Early Detection of Lung Cancer Saves Lives

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This title may seem a self-evident, but it should be pointed out that attempts to reduce the death rate from lung cancer using standard chest X-ray procedures have never shown any evidence of improving the situation. However, newer technologies have been improving matters, but no large trial until this year has convincingly shown that mortality can indeed be reduced by early detection (e.g. MRI, X-ray fluoroscopy).

The National Lung Screening Trial in the USA has very recently (early November 2010) reported on spiral or helical computer tomography (HCT) as a technology that does show clear statistical evidence of benefit in lung cancer mortality, so convincingly that the trial has been ended [1,2]. The study is definitely worth reviewing because it has been both extensive and expensive, being supported by the National Cancer Institute. They recruited from August 2002 to April 2004 nationwide no fewer than 53,000 subjects who were smokers or had been regular smokers between the ages of 55 and 74. Deaths in the intervening years to 2010 were 354 in those in which HCT had been used compared with 442 where earlier technologies had been applied. [To be accurate, there was a reduction of 7% in the total number of deaths in the HCT group compared with the others because the trial dealt with all forms of death, not those specifically from lung cancer. However, of that 7% overall reduction, the vast majority were due to improvement in lung cancer mortality.] It may be trite to say that early cancer diagnosis saves lives, but if you do not have a reliable means of detection, the evidence to back up this statement is lacking. Advancement in medicine relies on convincing "the body of the kirk" that new methods of diagnosis and treatment work to the benefit of the patient.

Since 2002, many hospitals and free-standing radiological clinics in the USA have acquired HCT machines, and therefore we can expect lung cancer mortality rates to decline in the future. This is good news because there are many millions of smokers or previous smokers in the States (estimated as high as 93 million – almost 2 out of every 5 of the population!), and lung cancer is the cause of more deaths than any other type of cancer. How then does HCT help in diagnosis? Its advantages are several-fold, one being that it is a low-dose method. Although repeated scans for monitoring advancement will inevitably have a detrimental effect due to increasing amount of irradiation of the subject, the benefits clearly outweigh this disadvantage. Another reason is that the images obtained are of higher resolution and give a much better "virtual reality" 3-D image of the patient's thorax (pelvis or whatever it is scans). The organs are seen more clearly. There are two reasons for this; the first is that the helical path of the scanner is far faster than the conventional CT scanner. The latter has to encircle the patient's thorax and stop after each rotation, and then repeat the operation when the table has been advanced one "slice" thickness. Since a complete HCT scan can take less than 15 seconds, a patient can be still through the scan (by holding the breath). The advance in technology (called slip rings, allowing the transfer of electrical power from a stationary source to a continuously rotating receiving gantry) of spiral X-ray tomography was made back in the 1980s, but only in the last decade has its application to the technology of scanning become available to the clinic.

The trial has not just advanced the diagnosis of early lung cancer, but clearly images so many other organs and tissues that might show other diseases and disorders, and therefore HCT is going to be beneficial in any situation where imaging needs to be improved. It also goes without saying that if we were only concentrating on lung cancer, by far the best way to reduce the mortality is to prevent the use (abuse) of tobacco from an early age, and get those who do smoke to kick the habit permanently. This seems to be an improving situation amongst young men in the UK, but there are fewer signs of this happening in the States, Eastern Europe and many other countries. Another problem is that cigarette smokers seem to have a preference for the faster-burning types (i.e. in which the tobacco has been treated with sodium nitrate – those that do not go out when you stop inhaling); the higher temperature at which they burn leads to greater breakdown of the tars to more dangerous carcinogens). Since it is unlikely that the habit of cigarette smoking will die out in the next few decades or centuries, early diagnosis of lung cancer will remain as one means of reducing mortality. ■

References

1. http://www.cancer.gov/clinical trials/noteworthy-trials/nlst
2. http://radiology.rsna.org/cgi/content/abstract/radiol.10091808