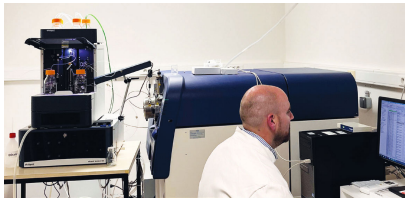
Specializing in mass spectrometry and omics tools, the Analytical Platform of the Faculty of Pharmacy at the Université libre de Bruxelles (ULB) brings together three faculties, four professors, two technicians, around 15 researchers, and five mass spectrometers spread over two campuses. The applications are both multiple and promising.



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From translational research to clinical practice

Mass spectrometry and omics tools meet a wide range of academic and industrial needs. The expertise of the Mass Spectrometry and Omics Tools Platform, a dedicated platform within the ULB Faculty of Pharmacy, Medicine, and Sciences, is widely recognized. This expertise relies on state-of-the-art equipment for applications in metabolomics, proteomics, and interactomics.

Complex mixture analyses are performed unsupervised along three main axes: proteins, small molecules, and interactions—both between proteins and molecules and among small molecules. A variety of sample types are studied, including biological fluids, plant extracts, bacteria, and human or animal cells.

Research applications

Designed to generate insights in response to research questions, the Mass Spectrometry and Omics Tools Platform collaborates with hospitals and university research laboratories. It currently conducts about 30 metabolomics and proteomics analysis projects related to diseases such as rheumatoid arthritis, neurological disorders, and urological conditions.

For example, a combination of proteomics and metabolomics is used in translational

clinical applications dedicated to biomarker research. Additionally, integrating a lipidomic approach (at the tissue level) provides a comprehensive view of analyzed samples. The Platform also extends its services to companies, assisting with molecule synthesis analysis and industrial process monitoring by identifying impurities or defects. Other applications include forensic investigations and archaeological studies.

Challenges and future directions

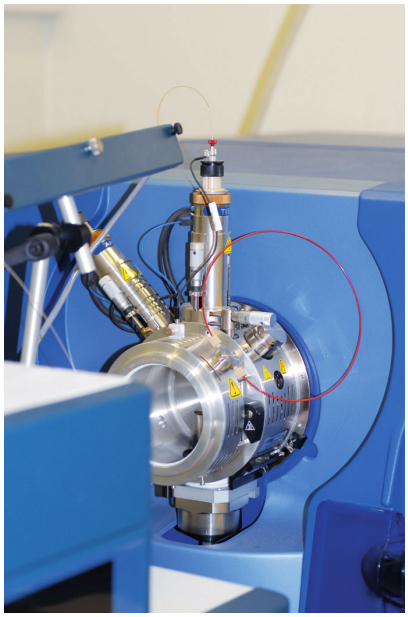
The primary challenge for the Mass Spectrometry and Omics Tools Platform is refining its capacity to analyze interactions between proteins and molecules. Similarly, exploring interactions between genes and gene transcription within complex systems presents a vast field of research. The goal is to develop multi-omics tools that integrate various data sources on protein and metabolite variations, as well as their interdependencies. This would enable researchers to better understand environmental influences on patients, cells, and plants.

Another critical challenge is multiblock analysis, which involves correlating metabolic and protein data with patient-specific information such as age, sex, and drug treatments. This approach aims to provide results that align with clinical conditions, enabling deeper data interpretation.

European funding and the future of multiomics research

The Mass Spectrometry and Omics Tools Platform is poised to secure European funding for the creation of a multiomics platform serving hospitals in the Brussels region. This initiative will integrate research from ULB and its partner university, VUB, and is set to begin operations in early 2025.

This project represents a significant opportunity to capitalize on Brussels' unique scientific and medical ecosystem. With two major university centers (ULB and VUB), the highest hospital density in Belgium, and a vast number of hospital beds, the city is ideally positioned for medical data collection. This initiative will enhance patient classification, improve therapeutic approaches, and ultimately contribute to a higher quality of life.



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