



RADIATION SAFETY

Technical advances in radiology over recent decades have led to a progressive reduction in the radiation dose received from xray studies. Despite this, the potential hazards of radiation must always be remembered.

Over the last 10 years there has been a surge in interest in radiation safety in the paediatric radiology literature. This has coincided with patients and the parents of patients having ready access to an extraordinary amount of information via the internet. Unfortunately much of this information is confusing or contradictory. Understandably this has been quite confusing for our patients. I find it is very useful to have a few handy facts at my fingertips that help to answer the majority of the questions asked by my patients.

Heritable Effects – Although heritable effects of radiation were once believed to be the most important biological effect from radiation exposure, this has not proved to be the case. No heritable effects have been observed in the 70,000 first generation offspring of the Hiroshima and Nagasaki survivors. Animal experiments have shown that the risk of heritable effects is extremely small.

Radiation in pregnancy – There are risks from radiation exposure during pregnancy. These vary with gestation and we would always like to avoid direct exposure to the fetus during pregnancy. However x-ray examinations where the fetus is not directly exposed to the x-ray beam can be performed if necessary with lead shielding of the abdomen. Each patient should be assessed on a case by case basis, and we are more than happy to be phoned for advice.

Radiation and cancer – There is some controversy as to whether exposure to radiation at low levels leads to an increased risk of developing cancer. However most institutions believe it is likely that there is a small but definite risk of developing a cancer from exposure to low levels of radiation. When explaining risk to patients I find it helpful to compare the radiation dose from a particular examination to the amount of **background radiation** we are exposed to each day.

- A single PA chest radiograph equates to around one day of background radiation.
- Examination of the limbs and dental x-rays are also very low dose and equate to a few hours to perhaps a few weeks of background radiation depending on the number of views necessary.
- Plain x-rays of the spine, the abdomen and pelvis are higher dose investigations because of the structures exposed and the amount of radiation needed. These examinations can equate to up to a few months of background radiation.
- Fluoroscopic examinations (such as barium meals and angiograms) intravenous urograms and CT scans are the highest dose investigations used in diagnostic imaging and equate to doses equivalent to 6 months to 2 years of background radiation.

Examinations equating to a few days of background radiation confer around a 1 in 1,000,000 risk of radiation induced cancer, a few weeks of background around 1 in 1,000,000 to 1 in 100,000, a few months to a year around 1 in 100,000 to 1 in 10,000 and a few years to 1 in 10,000 to 1 in 1,000 risk.

We have **information pamphlets** available that you may find useful for your patients. These are available on the internet in a printable form so that pamphlets can be available in your rooms should

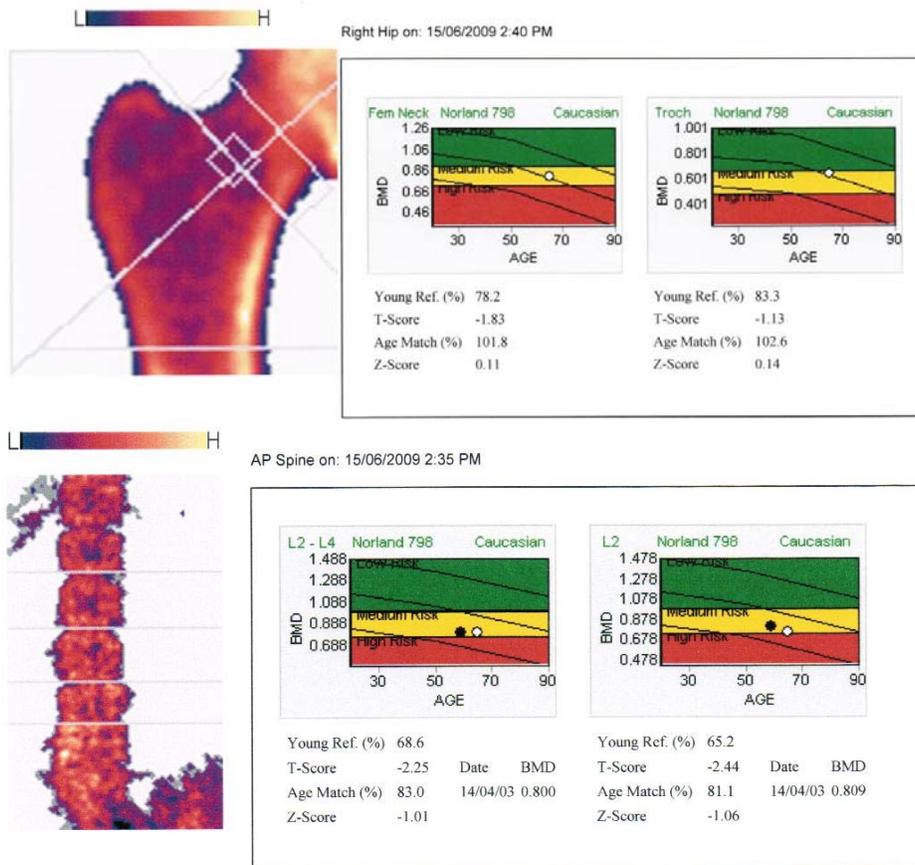
you wish. We use the first pamphlet in our rooms, which is produced by the American College of Radiology. The second is produced by the National Radiological Protection Board in the UK and is equally good. Access www.imagegently.org and www.nrpb.org.uk and follow the links to the information brochures.

Glen Thomson

References:

- Hall EJ, Brenner DJ (2008) Cancer risks from diagnostic radiology. Br J Radiol 81:362-378.
- Hall EJ (2009) Radiation biology for pediatric radiologists. Pediatr Radiol 39 (Suppl 1): S57-S64.
- Brenner DJ (2001) Estimated risks of radiation-induced fatal cancer from pediatric CT. AJR 176:289-296.

BONE DENSITOMETRY



Auckland Radiology Group provides bone densitometry at **Remuera, Henderson and Howick**. All significantly low bone densitometry scans are reported by rheumatologists Terry Macedo and Raoul Stuart, who give advice about further investigations and treatment options where appropriate.

Our DEXA scans are competitively priced at \$120. We also offer a \$40 discount for combined mammography and bone densitometry (\$210).