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A novel approach for melanoma circulating tumor cell isolation from patient whole blood

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Abstract

The current standard for investigating melanoma, solid tumor biopsy, is a costly and inefficient means of extracting information about disease progression through repeat tumor biopsies. Alternatively, circulating tumor cells (CTCs, cells that have broken away from the primary tumor or metastatic cites) can be extracted from the blood in a liquid biopsy using a minimally invasive blood draw. We hypothesize that analyzing these CTCs both genetically and epigenetically may divulge important insights into melanoma progression, evolution, and response to treatment. The purpose of this study is to develop improved methods for CTC isolation. Here, we demonstrate a novel workflow for isolating melanoma CTCs. We successfully validate this approach by isolating and sequence verifying single A375 melanoma cells enriched from whole blood. Previous strategies for CTC isolation have been problematic; microfluidic approaches to CTC isolation may miss CTCs of aberrant morphology, while other antibody-based CTC isolation strategies are limited by using only a small number of antibodies to label their cells. Our approach does not rely upon cell morphology, and takes advantage of a large cocktail of antibodies tailored specifically for melanoma CTCs to overcome these limitations. Future studies include single cell RNA sequencing to make mechanistic insights into melanoma evolution over the course of immune checkpoint blockade (ICB) therapy targeting the PD-1 axis.