Study on semi-automatically evaluated micronucleus frequency changes in patients with prostate adenocarcinoma undergoing low dose rate brachy- and external radiotherapy

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INTRODUCTION

We compared the biological damaging effect of low dose rate brachytherapy (LDR) external radiotherapy (ET) in healthy tissues of patients with prostate adenocarcinoma by following up the changes of DNA damage with cytokinesis-blocked micronucleus assay (CBMN) during and after the treatment. The CBMN assay was proven by literature to be good indicator of received dose during partial-body radiotherapy. The first blood samples were collected preceding the radiation therapy and the next ones in regular intervals after the seed insertion (LDR) or the end of ET fractions (once every 3 month during the first year). The automatic analysis (scanning and image processing) was conducted by a dedicated totally automatized microscopic system.

METHODS AND MATERIALS

RESULTS 1. - Protocol optimization

We determined the MN frequency of 5 patients from each treatment group automatically, semi-automatically and manually as well. We found that in order to ensure the reliability of the comparison of automatic scoring results an extra cleaning and/or re-dripping step has to be introduced for sample quality improvement. This way the tendency of MN frequency versus elapsed time became possible to be accurately identified and analysed for both radiotherapy techniques.

RESULTS 2. Validation: manual MN scoring and DIC assay

Due to low whole body equivalent doses, the statistical power of small MN and CA values are relatively low.

RESULTS 3. Comparison of LDR and ET

Although the signal is comparable with the order of changes, the automation-aided evaluation decreased the achieved uncertainty and made it possible to identify a definite and significant tendency in the change of MN frequency for LDR and ET as well.

CONCLUSION

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