Abstract

Metastasis is the main cause of death from solid cancer. The dissemination of cancer cells from a primary tumour is a very complex process that involves many steps and cells must overcome many obstacles to colonize distant organs. The tumour microenvironment influences the mode and the dynamics of invasion of cancer cells. Cancer cells have the ability to adapt to distinct environmental conditions in order to stay motile. Invasive cancer cells form membrane protrusions called invadopodia that are able to degrade extracellular matrix. The formation of invadopodia by cancer cells is interconnected to the production of matrix metalloproteases (MMPs). Metastasizing tumour cells use MMPs to break through extracellular matrix barriers and migrate in dense matrix. Both invadopodia formation and MMPs secretion is crucial for the degradation of the extracellular matrix. The most important is the membrane bound MMP-14 (MT1-MMP) and soluble MMP-2 and MMP-9. The invasive structures of tumour cells and the proteolytic enzymes in 2D environment is well described. However, a suitable model of localization and transport of MMPs and connection with invadopodia of tumour cells in 3D environment is still lacking. This diploma thesis focused on the extension of current knowledge of these key MMPs and on the optimization of experimental conditions more suitable for mimicking the situation *in vivo*.