Assessment of Response to Anti-angiogenic Targeted Therapy in Pulmonary Metastatic Renal Cell Carcinoma R2 value as a Predictive Biomarker

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PURPOSE The purpose of this study was to evaluate the usefulness of magnetic resonance(MR) R2* mapping in assessing response of treatment in patients with pulmonary metastatic renal cell carcinoma receiving anti-angiogenic targeted therapy.

MATERIALS AND METHODS. The exploration sample group and the validation sample group was respectively consisted of 46 and 41 patients with pulmonary metastatic renal cell carcinoma(mRCC) receiving anti-angiogenic drugs, patients were all examined with non-contrast enhanced CT and MR R2* mapping; Response Evaluation Criteria in Solid Tumors (RECIST) and the parameter of MR R2* mapping was assessed at baseline and after two treatment cycles. R2* values before and after treatment were analysed by using Wilcoxon signed rank test and receiver operating characteristic curve, The objective response to therapy was compared with progression-free survival(PFS). The Kaplan-Meier method was used to estimate survival functions.

RESULTS. Among patients receiving anti-angiogenic drugs, the change of R2* value before and after treatment($R2^*_{change}$) were higher in patients with PFS >1 year than in patients with PFS < 1 year(-23% vs -11%, p=0.005), when the R2* value before and after treatment were not significantly; The cut-off value with $R2^*_{change}$ derived from exploration sample was -15%. In validation sample group, a favorable response according to $R2^*_{change}$ had a sensitivity of 76% and specificity of 82% in identifying patients with a good clinical outcome (PFS > 1 year) versus 22% and 100% for RECIST partial response; For Kaplan-Meier method, using R2* mapping had a better performance in predicting PFS than RECIST Criteria with a lower p value(p=0.03 vs p=0.15).

Discussion: Patients with mRCC underwent non-contrast enhanced CT scan were evaluated using RECIST which based on the change of tumor size, However, treatment-induced change may even mimic PD with the use of RECIST [1]. Our study shows changes in R2* value could be a predictive imaging biomarker of response of pulmonary metastatic RCC to targeted therapy and has a better performance than RECIST Criteria, As R2* mapping can reflect histic iron concentration which is relative to angiogenesis [2,3], we assume that the anti-angiogenic targeted therapy could affect iron concentration of tumor and could be the main reason to explain the result of our study.

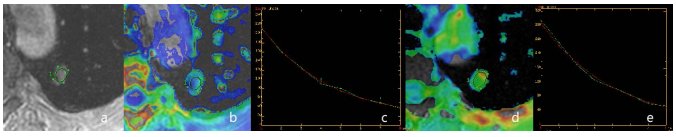

Fig.1 (a) patients with a left upper lobe lung metastasis who with poor response (b,c) R2* value before treatment (d,e) R2* value after treatment

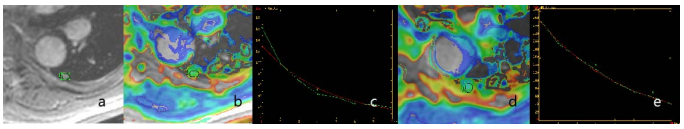

Fig.2 (a) patients with a left upper lobe lung metastasis with good response (b,c) R2* value before treatment (d,e) R2* value after treatment

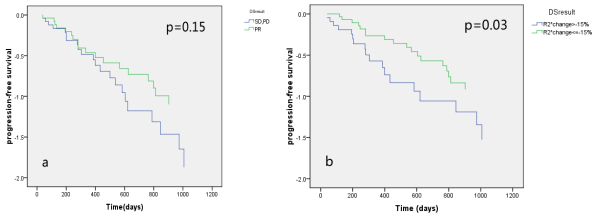

Fig.3 Kaplan-Meier curves show PFS for RECIST (a) and percentage change in R2* value (b).

CONCLUSION. Assessment of mRCC target lesions on R2* mapping for changes in R2* value is more accurate than response assessment by RECIST Criteria.

Reference:

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