

Personalized monitoring and management of bladder cancer recurrence: An integrated non-invasive urine proteomics approach using mass spectrometry

Luís B. Carvalho

luis.carvalho@bioscopegroup.org

Bladder cancer (BC), a common neoplasm of the urinary tract characterized by high recurrence and progression rates, requires frequent and often invasive monitoring, making it one of the most expensive cancers to treat per patient. In this work, we developed and integrated multiple works that focused on novel, non-invasive methods for improving the diagnosis, management, and monitoring of BC patients.

The current work introduces a new urine proteome storage approach that is compatible with filter-aided sample preparation (FASP) [1]. This approach provides protein stability at room temperature, allowing for long-term storage and easy inclusion into common clinical practice. Furthermore, an enhanced ultrafast proteomics methodology, Ultrasound-FASP, was developed, which dramatically reduces sample time processing using ultrasound energy whilst maintaining the robustness required for high-throughput mass spectrometry analysis [2] and high applicability for a hospital scenario. Advanced mass spectrometry proteomics approaches have also been used to find distinct proteome signatures that were linked with BC recurrence, resulting in novel prognostic biomarkers [4]. Moreover, by integrating the information within the urinary proteome into biochemical pathways, the differential personal pathway index (dPPI) was developed, allowing for tailored patient monitoring while using a non-invasive method. Such a novel approach makes it suitable for personal patient treatment and follow-up by providing insights into the evolution of BC and improving clinical decision-making [5].

This combined work provides a leap forward in the management of BC, providing a tailored, non-invasive alternative with the potential to improve patient outcomes. The current pipeline can be applied to different types of cancers or conditions, increasing the range and impact of the current research while also opening fresh avenues in precision medicine.

References

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