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New High Density Bolus
A new approach to treatment of superficial tumours with photons

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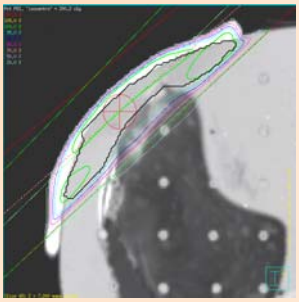


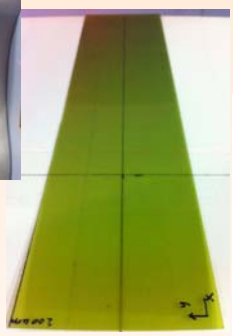
Application of bolus and its effect in treatment design

Objective

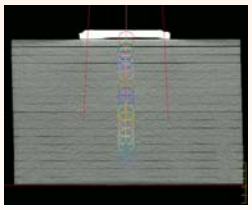
Treatment of superficial tumours is usually performed with electrons in combination with water equivalent bolii. Problems due to inaccurate and/or time consuming electron calculations together with lack of reproducibility in the positioning of bolus are serious shortcomings.
We present a new high density bolus (HDB), a moldable material that adapts perfectly to the area of treatment while hardening in a few minutes, allowing accurate positioning and reproducibility. Its physical density, similar to cortical bone, allows the use of photons instead of electrons for dose calculation in superficial tumours.

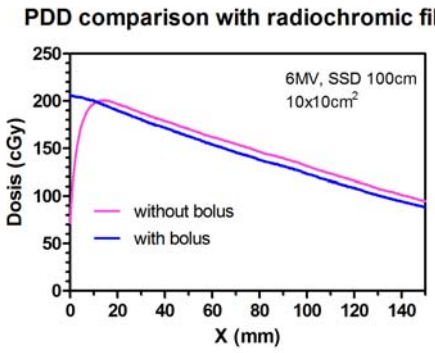
Material and Methods

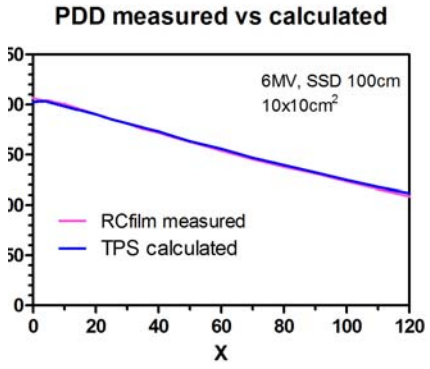
A cylinder 1cm high and 10cm diameter of HBD on a solid water slab phantom has been CT scanned. Radiochromic films have been irradiated to compare percentage depth dose curves with and without bolus. Resulting curves have been compared with PDDs obtained in Treatment Planning System (TPS) under the same conditions. Point measurements have also been compared.



Experimental set-up, irradiated RC film and CT scan of the phantom







Results and Discusion

Comparison of PDDs curves measured with RC films show how the bolus completely removes the build-up region for 6MV photons beams. Agreement with TPS calculated data demonstrated that this type of material can be accurately taken into account in treatment design.
The simplicity of the procedure has made possible its immediate application to a number of patients that have benefited of it, mainly for superficial and complicated localizations (chest wall, tracheostomas, skin tumours, etc), usually difficult to irradiate with photons The resulting cast not only retains its shape but also has some elasticity that permits an easy repositioning on the patient by the use of pen marks in the laser coordinate system of treatment unit. The adaptability eliminates the usual problem of air gaps associated with standard bolus. In cases were we want complete adherence to skin, ultrasound gels can be used in between the two surfaces.
Besides, the HDB material can be use to increase the rigidity of thermoplastic mask, leading to a very tight and accurate reproducibility, needed in some SBRT treatments.