Detection of human Biomarkers for Invasive Fungal Infections

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During the last decades, the number of fungal infections has been dramatically increasing. The main reason, is the increasing number of individuals with a weak immune system. Treatment of fungal infections is complicated by a a small number of known biomakers and drug targets, as well as drug resistance. *Aspergillus fumigatus* is the major fungal airborne pathogen which often infects patients after stem-cell transplantation leading to high mortality rates. The Junior Research Group PiDOMICs aims to identify biomarkers for *Aspergillus fumigatus* patients which a) predict the risk for infection, b) support early diagnosis and c) control treatment progression and support therapeutic decisions. Therefore, personal information of patients (e.g. age, sex) is combined with their medical status (e.g. antibiotics), as well as transcriptomics and proteomics data. One focus, is the OMICs-based identification of biomarkers based on the footprints of pathogens in whole blood of patients.

Here, I will present first results of the new group. In a pioneering study, we constructed a classifier based on transcriptional biomarkers in whole blood of donors which robustly discriminants bacterial from fungal infection and thus may support early therapeutic decisions (antimycotics vs antibiotics) for septic patients (Dix *et al* 2015 *Front Microbio)*. In that line, we found first hints of microRNAs which are specifically regulated in dendritic cells as response to fungal infection (Dix *et al* 2017 *Front Microbio)*. Moreover, we used expression data from patients after stem-cell transplantation in a Random Forest approach to identify genes whose expression can discriminate patients with and without an Aspergillus infection. Thereby the calcium binding protein S100B was identified as promising diagnostic biomarker (Dix *et al* 2016 *Front Microbio)*. Finally, we utilized time-resolved clinical data and to identify significant associations between clinical features such as given drugs sand the risk of an Aspergillus infection.