

# Sustainable Advances in Renal Diagnostics: The Role of Mass Spectrometry in Identifying Neoplasms, Acute Kidney Injury, and Bacterial Infections

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Mass spectrometry (MS) has significantly advanced the field of clinical diagnostics, particularly in quantifying proteins in blood and solid tumours. This technology has been crucial in improving the precision and specificity of various diagnostic tests. In a recent study, we utilised the total protein approach (TPA) based on high-resolution MS to investigate renal neoplasms, a group of tumours with similar features often presenting diagnostic difficulties. Using frozen tissue biopsies from different renal neoplasms and adjacent normal renal tissue as controls, we identified 205 proteins with differential expression. From this, 24 proteins emerged as potential biomarkers for distinguishing these neoplasms. Essential proteins such as PLIN2, TUBB3, LAMP1, and HK1 were further validated through semi-quantitative immunohistochemistry, highlighting their diagnostic value. Additionally, our research extends to acute kidney injury (AKI) and bacterial infections in the kidney, areas that also benefit from the precision of MS. In cases of AKI, MS enables the detection of specific protein changes that can indicate early damage, facilitating timely intervention. Similarly, MS helps identify pathogenic proteins for bacterial infections, aiding in swift and accurate diagnosis, which is crucial for effective treatment.

This study showcases the effectiveness of high-resolution MS combined with TPA in enhancing the pathology of renal neoplasms and suggests broader applications in clinical diagnostics. Moving forward, the incorporation of MS in clinical environments holds great promise, bridging the gap between research and practical applications and providing new insights into disease mechanisms and potential therapeutic targets.

## References

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