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CHARACTERIZING TUMOR CELL DISSEMINATION THROUGH ANALYSES OF CELL-MATRIX INTERACTIONS

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Abstract

Cell migration is a dynamic action that occurs in most biological processes, from wound healing to cancer metastasis and embryological development. Notable contributors to cell migration are focal adhesions, macromolecular structures that link the intracellular actin cytoskeleton to the extracellular matrix (ECM). While focal adhesion structures have been widely studied in a 2D environment, their role *in vivo* and the 3D microenvironment remains obscure. An interesting target for studying focal adhesion dynamics *in vivo* is through the *Danio rerio*, zebrafish. The transparent phenotype of zebrafish makes for an ideal imaging platform and the high number of samples a benefit from its fecundity. As a vertebrate, the zebrafish has about 70% conserved genes to that of humans and has become a model organism for studying melanoma, a very metastatic cancer in its higher form. The mechanism of tumor dissemination is unclear, but a recent study suggests that focal adhesions form *in vivo* and, thus, may be responsible for the cell migration. Fluorescently tagged paxillin, a known protein component of focal adhesions, has been shown *in vivo* as a punctate structure within zebrafish melanoma (ZMEL) cells that disseminate alongside the ECM. Yet whether the punctate structures are bona fide focal adhesions requires further investigation. We fluorescently tagged two known proteins of focal adhesions, integrin and paxillin, and transduced them into ZMEL cells. When injected into zebrafish embryos, the likely colocalization of the fluorescent markers will be a solid indication that focal adhesions form *in vivo* and that their presence may contribute to a dynamic role in tumor cell dissemination. The analysis of cell-matrix interactions by focal adhesions is critical for characterizing tumor cell dissemination *in vivo* and gaining a better insight into the regulation of metastasis and treatment options for cancer patients.