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In vivo quantitation of circulating tumor cells with high-speed confocal microscopy in mouse tumor model

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The circulating tumor cells (CTCs) have been considered as a seed for cancer metastasis and the level of CTCs in metastatic cancer patients has been considered as a valuable indicator for predicting the grade of cancer metastasis, efficacy evaluation of anti-cancer therapy, and potential early diagnosis of cancer recurrence. Currently, ex vivo isolation of CTCs based from a peripheral blood sample has been a major strategy for the quantitation of CTCs. However, accurate quantitation of rare CTCs, as few as 1~2 cells per ml of blood sample in patients with metastatic cancer, is technically challenging and suffers extremely low sensitivity. These limitations can be overcome by using intravital flow cytometry which provides direct detection and quantitation of circulating cells in blood flow. For direct observation of fast-flowing cancer cells in the bloodstream, a custom-built high-speed video-rate laser-scanning confocal microscope system was implemented. After the intravenous injection of cancer cells and long circulating reference cells such as red blood cells (RBCs), a dynamically changing number of circulating cancer cells and RBCs was continuously monitored by real-time imaging. By extracting the calibration factor from hemocytometric imaging analyses with intravenously injected RBCs, we could estimate the level of intravenous injected CTCs in the whole blood of a mouse. To evaluate the degrees of cancer metastases with *in vivo* CTC-quantitation approach, an orthotopic tumor mouse model was used. The dynamic change of metastatic CTC-level was observed during a few hours and the longtitudinal change of metastatic CTC was monitored in a single mouse, *in vivo*.

Biography

Howon Seo is pursuing an Integrated Master's and Doctoral Degree program at Korea Advanced Institute of Science and Technology in South Korea. He completed his Bachelor's Degree in Biochemistry and has worked in intravital imaging of circulating tumor cells with high-speed confocal microscopy. He is interested in the study of cancer metastasis and metastatic cancer therapy.

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