

## Heart scanner — who's between a rock and a hard place?

I am a radiologist with a minor shareholding in the electron beam computed tomography (EBCT) scanner discussed by Ina van der Linde,<sup>1</sup> and feel compelled to comment on its implied imminent demise.

Officialdom throughout the world demonstrates certain traits. Words such as self-righteous, retention of control and red tape spring to mind. They make endless rules which when analysed translate into self-empowerment and protection of their domain. South Africa in particular personified this in its apartheid system. I believe that a similar dynamic is at work with regard to the fate of EBCT.

The expensive EBCT scanner was imported after assurance was received from the Radiology Society of South Africa (RSSA) that conventional CT radiology codes could be used for EBCT studies. At that time everyone, including the RSSA, said that as EBCT was the only machine capable of detecting and measuring coronary artery calcification, a new code specific to this facet should be applied for. This was done, and the EBCT machine was ordered and subsequently installed in the Pretoria Heart Hospital in mid-1997. Events orchestrated by 'officialdom' resulted in the August 1997 *Guide to Fees* printing code 3598 for 'EBCT assessment of coronary artery calcification' with *no unit and no rand values*. The days of old-fashioned non-transparent *kragdadigheid* tactics are seriously challenged when new official sleight-of-hand reaches such heights. Not only are there no rand values, but hey presto, the 311.80 units given to code 3598 by MASA in June 1997 have also disappeared! A barrage of warnings has also emanated from the same officials, namely that code 3598 must be used for 'tracking purposes only' (and I thought the pass laws were scrapped!) 'so that procedures using this technology cannot be charged under existing codes.' Hence Ina van der Linde's article heading, 'Heart scanner min dae?', and her comment, 'does all this leave the HeartScan SA team between a rock and a hard place?'

To throw more light on the subject I will provide some background information. EBCT can perform conventional CT examinations. However, its ability to perform CT scans approximately 10 times faster than conventional scanners gives EBCT unparalleled advantages where rapid image acquisition is necessary, such as after trauma and in paediatric patients. For example, a brain scan can be performed in 2 seconds, avoiding the necessity of sedating or anaesthetising a child for a diagnostic procedure. CT angiography and organ perfusion analyses are examples where the extremely rapid acquisition time of EBCT, together with the use of less contrast medium, is distinctly advantageous. Does RAMS realise this? They seem determined to throw the EBCT baby out with the bathwater.

At present the abilities of EBCT are undoubtedly maximised in cardiac analysis, where, prior to EBCT, movement blurring bedevilled non-invasive cardiac imaging. EBCTs short exposure time (with and without intravenous

contrast) demonstrates cardiac anatomy with unrivalled clarity and allows detailed functional analysis.

Histological examinations of postmortem hearts show that coronary arterial calcification occurs exclusively in atherosclerotic arteries and is absent in normal vessel walls. The amount of coronary calcium is proportional to the amount of atherosclerosis in the coronary arterial system.

A direct relationship has been established between coronary calcium, as measured by EBCT, and atherosclerotic plaque detected with intravascular ultrasound. About 20% of the total plaque burden is represented as detectable coronary calcification by EBCT. The presence and amount of calcium detected in a coronary artery by EBCT indicates the presence, and correlates with the amount, of associated atherosclerotic plaque (the so-called 'tip of the atherosclerotic iceberg'). In one breath-hold EBCT can detect coronary artery disease non-invasively and painlessly. Surely this is a major advance?

Of the imaging modalities, only EBCT can detect and quantify (calcium score) coronary artery calcification in the living patient. EBCT calcium scores are calculated for each main coronary artery, and the sum of these scores is the total calcium score, which is proportional to the total plaque burden in the coronary system. Follow-up on patients in whom EBCT calcium scores had previously been performed demonstrated that those with higher scores had significantly more down-the-line coronary artery events than those with low scores. Surely such risk stratification is valuable information? We must learn to think of plaque burden, which is associated with risk, and not only of luminal stenosis, which is associated with symptoms.

'Normal' calcium scores for age and gender in westernised, industrialised populations have been established. Comparing these with the patient's score gauges the severity of the patient's disease. Given the fact that cholesterol-lowering remedies work, the calcium score taken in conjunction with the history, examination and risk factor analysis of the patient guides the aggressiveness of treatment, even in an asymptomatic patient. Makes sense to me. Why does officialdom insist that there is no clinical application?

Now let's examine some other issues. Of the 'necessity, efficacy and affordability' that officialdom requests for the introduction of new technology, the first two are to my mind well proven for EBCT and the third must be considered in a South African context. Should existing tests, such as stress tests in asymptomatic persons, not face up to the same scrutiny?

Autopsies proved that significant coronary atherosclerosis was present in young American soldiers killed in combat. In untreated westernised patients this disease progresses over decades. About 30% of fatal heart attacks occur suddenly in asymptomatic people, hence coronary artery disease has been named the 'silent killer'. It causes the most disease-related fatalities in westernised societies. The costs of cardiologists, cardiothoracic surgeons, hospitalisation, coronary angiography, coronary stenting, bypass grafts in theatre, medication and follow-up monitoring in the late stages of the disease consume huge amounts of scarce medical financial resources and have significant social and industrial consequences. Early diagnosis of coronary atherosclerosis using EBCT provides a large window of

opportunity, during which period inexpensive preventive measures such as diet and lifestyle changes can be applied. Exaggerated costs 'in excess of R100 million per annum' for the utilisation of this modern technology are bandied about with never a mention of the savings. Surely, as in every other disease, early diagnosis should be encouraged? Why do we have no preventive cardiology chair in this country?

Compensatory enlargement of the atherosclerotic artery allows considerable intimal thickening (plaque formation) before luminal stenosis becomes apparent. It is well known that sudden events take place in plaques which often lead to compromise or occlusion of a coronary lumen — this is when the patient recently passed by his doctor as having no evidence of coronary heart disease succumbs to a fatal heart attack. Cardiac symptoms, positive stress test results and angiographically visible narrowings are all dependent on significant luminal stenosis. Considerable atherosclerosis can be present in an asymptomatic patient in whom physical examination, stress testing, cardiac ultrasound examination, blood cholesterol and even angiography are 'normal'. Yet these tests are commonly used to evaluate patients suspected of having coronary artery disease. Is it not time to add previously unmeasurable happenings in the arterial wall to the present obsession with the lumen? The appropriate use of EBCT allows for early, accurate identification of patients with coronary artery disease.

Two world leaders in preventive cardiology, Drs Stuart Rich and Yadon Arad, both of whom have extensive experience with EBCT, gave lectures in South Africa in mid-1997. Why did Dr Richard Tuft, head of the RSSA and the Private Practice Negotiations Committee, and Dr Aslam Dasoo, head of RAMS, avoid making contact prior to, during or subsequent to these lectures, despite invitations? Dr Tuft, wearing his RSSA hat, however, states that EBCT is a 'research tool' and 'must be controlled and monitored in an academic environment'. How many black, previously poor rural (low coronary artery risk), now middle-class urbanised (high-risk) South Africans are likely to have heart attacks? Perhaps EBCT could be used to identify them as something uniquely South African. And where is this 'academic environment' — in State hospitals? Is this realistic when such hospitals haven't yet come to grips with installing less expensive MRI machines?

Dr Dasoo of RAMS, as advised by the RSSA, recommends that medical aids should not pay for EBCT. One reason is because it is a joint venture involving, *inter alia*, cardiologists and radiologists (has this Immorality Act not been scrapped?) with so-called 'perverse self-referral incentives'. The trust that bought and owns the Pretoria machine expects repayments to take place over 5 - 6 years before there is any possible profit. If and when such profit occurs, shareholder reimbursement will be proportional to capital invested. This is perfectly legal and is a dilute incentive when compared with present South African norms. Cardiologists own their own ECG, stress ECG and ultrasound equipment. Each time they use them they get 100% of the fee paid for the procedure by the medical aid within about 60 days. Pulmonologists, surgeons and gynaecologists who own and use lung function laboratories, endoscopes and ultrasound machines are paid. Are these not 'totally owned' ventures? Such common everyday happenings, it seems, are not seen as 'self-referral', or as

having any 'perverse incentives.' Must a new test fulfil different norms?

The RSSA advocates sole EBCT ownership by radiologists. Would rearrangement of the present ownership to that end result in its miraculous acceptance of the modality? Why did Dr Tuft, wearing his Private Practice Negotiations Committee hat, recommend that 'the following new item [code 3598] be introduced in the current Tariff structure with *immediate* effect' in June 1997? Why, shortly thereafter, did Dr Tuft, wearing his RSSA hat, write to RAMS saying 'If funds are allocated [to EBCT] we would request they be not allocated to radiology'? Is this intended to stop others from utilising the exclusive CT radiology toll road? Amazingly, the RSSA allows vintage, unroadworthy, lethally dangerous CT scanners 'with a matrix less than 250' to still utilise this road, while the latest-model EBCT must drive on its own pathway, which is landmined with code 3598! Is this job reservation in the interest of the patient, who must now pay for this test out of his pocket? What will happen to CT colonoscopy, CT bronchoscopy and CT angiography? Who will own MRI-guided operating theatres? Is the RSSA positioning to have sole ownership of (and profit from) all of these?

In summary, EBCT represents a quantum leap in technology in terms of rapid image acquisition. This is of special importance in the non-invasive early detection of coronary heart disease. Ideally, patients at risk need a thorough history and examination performed by any caring, honest doctor, who will then refer some patients for coronary artery calcium assessment by EBCT. The additional value of the calcium score allows the knowledgeable doctor the best opportunity to appropriately advise and, if necessary, cost-effectively administer tailored treatment to the patient. Patients at risk, but having normal stress tests, are less likely to accept medical advice and comply with therapy than patients shown radiographs demonstrating the distribution and extent of visible calcium deposits in their own arteries. The calcium score and calcium distribution alteration over time may prove to be a useful yardstick to monitor coronary artery disease progression.

Continued dependence on inaccurate and misleading tests, which medical aids pay for, wastes money, while advising them not to pay for EBCT coronary calcium assessment shows an irresponsible lack of concern for patient well-being. Is the patient not between a rock and a hard place if he or she must pay for this valuable test?

Some new aspects of imaging can no longer be restrained by the artificial 'turf' compartments of conventional medicine. The dirty linen of medical issues which may not have the patient's best interests at heart will surely soon be washed in well-publicised court cases, seriously damaging the image of conventional medicine. There is an urgent need for wise and unbiased arbitration in this EBCT conflict.

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