

# Technology offer: Personalized monitoring of immunosequencing profiles to advance precision medicine

The University of Antwerp has been developing and refining data mining and machine learning models to process T-cell immunosequencing data. They are now in the process of developing a toolset and analysis framework for wider use and application within a commercial setting and in search of interested partners.



## ■ Situation before

Think for a moment that we could read someone's complete immune status from a single test. Imagine that we could rapidly determine their disease history, both past and present; their immunities, their allergies, the efficacies of their vaccine treatments, their risks for future infections or their predisposition for auto-immune diseases.

Recent research at the University of Antwerp and in other labs around the world has shown that this is the future potential of T-cell immunosequencing. In just a few years, it has become feasible and affordable to read-out the entirety of someone's T-cell immune repertoire. However, these procedures generate massive amounts of data, which are thusfar impossible to translate to relevant medical knowledge and actionable insights. No tools are so far on the market that solve this problem, despite the enormous potential of the experimental technology.

## ■ Technology

Within the scope of the AUDACIS (Antwerp Unit for Data Analysis and Computation in Immunology and Sequencing) consortium, we have been developing and refining data mining and machine learning models to process T-cell immunosequencing data during the past four years. We have shown in several recent papers (both published and unpublished) that these tools can accurately identify T-cells with specific functions. An example is the recognition of critical HIV epitopes. This knowledge can in turn be used to monitor an individual's immune status against a specific pathogen. In a recent study on cytomegalovirus seropositivity we have shown that this is possible with 87% accuracy. Currently, we have several trials ongoing to validate our methods in the context of vaccine development, disease monitoring and cancer immunotherapies. We are now in the process of developing a toolset and analysis framework for wider use and application within a commercial setting.

## ■ Partners we search for

At this stage we are in search of interested partners who have either invested in T-cell immunosequencing technology, or who consider doing so in the future. Our focus is primarily concentrated on the development of computational techniques and tools to aid in the exploration and interpretation of this new data type. This work builds upon our decade long expertise in establishing innovative computational solutions for the interpretation of large-scale biomolecular datasets.

## ■ About the researchers

The Antwerp Unit for Data Analysis and Computation in Immunology and Sequencing (AUDACIS) is a multidisciplinary and interfaculty consortium at the University of Antwerp that develops new immunoinformatics and immunosequencing techniques for biomedical research. Within AUDACIS, the Center for Medical Genetics manages RNA and DNA (immuno)sequencing. The Vaccine and Infectious Disease Institute (VAXINFECTIO) focuses on applications in vaccinology, infectious diseases, tumor immunology and auto-immunity. The ADREM Data Lab is internationally recognized in the study of advanced data processing and data mining approaches. A substantial fraction of ADREM works on biomedical data challenges under the umbrella of BIOMINA (Biomedical Informatics Network Antwerpen) in fields such as biomolecular data mining, personalized medicine and smart laboratory monitoring.

