AbstractID: 13703 Title: A necessary and efficient Cerenkov subtraction technique for in vivo scintillation dosimetry for HDR brachytherapy.

Purpose: To study the Cerenkov contribution in scintillation dosimetry at lower energies using an HDR Ir-192 brachytherapy source and to show the need for its subtraction for accurate *in vivo* dosimetry. **Method and Materials:** The detector consisted of a green plastic scintillating fiber coupled to an optical fiber guide. Light was detected using an RGB photodiode connected to a two-channel electrometer (SuperMax model, *Standard Imaging*), which allows for implementation of different Cerenkov removal techniques. Measurements were performed in solid water. The detector's characteristics were assessed as well as the performance of different Cerenkov filtration techniques. Results from single-color filtration and a more sophisticated chromatic technique were compared to the case where no specific technique was used. A previously benchmarked Monte Carlo study of the dose distribution for the microSelectron V2 Ir-192 radioactive seed was used as the gold standard for comparison. **Results:** We have shown that this detector is capable of measuring accurately dose rates down to 1 mGy/s and was far from saturation for source distances as small as 2 mm from the scintillator. The Cerenkov component could be easily resolved up to 7 cm from the scintillator. This study demonstrates that when no specific Cerenkov removal technique is used, the detector will yield inaccurate results in certain conditions. Furthermore, the chromatic method clearly outperformed the simple color filter. Finally, the dose rates calculated with the chromatic method were found in good agreement with gold standard data. **Conclusion:** Including an effective Cerenkov removal technique will enhance the versatility of the plastic scintillation detector and will increase its accuracy. The development of a detector with a built-in Cerenkov removal technique is an important step towards the goal of performing accurate in vivo dosimetry during HDR Ir-192 brachytherapy.
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