regimens in 23 studies. Applying these doses to estimated typical absolute cardiac risks showed the absolute risk of a radiation-induced major coronary event for many women today is less than 1%. So for them, the risk of radiotherapy is likely to be much smaller than the benefit. Nevertheless there is considerable variation in predicted absolute cardiac risks, depending on an individual woman's background risk and on her heart radiation dose.

Conclusions: Exposure of the heart from breast cancer radiotherapy has reduced substantially over the past few decades but there is still considerable variation in published heart doses worldwide. In addition, there is variation in the risk of heart disease among patients being considered for radiotherapy. Thus there is likely to be substantial interpatient variability in the cardiac risks of radiotherapy. The population-based dose-response relationship can be used to provide reassurance for many women that their absolute risk of ischaemic heart disease from breast cancer radiotherapy is likely to be small compared with their likely absolute benefit. For other women, for example those with a high predicted heart radiation dose or for those with prior heart disease, the dose-response relationship can be used to identify the minority of women for whom the risk-benefit ratio is less favourable. In these women, consideration may be given to reducing cardiac radiation dose to reduce the radiation-related cardiac risk.

Funding This work was funded by core funding from Cancer Research UK to the CTSU, University of Oxford and the Department of Health, London (project grant RRX 108).

Conflicts of interest None

References

SP-0397 Predicting cardiac toxicity after breast irradiation: new quantitative data and new challenges
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The QUANTEC summary of data on dose-volume-response effect in heart after radiation therapy provided some answers and practical guidelines for the optimization of the dose distribution in breast cancer patients, and left a few problems open. The main dilemma centered on the fact that cardiac serious events are late, requiring long follow-up and rare, requiring large populations. Furthermore, in studies evaluating cardiac toxicities after irradiation the quality of the outcome clinical data was in general different from the quality of the dosimetrical data. Similar considerations still apply to a few studies performed after QUANTEC. A main step forward is represented by the increased size and design of the studies, e.g. as in the one by Darby et al (N Engl J Med 2013) which included about 2,000 women treated in Scandinavia. The paper provided among several results an estimation of the cumulative risk of death from ischemic heart disease for patients treated/not treated with radiation therapy and with different mean heart doses, obtained through reconstruction of the dose planning on a model patient. Beyond size and type of study population another relevant factor investigated in several analysis is the relationship between fraction size and late cardiac effects. Mahrin (Int J Radiation Oncol Biol Phys. 2007) performed an analysis on about 3,800 left sided respectively 3700 right sided breast cancer patients treated between 1984 and 2000, compared the different fractionation schedules and concluded that a statistical increase in overall and cardiac-specific mortality could not be found comparing left vs right breast cancer patients. Furthermore the hypofractionated adjuvant RT regimens did not significantly increase the risk of cardiac mortality. The 10 year follow-up of the START - UK Standardization of Breast Cancer Radiotherapy trials of radiotherapy hypofractionation (Haviland JS et al, Lancet Oncol 2013) confirmed the 5 years results that “appropriately dosed hypofractionated radiotherapy is safe and effective”. A norwegian study with a longer follow-up, but a smaller study population and irradiated in a different way concluded instead than the degree of hypofractionation and parasternal nodes contributed to an increased cardiac mortality in the patient cohort (Tjøssem et al, Int J Radiation Oncol Biol. Phys 2013). Another prospective is given by the studies on cardiac dose-volume effects where dose distributions in subregions of the heart are investigated (e.g. Nilsson G et al, J Clin Oncol 2012; Johansen S, Breast cancer: basic and clinical research 2013). The results from these analysys might be very helpful in the design of treatment protocols.

Finally the technological development has to be taken into account (e.g. gating, DIBH etc), which in some cases might simply by-pass the issue of cardiac irradiation. This approach does not provide answers to the basic question, but provides a convenient solution.

SP-0398 Active surveillance for cardiovascular disease after Hodgkin lymphoma
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Hodgkin lymphoma is a relatively rare form of cancer, which mainly effects young adolescents and young adults. Over the past decades developments in treatment options for patients with Hodgkin lymphoma have led to improved outcome rates. As a result, there is an increasing number of Hodgkin lymphoma survivors. They are at risk of developing long-term toxicity due to treatment such as secondary malignancies or cardiovascular complications. There is an increased risk of developing valvular heart disease after mediastinal radiotherapy, although risk increases significantly after radiation treatment doses over 30 Gy (1). Recent studies also show a 4-6 fold increased standardized incidence ratio of heart failure and coronary heart disease (CHD), due to anthracycline containing chemotherapy regimens and radiotherapy (2). Severe CHD can even be present in the absence of typical symptoms such as chest pain (3). A linear dose-response relationship between mediastinal radiotherapy and CHD has been established with a 2.5-fold increased risk of CHD after receiving a mean heart dose of 20 Gy (4). This implies that even patients treated with current standard radiotherapy doses remain at serious risk of developing radiation induced CHD. At the same time, new strategies for non-invasive screening for CHD have developed, by means of CT coronary angiography, showing encouraging positive and negative predictive values for detecting significant CHD. In this lecture, an overview of recent efforts of screening for coronary artery disease in Hodgkin lymphoma patients is presented, and clinical implications are discussed.

REFERENCES