

The role of Monte Carlo and other advanced dose calculation algorithms for breast APBI

Abstract:

The medical physics community has been faced with a growing body of literature that is exploring the effects of shielding, tissue heterogeneities, interseed attenuation and others in brachytherapy. With new algorithms now identified as possible candidates for clinical implementation or already commercially available, the question of their role in clinical practice is important. Because of its external location and tissue composition, breast is certainly one of the most interesting organs for brachytherapy dosimetry algorithms. This portion of the SAMS session will underline the limitation of the current TG43 dose calculation standard in breast brachytherapy. The notion of scatter condition and tissues heterogeneities will be explored from literature review and with specific clinical examples. The link to basic physical quantities and processes will be made. The choice of treatment isotopes (from ^{103}Pd to ^{192}Ir) or energy (for eBx source) for breast APBI will be recast in the context of uncertainties in the dose calculation protocol. The possible hurdles in integrating advanced dose calculation algorithms in clinical practice will be discussed.

Learning Objectives:

- 1- Understanding the current limitation related to breast brachytherapy dosimetry.
- 2- Identify situations where Monte Carlo or other advanced dose calculation algorithms could be useful.
- 3- Identify the underlying dosimetric impact of the choice of treatment isotope or source energy (eBx) in breast brachytherapy