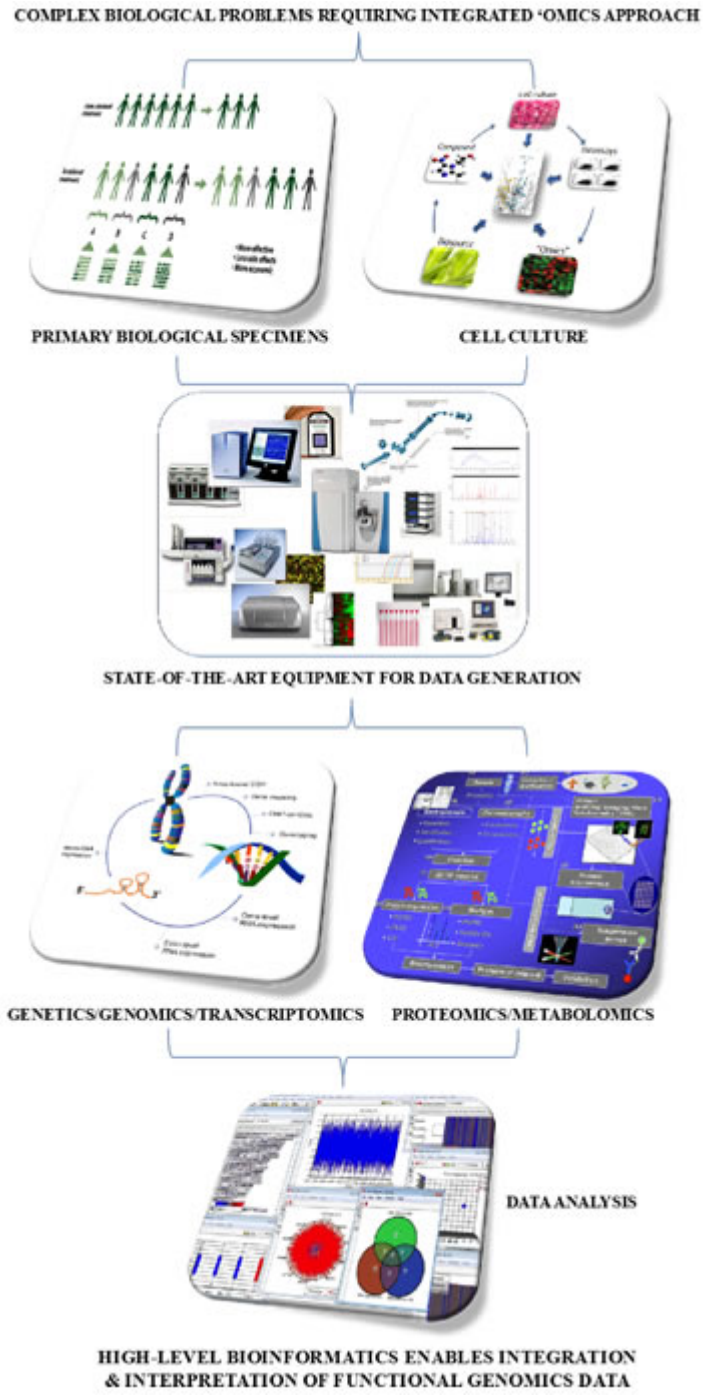
WHAT IS APPLIED PROTEOMICS & CHEMICAL BIOLOGY?



Chemical Biology is a discipline spanning the fields of chemistry, biology and physics, involving the application of chemical and biochemical techniques, tools and analyses to the study and manipulation of biological systems, including the study of molecular mechanisms that underlies cellular function in human health and disease.

Applied Proteomics is a field of high throughput biological research that aims to describe and understand how the abundance, post-translational modification and functionality of the global proteome varies in a temporal manner in correlation with macroscopic properties of complex biological systems (e.g. development and progression of disease). The global aim is thus to delineate the molecular interaction networks between individual components which generate and control complex systems (e.g. cells, tissues & organisms) and their response to external stimuli.

Applied Proteomics also aims to understand the effects of genetic variation on the expression and function of the encoded proteins as well as on the properties of the whole cell, tissue or organism (e.g. correlating changes in genotype, gene transcription, or protein expression with disease susceptibility, disease progression, or with drug response in human and other systems).

Applied proteomics research programs invariably involve large-scale assays in which many proteins (or small molecules) in a cell, tissue or organism are measured and tracked in parallel through time and localization under different environmental conditions, in order that quantitative comparisons can then be made between for example normal and altered states. Such programs therefore rely heavily on high throughput data-generating experimental technologies such as *proteomics and metabolomics, but also including genomics*, whilst using the data analysis methods of *bioinformatics* in order to make sense of the vast quantities of raw data that can now be generated through such large-scale assays. Increasingly a typical applied proteomics program of research and innovation involves a multidisciplinary collaboration across a number of high throughput experimental platforms to study a specific, complex biological problem; for example, an applied proteomics program might study quantitative changes in protein and lipid expression in specific tissues or peripheral fluids through a large cohort of patients in order to identify molecular markers that might be diagnostic for a particular disease.

Applied Proteomics & Chemical Biology research therefore has the potential to impact directly on our fundamental understanding of both individual molecules and complex biological systems, as well as of how their dysfunction correlates with disease. In doing so, such research should yield the information, discoveries and inventions that can then be translated into future biomedical advances or that which have downstream commercial potential including, for example:

1. **Identifying underlying disease mechanisms**
2. **Discovering and validating novel molecular targets for new drug- or vaccine development programs**
3. **Identifying & validating patterns of biomarker expression which correlate with e.g. disease and/or disease progression and which could be used as the basis for new diagnostic/prognostic tests**
4. **Identifying & validating patterns of surrogate marker expression which correlate with response to treatment and which could be used for patient stratification and monitoring during clinical trials of new drugs.**