

## Designed Experiments in Development of a Predictive Index for Pancreas Cancer

Klaus K. Andersen<sup>\*1</sup>, Julia S. Johansen<sup>2</sup>, Nicolai A. Schultz<sup>2</sup> and Christian Dehlendorff<sup>1</sup>

<sup>1</sup>Danish Cancer Society Research Center, Denmark. \* [Klaus@cancer.dk](mailto:Klaus@cancer.dk)

<sup>2</sup>Department of Oncology, Herlev University Hospital, Denmark

More than 1500 human microRNAs (non-coding RNAs) have been discovered to date and many of these have been shown to be related to the prognosis and incidence of cancer. Our aim was to develop a predictive index of pancreas cancer based on measurements on only a few microRNAs. The reproducibility of such measurements, however, is often of considerable size and influenced by several sources of variation. Thus, in order to develop a robust predictive index which can be used under reproducibility conditions, i.e. in new labs with new measurement equipment, factors influencing the reproducibility must be identified and controlled for in new settings.

Our presentation will describe a designed experiment approach to address this challenge. First, a designed experiment to estimate reproducibility is presented. Based on three different data sets containing health outcome (cancer/healthy) and CT expression of selected microRNAs variance components for factors influencing reproducibility are estimated. Based on these findings a predictive index for pancreas cancer is suggested. The proposed index is a contrast with the aim of cancelling out systematic and nuisance technical variation in a clinical setting. Based on a separate validation set the predictive performance of the index is illustrated. Challenges in data analysis related to heterogeneity and missing values are discussed and possible solutions given.

Key Words: Designed experiments, reproducibility, predictive index, microRNA