

AbstractID: 4828 Title: Analysis of technical failures in 1000 clinical applications of Pulsed Dose Rate brachytherapy

Purpose: Investigation of safety and reliability of Pulsed Dose Rate brachytherapy within and outside office hours.

Method and Materials: More than 1000 patients were treated with two first generation (1996-2004) and three second generation (starting 2004) PDR afterloaders (Nucletron, The Netherlands). The most frequently treated tumorsites were breast, esophagus, gynecology, prostate and bladder. The number of pulses and the overall treatment time ranged from 4 pulses in 30 minutes for esophagus to 62 pulses in 135 hours for anal carcinoma. Apart from treatment-related parameters the type and frequency of technical failures, e.g. source obstruction, were registered for each treatment. From these data the fractions of disturbed pulses and treatments were determined for all tumor sites. Also the behavior of these fractions over time was studied.

Results: Error frequency depended strongly on treated tumor site. For breast 149 out of 5936 pulses were disturbed (2.5%). For prostate the error fraction decreased from 16% in 11 patients to 11.7% after 49 patients. Gynecology scored well with only 28 disturbed pulses out of 2002 pulses given (1.4%). For breast the first error most often occurred in the first pulse. For prostate and bladder the first error occurred in a further stadium of treatment. By applying dummy checkwire runs, errors with the active source occurred only rarely. Our experience is that 98% of the patients received the intended dose correctly. Only in 2% of the treatments an adjustment of implant geometry or planned dose or a cancellation of part of the treatment was necessary. Of these 2% however, about half was caused by medical rather than technical reasons. No significant difference was seen between the first and second generation afterloader type.

Conclusion: Errors do occur and are tumor site dependent. Our experience however shows that PDR can be safely applied, also outside office hours.