

Late Effects from Radiation Therapy

Long-term survivors of radiation therapy are at a substantially increased risk for various late effects. This two hour session will focus on two most commonly reported late effects, cardiac effects and second cancers. The first speaker will discuss radiation related cardiac effects and dosimetry for epidemiological studies of late effects. The second speaker's presentation will focus on second cancers.

Cardiac effects are the second most common late effect among long-term cancer survivors. Until recently, there was a general belief that radiation related cardiac effects were only associated with high doses, i.e., >30 Gy. Evidence was largely derived from patients treated for Hodgkin Lymphoma. More recently, evidence is emerging that radiation related cardiac effects can occur at much lower doses. Several of the studies that indicate the existence of low dose effects are for survivors of the atomic bombings of Hiroshima and Nagasaki or populations of radiation workers. However, recently there is increased evidence that similar low dose effects occur in medically exposed populations. To date, the evidence in the literature has focused on three patient populations, those who received radiation therapy for peptic ulcers, breast cancer and childhood cancer.

This SAMS session will discuss the topic of radiation related cardiac effects and emerging data in the literature. Specifically, the presentation will focus on the existing literature on cardiac effects in long-term survivors of breast cancer and pediatric cancer. The presentation will also provide an overview of retrospective dose reconstructions commonly used in these large cohort studies. Understanding the dosimetry in these studies will provide a better understanding of the results of the studies, the dose response models, and gaps in knowledge regarding dose volume effects. Finally, the presentation will discuss examples of how cardiac dose can be reduced in routine clinical practice.

Learning objectives: increase the knowledge of clinical medical physicists regarding radiation-related cardiac effects as well as stimulate further research in this broad and increasingly important area. There are four main learning objectives for this session:

- a. To improve understanding of the results of large cohort studies and their impact on the future practice of Medical Physics.
- b. To provide general overview of the dose reconstruction methods used in epidemiological retrospective cohort studies of radiation related late effects.
- c. To present an overview of current knowledge on dose response models for radiation related cardiac effects.
- d. To provide examples of how cardiac dose can be reduced in routine clinical practice (pediatric and breast cancer examples will be presented).