

PD7: The Inclusion of Radiation-Specific Clinical Data as Covariates in Toxicity-Related Radiogenomic Studies: A Systematic Review

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ABSTRACT

Introduction: Radiation-specific clinical factors can contribute to radiation toxicity. In radiogenomic studies, it is important to determine that the genotypes are associated to toxicity independently of treatment factors. Hence, the details of radiation-specific clinical data should be considered as covariates. This systematic review will evaluate the completeness of radiation-specific clinical data in radiogenomic studies and determine whether the studies consider these data as covariates. **Methods:** Studies were identified by searching Scopus, PubMed and Medline until November 2016. References from the retrieved articles were also searched for additional publications. Studies satisfying the following criteria were eligible for inclusion: related to the effects of radiation dose from radiotherapy to normal tissues and involving human subjects. Studies on animals, cell cultures, case reports, meta-analysis and systematic review articles were excluded. The completeness of the radiation specific clinical data was determined by mining the statement of total radiation dose, dose-fractionation, target volume selection or arrangement and dose-volume metrics. The consideration of the dose and dose-volume metrics as covariates were based on the statement mentioned in the statistical analysis part of the studies. The significance of these covariates was extracted from the results of studies. Descriptive analyses were performed to determine the completeness and inclusion as covariates. **Results:** A total of 112 studies were found to satisfy the inclusion criteria. The completeness of radiation-specific clinical data in the studies was increasing from year <2005 (60%), year 2005 to 2010 (65%) and year >2010 is (87%). 95% (107/112) of the studies mentioned total radiation dose used in the cohorts but only 19% (20/107) considered radiation dose as a covariate, 45% (9/20) are lung cancer studies, 30% (6/20) are breast cancer studies, 10% (2/20) are prostate cancer studies and 15% (3/20) are head and neck cancer studies. Only 29% (33/112) of studies mentioned dose-volume metrics used and of these 67% (22/33) of the studies consider dose-volume metrics as covariates. 20% (4/20) of the studies that consider radiation dose are significant associate with the studies endpoints. 41% (9/22) of the studies show dose volume metrics are significant in associating with the studies endpoints. **Conclusion:** Large proportion of radiogenomic studies do not account for dose and dose-volume factors despite significance of dose factors to toxicity shown in other studies. However, the completeness of radiation-specific clinical data increased in recent years which may improve gene-toxicity association studies.

KEY WORDS:

Radiogenomics; dose indices; radiotherapy; toxicity