Clinical Validation of a live-cell phenotypic biomarker - based diagnostic assay for the prediction of adverse pathology in Prostate Cancer

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INTRODUCTION

Potential (\(\text{MAPP}\)), a blinded 237 sample set in an automated high-throughput manner. (5) Statistically analyze the 237 sample set in an unbiased objective way using automated algorithmic analysis and test the performance of the algorithmic analysis by comparative analysis of the unblinded data. Rationale: Develop algorithms that can predict adverse pathology from a sample using either tumor derived cells from adjacent normal tissue in order to capture the tumor behavior before the tumor has on cell loss to the surrounding tissue not directly involved as tumor cells.

Methods: This clinical validation study was also performed on fresh prostate cancer samples (n=237) obtained at the time of radical prostatectomy in which tumor and adjacent normal tissue (n=67) were procured. Patient cells were grown in vitro for 72-h using unique label-free imaging of multiple phenotypic biomarkers. Cells were then stained and imaged for molecular markers. Data were objectively quantified by machine vision algorithms to evaluate cellular behavior, and machine learning analysis to generate predictive metrics.

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   - Flow diagram of algorithmic automated biomarker analysis specific to prostate cancer.
   - Cortical actin and sub-cortical stress fiber phenotype level.
   - Microtubule phenotype level.
   - Nuclear phenotype level.
   - Cell cycle phenotype level.

2. **Phenotypic Analysis:**
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**CONCLUSIONS:**

- Only when biopsy samples are imaged, is a microscopic cellular analysis possible. However, the current state-of-the-art does not allow for a reliable method to determine the presence of cancer.
- Due to the lack of clear diagnostic tools, cancer is often diagnosed after over treatment and over treated (1-7).
- There is an urgent need for quantitative & actionable risk-stratification biomarkers for prostate cancer.

- Without a reliable method for the accurate diagnosis of prostate cancer, the need for novel diagnostic tools is evident.
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