

Open Ph.D. projects

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Title of the research topic: Role of the neurovascular unit in brain metastasis formation

Description of the research topic: Brain metastases of malignant tumours are among the most severe consequences of cancer having limited therapeutic options. Therefore, suppressing or reducing the risk of metastasis formation could be one of the most effective approaches in the therapeutic strategies besides surgical removal of the primary tumour. Since the CNS lacks a lymphatic system, the only possibility for cancer cells to reach the brain is via the blood stream. Metastatic cells invading the CNS thus have to pass the blood-brain barrier (BBB). The tumours giving CNS metastases with the highest frequency are the malignant melanoma, lung cancer and breast cancer. By using an in vitro model of the BBB the project is focused on the elucidation of molecular mechanisms by which cancer cells cross the BBB. Different molecular, biochemical and immunofluorescent techniques are applied to elucidate the role of various signalling mechanisms, proteolytic enzymes and brain derived factors in the transmigration of metastasizing cancer cells. In vivo, advanced microscopic techniques (two photon microscopy) are applied to monitor the process of transmigration.