Abstract #1559: Evaluation of Circulating miRNAs for Earlier Cancer Detection through Machine-Learning Expression Profiling

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Background:

- Earlier cancer diagnosis leads to higher survival rate and reduces financial burdens for patients
- Extracellular microRNAs (miRNAs) hold great promises as diagnostic biomarkers
- Utilizing novel technology PanelChip® and machine-learning profiling, we sought to determine whether we could use individuals' miRNA expression to distinguish between healthy subjects and cancer patients

Methods:

- Cancer and healthy blood samples were collected
- miRNAs were extracted and reversed transcribed into cDNA
- Expression analyses were performed with multi-biomarker, qPCR-based technology PanelChip® for 167 miRNA candidates
- 135 miRNAs were used as features in Support Vector Machine (SVM) to build OncoSweep™ classifier, a proprietary prediction algorithm for classification of the samples
- Ten-fold cross validation was used to evaluate the performance of OncoSweep™

Panel of 135 Circulating miRNAs Biomarkers Capable of Pan-Cancer Prediction

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Results

- 344 healthy donor samples and 417 cancer patient samples were collected for the study
- The prediction algorithm, OncoSweep™, was derived based on the miRNA expression patterns of the healthy and patient samples
- The algorithm scored an overall accuracy of **86.47%** for cancer prediction, with a sensitivity of **91.4%**, a specificity of **85%**, a PPV of **85%** and an NPV of **88.5%**.

Conclusions/Future Direction:

Utilizing PanelChip® and machine-learning method of analyzing circulating miRNA expression profiles, the derived algorithm OncoSweep™ shows significant promise in cancer prediction. Validation is currently being performed in a larger study. We believe circulating miRNAs, through stringent sample processing, precise technical platform and machine-learning methodology, are powerful biomarkers for earlier cancer detection.