



Biochemical Biomarkers for Kidney Diseases

Chapman Case #2024-002

Market Need

Hypoxia is an inherent pathophysiological characteristic of chronic kidney disease (CKD), which is closely associated with the development of renal inflammation and fibrosis, as well as CKD-related complications such as anemia, cardiovascular events, and sarcopenia. The global CKD treatment market was valued at \$32 billion in 2022 and is projected to grow to over \$45 billion by 2032. The market for treating chronic kidney disease and the increasing need for early detection, especially in cases involving hypoxia, is substantial and continues to evolve; however, the market lacks sensitive and specific biomarkers for hypoxic kidney injury. The current diagnostic tests for kidney diseases are not able to differentiate the underlying pathological mechanism, whether it is hypoxia-driven or not; therefore, the market needs hypoxia-specific biomarkers that can provide this valuable information.



Chapman Solution

Dr. Francisco Nunez, Dr. Farideh Amirrad, Dr. Muhamad Imran Sajid, and [Professor Surya Nauli](#) of Chapman University have devised a method that combines metabolomics and bioinformatics approaches to identify a panel of metabolite biomarkers for early detection of hypoxia-induced kidney injury. This panel of hypoxia-associated metabolites could form the basis of a non-invasive diagnostic test using urine or blood samples that can detect early signs of hypoxic kidney injury, thus allowing for timely intervention and treatment. Compared to existing diagnostic methods, Chapman's solution has the following advantages:

- Comprehensive profiling of thousands of metabolites simultaneously without bias towards specific compounds
- Ability to identify novel biomarker candidates that may be missed by targeted approaches
- Integration of metabolomics data with biochemical pathways to understand mechanisms
- Use of advanced analytical techniques like UPLC-MS/MS for high sensitivity and resolution

Applications

- Be the basis for the development of diagnostic tests or therapeutics for hypoxia-related kidney diseases
- As a research tool for identifying biomarkers for other diseases

Key Publication

[“Untargeted metabolomics analysis on kidney tissues from mice reveals potential hypoxia biomarkers”](#), Nature Scientific Reports, October 2023.

Stage of Development

- Early detection of hypoxia-induced kidney fibrosis on mice models from using the proposed biomarkers
- Available for licensing and further research collaborations

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