Individually and thereby optimize radiotherapy

Fast and easy method for predicting the radiosensitivity of cells

**Invention**
The success of radiotherapy decisively depends on how sensitive the tumour is to radiation. Radiation sensitivity of tumour and normal tissue are the most important parameters radiotherapy must consider for optimal outcome. At the University Duisburg-Essen, so-called prompt double-strand breaks (prDSBs) have been identified as a surrogate predictor of cellular radiation sensitivity. The method enables the determination of radiosensitivity of each tumour, and possibly also of surrounding healthy tissue, and can be used to generate individualized treatment plans.

The gold standard for determining radiation sensitivity (cell death as a function of radiation dose) is the colony formation of single cells. However, the method cannot be implemented for routine use in the clinic, because it is too time-consuming and expensive (cell cultivation after irradiation takes 2-3 weeks). The same applies to an alternative approach, which addresses the repair of double-strand breaks (DSBs) as a surrogate predictor of cellular radiation sensitivity. Furthermore, the results are prone to be strongly affected by the physiological status of the cells due to cultivation, which is necessary for the determination.

The inventive method solely detects double-strand breaks induced promptly by radiation (prDSBs) and excludes DSBs developing subsequently due to the conversion to breaks of radiation induced heat labile lesions (tlDSBs). Since irradiated cells are analyzed immediately, determination of prDSBs induction is not affected by cell physiology. When using single cell assays, only a few hundred cells are required and results are available within 4 days.

**Commercial Opportunities**
The main potential lies in the clinical use for planning of radiation therapy administered to about half of the patients suffering from cancer. Furthermore, the method could be used in radiation protection and research. The technology is offered for licensing and further development as test.

**Current Status**
Results for the determination of prDSBs are available for 15 tumor cell lines. The aim is to develop a clinical practicable method that measures the induction exclusively of prDSB via single cell analysis (comet assay). Subsequently, an automation of the determination would follow. In case of interest we are pleased to inform you about the patent status.

**Relevant Publication**

An invention of the University of Duisburg-Essen.