TP3: The role of adipocytes in the bone tumor micro-environment

Scientific staff

Aline Bozec, Prof. Dr. rer. nat., principal investigator
Tobias Bäuerle, Prof. Dr. Med., principal investigator
Daniel Erickson, PhD student
Christine Zech, technician]

Project description

The project aims to delineate the role of bone marrow adipocytes in bone metastatic diseases. To date, adipocyte-supplied factors have been related to cancer development and progression. However, the study of the bone marrow adipocytes has been neglected. The bone microenvironment showed an increased adipocytes number with age and obesity. Our preliminary data indicated that melanoma growth within the bone marrow is enhanced in an adipocyte rich bone marrow environment. Still it remains unclear, which adipocytes factors control cancer cell proliferation and how targeting depletion of adipocytes affects the interaction of breast cancer and melanoma cells with the bone microenvironment. The main hypothesis is that bone marrow adipocytes and their derived factors influenced the bone marrow microenvironment and tumor cell growth in the metastatic niche.
To test this hypothesis, we will investigate the process like tumor cell proliferation, bone resorption and angiogenesis in osteolytic bone metastases in different model of expansion and loss on bone marrow adipocytes.
The results of this project will develop new knowledge on the pathophysiology of metastatic progression in bone related to the presence and metabolic activity of adipocytes for the clinical setting of therapeutic and diagnostic purposes. Novel therapeutic options targeting the adipocyte metabolism might arise based on the molecular interaction between fat, tumor cell and bone cells, and imaging of the metastatic niche might facilitate early detection of bone metastatic disease.

Expertise

We have developed in vitro and in vivo molecular assays as well as multimodal imaging to investigate tumor cell proliferation and bone resorption. The model of in vivo expansion and loss of adipocyte will be used together with intra-tibial injection of melanoma cell in mice or intra-arterial injection of breast cancer cells in rats.

Project-related publications

Ellmann S, Seyler L, Evers J, Heinen H, Bozec A, Prante O, Kuwert T, Uder M, Bäuerle T (2018). Bone 120:254-261

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Luo Y, Chen GL, Wirtz S, Zech C, Bäuerle T, Munos L, Schett G, Bozec A. (2015). Cell Metabolism 22, 886–894

Bozec A, Zaiss M, Kagwiria R, Voll R, Rauh M, Chen Z, Mueller-Schmucker S, Kroczek R A, Heinzerling L, Moser M, Mellor A L, David JP, Schett G. (2014). Sci Transl Med 6:235

Bäuerle T, Komljenovic D, Merz M, Berger MR, Goodman SL, Semmler W (2011) Int J Cancer 47: 2453-2462

Bäuerle T, Merz M, Komljenovic D, Zwick S, Semmler W (2010) Clinical Cancer Res 16: 3215-3225

Further information: http://www.medizin3.uk-erlangen.de/forschung/arbeitsgruppen/juniorprofessur-osteoimmunologie/