Proteomic Profiling Technology: A Novel Approach in Clinical Laboratory Applications

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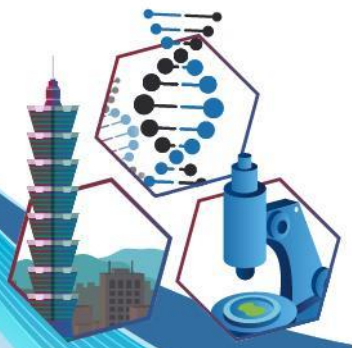
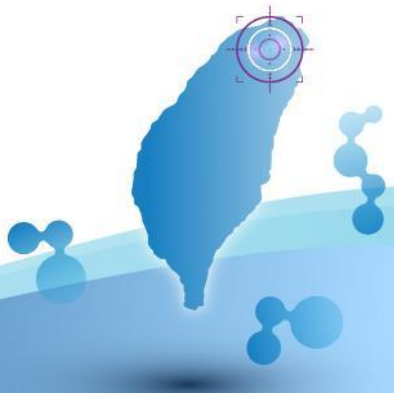
Proteomics mass spectrometry technology has shown revolutionary applications in clinical diagnostics, allowing for high-sensitivity quantitative analysis of proteins and their modifications. This technique is used for biomarker detection in cancer, cardiovascular diseases, and more, providing physicians with more accurate diagnostic and therapeutic tools. For example, personalized proteomics is gradually advancing precision medicine through the discovery of protein biomarkers, molecular characterization of disease subtypes, and evaluation of individualized treatment responses.

From the proteogenomics research within Taiwan's Cancer Moonshot Program, we have gained valuable insights. The proteomics classification approach successfully identified early recurrence subtypes in lung cancer and breast cancer. These findings have inspired us to develop protein biomarkers to identify high-risk subgroups of early recurrence in stage I cancer patients, aiding in more aggressive treatment strategies for high-risk patients.

Additionally, the advancement of single-cell mass spectrometry technology, particularly in tracking disease progression and drug responses, is paving the way for precision medicine to reach new milestones.





In order to meet the stringent regulatory standards of clinical laboratories, I will share our experience using Thyroglobulin (Tg) as a biomarker to establish a laboratory model that complies with the Clinical Laboratory Improvement Amendments (CLIA).

Furthermore, I will specifically discuss rapid diagnostics based on nano-probe mass spectrometry analysis combined with AI models. This technology uses serum protein variation barcodes to perform rapid diagnostics with a minimal amount of serum (20 microliters) within one hour, enabling early detection of gastrointestinal cancers. The multi-dimensional information provided by mass spectrometry not only assists in diagnosis but is expected to optimize treatment decisions, opening a new chapter in precision medicine.