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(54) Title: A PROTEIN INVOLVED IN DETECTION OF CANCER METASTASIS AND A TREATMENT THEREOF

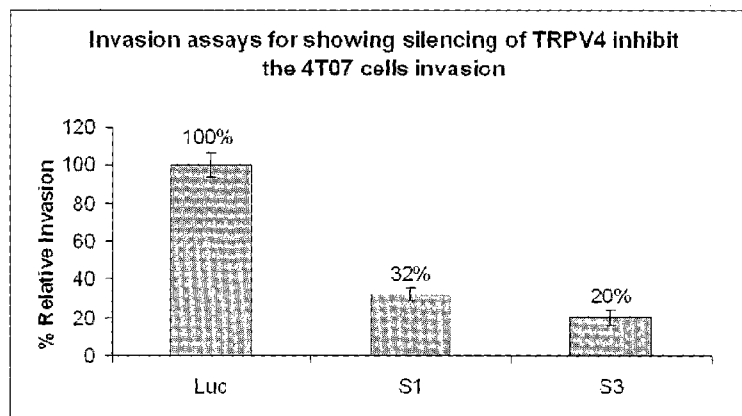


Figure 3C

(57) Abstract: Using phosphoproteomics, we profiled the phosphorylation levels of hundreds of proteins concurrently across an isogenic model of breast cancer metastasis. Among them is TRPV4, a calcium channel that we found to be overexpressed in invasive breast tumors compared to ductal carcinoma *in situ*, a pre-neoplastic lesion and normal tissues. TRPV4 was also found to be elevated mostly in invasive breast cancer cell lines and less so in non-invasive breast cancer cell lines. These data led us to hypothesize that TRPV4 confer early traits of metastatic cancer cells. Functional studies revealed that silencing of TRPV4 expression diminished breast cancer cell migration and invasion significantly but not proliferation. Silencing expression of TRPV4 in metastatic breast cancer cells also reduced the number and size of metastatic colonies in mice. This supports the notion that TRPV4 is an attractive drug target to curb metastasis. Further experimentations suggested that the functional effect of TRPV4 on breast cancer cellular processes was associated with regulation of intracellular Ca²⁺, cell plasticity and expression of cell-cell adhesion proteins such as beta-catenin and E-cadherin. The latter two events have obvious implications in cancer invasion and intravasation/extravasation. We have also made novel observations that activation of TRPV4 by PDD led to activation of AKT and FAK pathways, both shown to be important to cell migration. In particular, downregulation of E-cadherin and b-catenin following TRPV4

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**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
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