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A comparative study of single or dual treatment of theranostic 188Re-Liposome on microRNA expressive profiles of orthotopic human head and neck tumor model

Background: 188Re-liposome has been used for evaluating the theranostic efficacy on human head and neck squamous cell carcinoma (HNSCC) at preclinical stages. Here we furthercompared the microRNA expressive profile in orthtopic HNSCC tumor model exposed to 188Re-liposome.

Methods: A single dose or dual doses of 188Re-liposome was intravenously injected into tumor-bearing mice followed by the Cerenkov luminescent imaging (CLI) for monitoring the accumulation of 188Re-liposome in tumors. The microRNA expressive profile was generated using the Taqman® OpenArray® Human MicroRNA Panel followed by the DIANA mirPath analysis, KEGG signaling pathways prediction, and Kaplan-Meier survival analysis for predicting the prognostic role of 188Re-liposome affected microRNAs.

Results: Dual doses of 188Re-liposome exhibited a better tumor suppression than a single dose of 188Re-liposome, including reduced tumor size, Ki-67 proliferative marker, and epithelial-mesenchymal transition (EMT) related factors. The microRNA expressive profiles showed that 22 microRNAs and 19 microRNAs were up-regulated and down-regulated by dual doses of 188Re-liposome, respectively. Concomitantly, these two groups of microRNAs were inversely regulated by a single dose of 188Re-liposome accordingly. These microRNAs influenced most downstream genes involved in cancer related signaling pathways. Further, miR-520e and miR-522-3p were down-regulated whereas miR-186-5p and miR-543 were up-regulated by dual doses of 188Re-liposome, and they separately affected most of genes involved in their corresponding pathways with high significance. Additionally, high expressions of miR-520e and miR-522-3p were associated with lower survival rate of HNSCC patients.

Conclusion: MicroRNA expression could be used to evaluate the therapeutic efficacy and regarded prognostic factors using different doses of 188Re-liposome.