appearance of new generation sequencing techniques opened a new dimension of ancient DNA studies, since from traces of DNA, large amount of sequence data can be obtained with this method.

We heve recently created a special sterile aDNA laboratory at the Department of Genetics. This so called pre-PCR laboratory is supplemented with a post-PCR, standard molecular laboratory in a distant part of the building (a requirement to prevent contamination). Both laboratories are equipped, and we have optimized DNA extaraction and amplification. In the pre-PCR laboratory, a simple method was adapted for bone's milling. For DNA extraction we also adapted a cheap but reliable modified silica powder affinity purification method. For DNA amplification we are testing various enzyme brands and conditions recommended by the manufacturer.

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Effect of hypoxia on MCF-7 cells' transcriptome and metabolic activities

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The hypoxic condition is prevalent in solid tumours and it is often associated with poor prognosis. Metabolic alterations that make possible for the cancer cells to survive and thrive under hypoxic condition are subject to high interest, however a systems-level understanding is still missing.

In order to emulate the hypoxic state, cell of a well established breast cancer model cell line (MCF-7) were cultured under normal oxygen concentration and subsequently exposed to hypoxia. To detect the cells' response to hypoxia, RNA samples were collected and sequenced from both conditions and mRNA abundances were determined.

With the aim of inferring the metabolic routes that may play important roles in the cancer cells' response to hypoxia, we employed the iMAT method that integrates gene expression data and a human genome-scale metabolic network reconstruction to predict metabolic reactions that are specifically altered in hypoxic condition. Beside, to gain a more global view of the functional changes underlying the hypoxia-response, we carried out a Gene Ontology analysis on the RNASeq data. In addition, to generally assess the predictive capability of the human metabolic network model, we applied an essentiality analysis and compared predictions to available high-throughput data.

The analyses resulted in the identification of 33 metabolic reactions which are specifically activated under hypoxia. The the majority of the detected reactions is distributed across 4 modules of cellular metabolism, namely sphingolipid metabolism, pyruvate metabolism, nucleotides metabolism, inositol phosphate metabolism. In addition, C160 fatty acid activation, diacylglycerol phosphate kinase and the arginine/lysine transporter were predicted to be active.

The predicted arginine transported and the reactions of the pyruvate metabolism will be subject to further experimental investigations by our collaborators in order to assess their role in hypoxia.

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Methane inhalation prevents from the quantitative changes in nitrergic myenteric neurons and intestinal motility disorders in a rat model of intestinal ischemic-reperfusion injury

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The gastrointestinal tract is highly susceptible to hypoxia, thus local or systemic circulatory disturbances are often associated with intestinal inflammation and enteric neuropathy. Inflammatory mediators influence the activity of enteric neurons, therefore, development of the intestinal inflammation is frequently associated with gut motility disturbances. Previously, we have demonstrated the anti-inflammatory effects of exogenous methane inhalation after IR. However, the effects of inhaled methane on the IR-related quantitative changes of enteric neurons or on the myoelectrical activity of the gastrointestinal tract were not investigated until now. Therefore, the main focus of this study was to investigate the consequences of intestinal IR and normoxic methane inhalation on the quantitative parameters of myenteric neurons and intestinal motility.

For the study 300-350 g male Sprague-Dawley rats were divided into three groups, these are: sham-operated, IR and methane-treated IR (n=8-8). Ischemia was induced by the occlusion of superior mesenteric artery. The inhalation of normoxic artificial air with 2.2% methane