To tackle this problem, we aim to identify novel biomarkers predictive of stage II CC relapse risk, utilizing an integrated, data-driven multi-scale approach for combined analyses of biological data layers obtained through six different CBmed technology platforms: NGS, LC-MS/MS Proteomics, MALDI-MS, Metabolomics, Immune Profiling, and Digital Pathology plus Clinical Data.

FUSION Technology – A Systems Biology Approach Towards Predictive Biomarkers for Relapse Risk in Stage II Colon Cancer

Colon cancer (CC) belongs to the most commonly diagnosed malignancies among men and women in the developed world, with an estimated 140,250 new cases being diagnosed in 2018 in the US alone, including 50,630 estimated deaths in 2018. Identification of high-risk patients with stage II CC is difficult and currently defined by several clinicopathological risk factors. Although the current risk definition for stage II CC-patients is still recommended, new prognostic and predictive markers for patients potentially profiting from adjuvant chemotherapy (CTX) represent a clinical need. CBmed therefore took a FUSION Technology – assisted multi-platform approach towards biomarker discovery for stage II colon cancer risk prediction.
Biomarker Candidates for Relapse Risk Prediction in Stage II Colon Cancer

First results obtained from NGS analyses indicated differing mutational patterns in the KIT and KRAS genes comparing relapse vs. relapse-free patients. Systems-level FFPE tissue LC-MS/MS proteomics revealed two clusters, one of which is enriched in relapse. We performed Machine Learning feature selection using Random Forest (RF), and found 4 proteins that were consistently predictive in linear logistic regression models (AUCs > 0.8). Signatures of 3, or 4 increased the predictive performance to AUCs ≥ 0.9.

Benefits & Impact of FUSION Technology

FUSION Technology computational data science capabilities and infrastructure enable CBmed biomarker research through support in data management and processing of complex multi-platform, data-driven projects. Already, FUSION-DB, bioinformatics expertise, and first algorithmic workflows in FUSION-SOFT support CBmed core technology platforms, such as next-generation sequencing (NGS) and digital pathology data analyses. In the future, these assets will support CBsolutions (non-K) projects.

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