

## **CT Screening - whole-body and targeted**

### ***Radiation Protection Advisory Council position statement, December 2003***

#### **Summary**

*At this point in time, the Radiation Protection Advisory Council does not support the practice of self-referred whole-body CT screening of asymptomatic patients because:*

- There is a high likelihood of false positives requiring further investigations with attendant risks;*
- There is no proven evidence to date that early detection of life-threatening disease by CT has a significant positive effect on outcome; and*
- The procedure involves a non-trivial radiation dose, which assumes even greater significance in the context of an ongoing screening programme.*

*The Radiation Protection Advisory Council further advises that all CT examinations must continue to be the result of a referral from an independent medical practitioner.*

*The RPAC will continue to monitor scientific studies concerning this procedure.*

#### ***Introduction***

In some countries there has been considerable promotion in some quarters of the use of whole-body CT examinations for screening asymptomatic self-referred persons. Part of the promotion has been the implication that not undergoing such a procedure is putting your health at risk.

A refinement of the whole-body CT is the so-called targeted CT screening.

#### ***What is whole-body CT?***

The various terms “whole-body CT”, “whole body scanning”, “total body scanning” or “full body scans” each refer to the CT scanning of most of the body (head to groin) of a self-referred patient in the absence of any symptoms.

The procedure results in the patient being exposed to a non-trivial amount of ionising radiation – the actual effective dose will depend on the protocol and CT scanner used, but is likely to be in the range 10 to 20 mSv. And, on the imaging side, the procedure generates a very large amount of image data which may be viewed in cross section or in 3-dimensions.

#### ***What is targeted CT screening?***

This is screening by CT of asymptomatic persons, but with reduced scope – reduced in terms of disease being looked for and in the categories of persons being screened. At present the 3 targeted areas are the lungs (for lung cancer), the heart and vessels (for coronary heart disease) and the colon (for cancer of the colon and polyps). The target population for each is the symptom-less but at higher-risk group of persons.

While the volume of the patient being exposed to radiation is less than for whole-body CT, the dose is again non-trivial with likely effective doses around 10 mSv.

*What do proponents of whole-body CT claim?*

The positive claims for the technique are that a “clear” whole-body CT scan gives the patient “peace of mind”, and that if there are abnormalities detected then early detection means early intervention and hence improved outcome. But are these claims true?

The likelihood of a false negative outcome for whole-body screening is arguably greater than for a clinically referred CT scan, for two reasons. First the radiologist reading the screening images has no clinical guidance of what to look for in an apparently normal, healthy individual. And second, this is compounded by the need to search through a larger image data set than would be typical for a symptom-driven CT scan. Hence the peace of mind may not be as well founded as claimed.

The second positive claim is hotly debated in the medical literature. There is little argument about the capability of CT to provide early detection. But what is open to question is whether early detection does actually influence medical outcome. The proponents of whole-body screening tend to provide anecdote-based arguments – putting forward those cases where disease was found and the benefits to those individuals. This is countered by arguments based on looking at the screened population as a whole – where the claims are that there is no scientific evidence to date showing a net benefit for the screened population, where the prevalence of actual life-threatening disease is low.

*What are the negative aspects of whole-body CT screening?*

If the procedure results in suspicious findings then these will fall into 3 categories - real life-threatening disease, insignificant abnormalities, or false positives. Follow-up tests, which may range from simple non-invasive tests through to high-risk procedures, will be required to clarify the findings. Because the likelihood of false positives is higher for whole-body screening being performed on symptom-less patients and because the prevalence of benign abnormalities is not uncommon, a significant number of medical interventions (with their own attendant risks) will occur unnecessarily.

As mentioned above, the patient undergoing whole-body CT will receive a radiation dose that will increase that patient’s risk of radiation-induced cancer by a small amount. But the proponents of the technique recommend screening at regular intervals. Depending on the age at commencement and the interval between screens, the attributable risk of radiation effects (cancer) can become quite significant. For example, a person having their first screen at age 40, with a protocol delivering an effective dose of 10 mSv, and then subsequent screens every 3 years could have increased risk of fatal cancer approaching 1 in 200.

And on a more technical note, the factors and technique used to perform whole-body CT may not be the optimum for disease detection in the various parts of the body scanned – for example, contrast media are not used. This further increases the chances of equivocal findings leading to the problems discussed above.

*Do these arguments apply to targeted CT?*

Advantages of targeted CT over whole-body CT include the real ability to optimise the image acquisition technique factors, a potentially lower patient dose compared with whole-body CT, and a more focussed image reporting task for the radiologist.

However many of the above points are equally valid for targeted CT – the risks of false positives still remain with the ensuing need for further investigation, as do the questions over whether early detection translates through to improved outcome.

Currently there are trials underway investigating whether CT might be a useful method to screen for lung cancer in smokers of particular ages; whether CT virtual colonoscopy is as good as colonoscopy in men and women aged over 50; and whether CT coronary calcium scoring is effective in predicting heart disease. These trials may establish a targeted role for CT screening, but they will not prove the applicability of CT screening to the self-referred general population.

*Statements from professional bodies and other agencies*

Given the above background information it is not surprising that relevant professional bodies have issued statements.

The Royal Australian and New Zealand College of Radiologists adopted the following policy statement in May 2002: “The Royal Australian and New Zealand College of Radiologists (RANZCR), at this time, does not believe there is sufficient scientific evidence to justify recommending total body computed tomographic (CT) screening for patients with no symptoms or a family history suggesting disease.

To date there is no evidence that total body CT screening is cost effective or is effective in prolonging life. In addition, the RANZCR is concerned that this procedure will lead to the discovery of numerous findings that will not ultimately affect patients’ health but will result in increased patient anxiety, unnecessary follow-up examinations and treatments and wasted expense.”

The American College of Radiology issued an updated statement in November 2002 very similar to that of the RANZCR. It did make the distinction between whole-body and targeted CT screening, with the comment that the latter may be clinically valid.

The US Food and Drug Administration has posted considerable information on whole body scanning on its website (<http://www.fda.gov/cdrh/ct/>), but the essential message (dated April 2002) is that “at this time the FDA knows of no data demonstrating that whole-body CT screening is effective in detecting any particular disease early enough for the disease to be managed, treated, or cured and advantageously spare a person at least some of the detriment associated with a serious illness or premature death”.

Other professional bodies with similar statements not supporting whole-body CT screening of asymptomatic patients include the American College of Cardiology, the American Association of Physicists in Medicine and the Health Physics Society.

*Why can't I choose to undergo whole-body CT?*

The question that often gets posed is if a person is willing to pay for the procedure, then why can't they have it? In other words, they accept that there is no evidence for population-based screening, but as an individual they want the procedure and further, they will pay for it.

Any decision where benefit is being balanced against harm must be made from a complete knowledge of the issues, not from just "one side of the story", especially if that one side is being pushed vigorously in the media.

And in addition regulatory means are sometimes employed to ensure a "safety net" for members of society. In some states of the USA and of Australia the practice of self-referred whole-body CT screening is banned by regulation.

*What does this all mean for NZ?*

In New Zealand the regulatory control over the use of x-rays in medical diagnosis is via the *Radiation Protection Act*, *Radiation Protection Regulations* and the *Code of safe practice for the use of x-rays in medical diagnosis, NRL C5*. The *Code* has as one of its corner-stone radiation protection principles that all x-ray examinations must be justified – there must be a net benefit to exposed persons that outweighs the risk associated with the radiation dose received. This applies to the individual for their intended x-ray procedure and to the screened population in the case of a screening programme.

Meeting the justification principle is every radiologist licensee's responsibility and ensuring that patients have appropriate referrals from independent medical practitioners is part of that responsibility. Self-referral for a whole-body CT scan would not satisfy these requirements. And any institution of a population-based CT screening programme must be the result of proven evidence from sound epidemiological study that the programme is of net benefit to the screened population.

The Radiation Protection Advisory Council endorses the above statements and, as such, does not support the practice of self-referred whole-body and targeted CT screening of asymptomatic patients. This position will continue to be reviewed as more information comes to hand.