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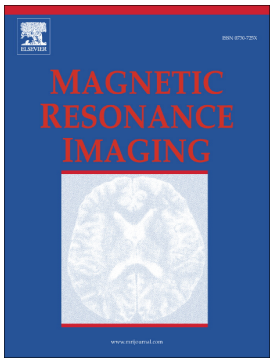

Prediction of survival and progression in glioblastoma patients using temporal perfusion changes during radiochemotherapy; Methodological issues to avoid misinterpretation

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Prediction of survival and progression in glioblastoma patients using temporal perfusion changes during radiochemotherapy; Methodological issues to avoid misinterpretation

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Advances in Knowledge: It is crucial to know that for prediction of progression and survival in glioblastoma, group based approaches cannot be applied for an individual based purpose. There is a huge difference between glioblastoma as a disease and an individual patient with glioblastoma. Poor prognosis of glioblastoma does not mean poor survival for a glioblastoma patient. The reason is interaction of different variables that associated with survival which completely different from person to person. The importance of personalized medicine in prediction studies should be considered.

Implication for patient care:

Progression and survival in glioblastoma can be impacted dramatically when qualitative interactions are present. Therefore, completely different progression and survival can be expected among different patients.

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I was interested to read the article titled "Prediction of survival and progression in glioblastoma patients using temporal perfusion changes during radiochemotherapy." by Larsson C and colleagues.[1] The purpose of this study was to investigate changes in structural magnetic resonance imaging (MRI) according to the RANO criteria and perfusion- and permeability related metrics derived from dynamic contrast-enhanced MRI (DCE) and dynamic susceptibility contrast MRI (DSC) during radiochemotherapy for prediction of progression and survival in glioblastoma. Twenty-three glioblastoma patients underwent biweekly structural and perfusion MRI before, during, and two weeks after a six weeks course of radiochemotherapy. Temporal trends of tumor volume and the perfusion-derived parameters cerebral blood volume (CBV) and blood flow (CBF) from DSC and DCE, in addition to contrast agent capillary transfer constant (K^{trans}) from DCE, were assessed. The patients were separated in two groups by median survival and differences between the two groups explored. Clinical- and MRI metrics were investigated using univariate and multivariate survival analysis and a predictive survival index was generated. They mentioned that a 10%/50% increase in K^{trans}/CBF two weeks after finishing radiochemotherapy resulted in significant shorter survival (13.9/13.6 vs. 31.5/33.1 months; $p < 0.05$). Multivariate analysis revealed an index using change in K^{trans} and relative CBV from DSC significantly corresponding with survival time in months ($r^2 = 0.84$; $p < 0.001$).

Though the article provides insight into the decision that DCE-based metrics shows most promise for early survival prediction, its conclusions are limited in three ways. The first consideration is that group based approaches cannot be applied for an individual based purpose. Therefore, applying multivariate analysis and reporting association even statistically significant, do not guarantee accurate prediction. [2-5] The second consideration is that for prediction of an outcome in clinical practice such as progression and especially survival in glioblastoma, we need data from two different cohorts or at least from one cohort divided into two to first to develop a prediction model and then validate it. Misleading results are generally the main outcome of research that fails to validate its prediction models. Validation of a prediction model or score should be done by applying different approaches such as split file, bootstrapping, or other well-known validation methods. [2-5] Finally, in prediction studies, we must assess the interactions between important variables especially for survival. Final results can be impacted dramatically when qualitative interactions are present. Any conclusion about prediction needs to be supported by sound methodologic and statistical processes. Otherwise, misinterpretation cannot be avoided.

KEYWORDS: Prediction; survival; glioblastoma; radiochemotherapy

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