Optimization Study - Differentiating pancreatic cancer from individuals with concerning symptoms, including type II diabetes

Payam Delfani[2], Anders Carlsson[2], Thomas King[2], Randall Brand[3], Alexander Ney[1], Stephen P Pereira[1], Linda Dexlin Mellby[2]

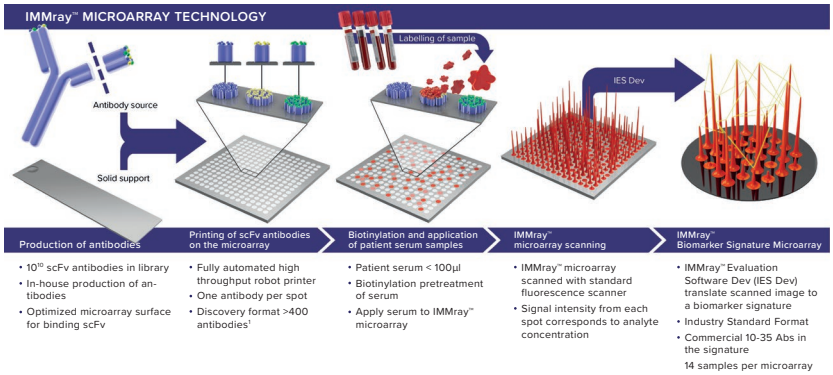
1. University College London, UK 2. Immunovia, Lund, Sweden and Marlborough, USA 3. Department of Medicine, University of Pittsburgh, USA

Objectives

IMMray™ PanCan-d Optimization Study aimed to evaluate how IMMray™ biomarker signature could separate patients with PDAC (stage I-IV) from individuals with various concerning symptomatic conditions not caused by PDAC, which mirrors the clinical setting encountered by healthcare professionals.

Patients and Methods

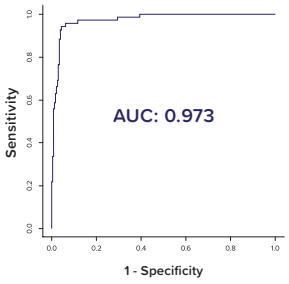
In total, 923 serum samples were analyzed with IMMray™ discovery set up and a CA 19-9 ELISA. Patient samples from 136 PDAC (stage I-IV), 570 symptomatic individuals and 217 healthy controls were tested in a blinded manner. All PDACs were histologically confirmed. Based on one year follow up data non of the symptomatic controls developed PDAC. To minimize confounding and pre-analytical variables, all patient samples were collected and processed using the same standard operating procedures, stored at -80°C and tested within a year after collection. Data analysis for each group was performed using Support Vector Machine (SVM) algorithms. Data was divided into a training and test set, and test performance given as ROC AUC values, was then evaluated for the test set.



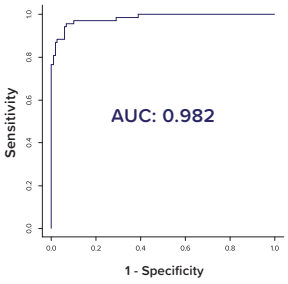
PDAC				Controls		
Stage I	Stage II	Stage III	Stage IV	Healthy controls	Symptomatic controls (without diabetes)	Diabetes controls
No. 20	34	21	61	217	480	90

Results

A. Symptomatic vs. PDAC



B. Healthy vs. PDAC



C. Diabetes vs. PDAC

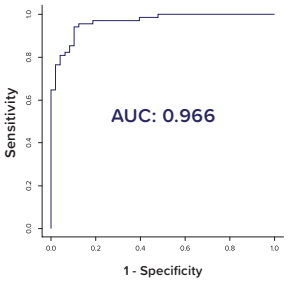


Fig 1. In total, 923 individuals were analyzed. Combining IMMray™ biomarker signature with CA 19-9, the results from the test set showed ROC AUC values of 0.973 and 0.982 differentiating PDAC (stage I-IV) vs. symptomatic individuals, and healthy controls, respectively. PDAC (stage I-IV) could also be discriminated vs. diabetes type II controls with a ROC AUC value of 0.966.

D. Controls vs. PDAC Stages I & II

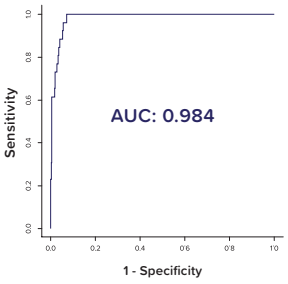


Fig 2. PDAC Stages I & II could be discriminated from controls (symptomatic + healthy + diabetes), using IMMray™ biomarker signature and CA 19-9 ELISA. The result from the test set showed a ROC AUC value of 0.984 differentiating PDAC Stage I & II.

Conclusions

- IMMray™ PanCan-d **Optimization Study** showed for the first time that IMMray™ biomarker signature together with CA 19-9 has the capacity to differentiate PDAC (stage I-IV) from symptomatic, non-PDAC individuals, including type II diabetes. This study paves the way for the next, where the IMMray™ PanCan-d commercial biomarker signature is selected and the commercial test model is built.
- Importantly, early stage I & II of PDAC was discriminated from controls with an unprecedented accuracy of 0.984.
- These findings need to be validated but have significant clinical implications for individuals attending primary and secondary care units with non-specific but concerning symptoms where PDAC may be suspected.

Acknowledgements: *Immunovia would like to acknowledge Växjö Central Hospital, Department of Transfusion Medicine, Sweden, for providing freshly collected samples for the optimization study.*

References

1. Mellby LD, Nyberg AP, Johansen JS, et al. Serum Biomarker Signature-Based Liquid Biopsy for Diagnosis of Early-Stage Pancreatic Cancer. Journal of Clinical Oncology. 2018 Aug;36(28):2887-2894

2. Carl A. K. Borrebaeck. Precision diagnostics: moving towards pro marker signatures of clinical utility in cancer. Nature Reviews Cancer. 2017 Mar;17(3):199-204.