: *Nuclear Medicine: Science and Safety*, p. 83

Approved by Director: November 2004
Date of Revision November 2005.
Revision due November 2007.

Approved by Director: November 2004
Date of Revision November 2005.
Revision due November 2007.