Development of a surface applicator (preliminary results)

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Purpose: For brachytherapy treatments of superficial lesions the following applicators are availabe: the Leipzig applicator, sets of Mould applicator and Freiburg Flap applicator. The alternative treatment method is the implantation of needles or flexible catheters. Our aim was to develop a surface applicator with slow variation of dose field profile and depth dose curve too.

Method: We constructed a multichannel applicator model, which produced 5 cm diameter dose field. Five sources were positioned in pentagular arrangements as illustrated in Fig. 1. We obtained separated beamlets with lead shield. The arrangement of source positions and the lead shield resulted in skin surface dose from a single beamlet mainly, while under the skin surface, the doses from the beamlets were superimposed. We measured four orthogonal radial dose profiles measured with a five-channel rectal probe and Multidos (PTW). The probe was inserted into a PMMA slab (PTW), while we positioned 5 cm backscatter sheets under the probe. We obtained radial profiles in 6, 11, 16, 21 and 26 mm PMMA depths. The averaged radial dose profiles and the central depth dose curve is illustrated in Fig. 2.

Results: We experienced variation of 20% in dose profile values within the therapeutic region. The depth in PMMA slab corresponding to the 80% of the surface dose was 10 mm.

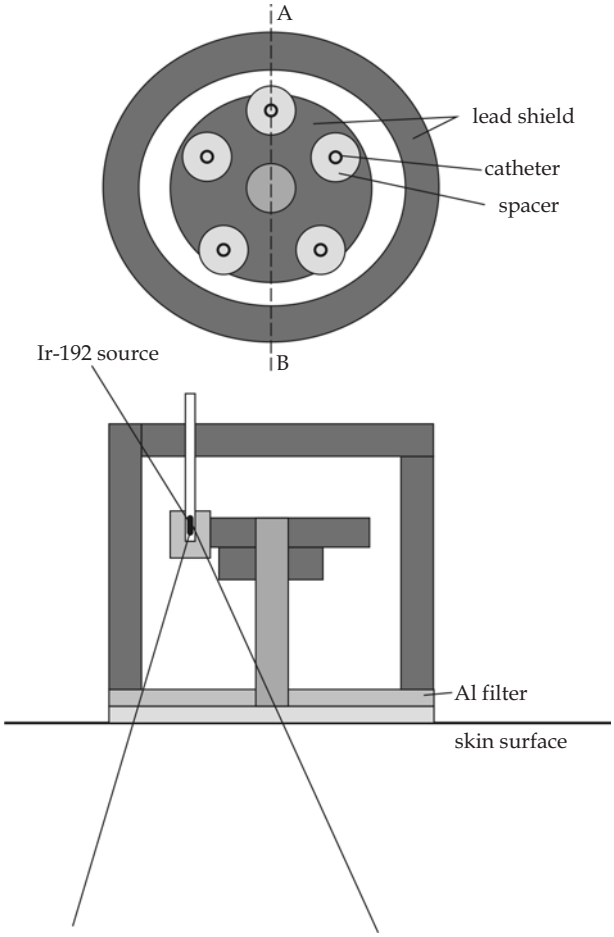

Fig. 1. The applicator geometry

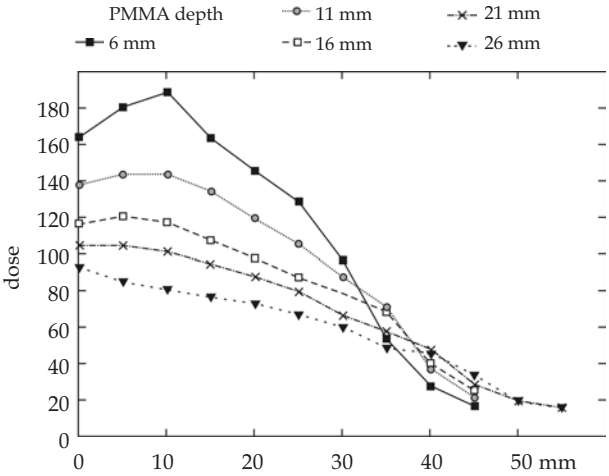

Fig. 2. Radial dose profiles