Metastasis is the primary cause of death in cancer patients. However, metastatic manifestation can take years after primary tumor removal. This delay in metastatic growth is a consequence of tumor dormancy, a reversible growth arrest that can be regulated by the interaction of disseminated tumor cells (DTCs) with the environments, through balancing p38/ERK (quiescence/proliferative) signals. Tumor cells interact with collagen through integrins, DDRs, GPVI and LAIR-1 receptors. The collagen receptor Discoidin Domain Receptor 1 (DDR1) is part of a dormancy signature established in ER+ breast tumors, however its role in tumor dormancy is not well understood. Here, we investigate the role of DDR1 in tumor dormancy.

**Methods:** We used breast cancer cell lines and a well-described dormancy model of head and neck squamous cell carcinoma (HNSCC) to study the role of DDR1 in tumor dormancy. To analyze the status of p38/ERK signaling pathways at the single cell level we used recently developed p38 and ERK biosensors to study the activation of these signaling nodes *in vivo* by using intravital microscopy.

**Results:** We have determined that DDR1 is overexpressed at both RNA and protein level in breast cancer and HNSCC dormant cells when compare with their proliferative counterparts. We demonstrated that the downregulation of DDR1 induces proliferation of dormant cells *in vivo*: in chicken embryo CAMs and in nude mice, by regulating the pERK/p38 signaling. Finally, we utilized p38 and ERK biosensors as readout to identify where proliferative and dormant cells reside *in vivo*.

**Conclusion.** We demonstrated that DDR1 expression maintain quiescence of tumor cells and prevent metastasis formation through the regulation of p38/ERK signaling.