Mabylon
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Harnessing the therapeutic potential of naturally occurring human antibodies

Swiss preclinical stage biotech company Mabylon is developing novel human-derived antibody therapeutics to treat allergies and neurological disorders.

Neurological disorders, according to the World Health Organization (WHO), affect around a billion people worldwide and the numbers are likely to increase as populations age. Peanut allergy affects up to 30 million people globally and is one of the major causes of potentially fatal food-induced anaphylaxis. Pollen allergies affect 10–30% of the global population with more than 300 million people suffering from asthma. Allergen avoidance is challenging, and desensitization therapies are lengthy, cumbersome, and associated with significant side effects and variable efficacy.

Mabylon's approach to these largely unmet medical needs is to harness the human body's ability to produce highly specific, biologically potent antibodies. Mabylon's antibody-based therapy offers immediate onset of protection against allergens and an excellent safety profile.

Founded in 2015 based on research by Adriano Aguzzi, board member and director of the Institute of Neuropathology at the University of Zurich, Mabylon is located in Schlieren, Switzerland.

"We have developed a powerful platform technology to rapidly identify and characterize naturally occurring human antibodies, and our current focus is on allergies and neurodegeneration," said Alcide Barberis, CEO.

Building antibody therapeutics

The human body tightly regulates the development of antibodies against self-targets to reduce the risk of autoimmune disease. However, some of these rare antibodies, which are present in the general population in one in 10,000 or 100,000 individuals, may have potential against a number of therapeutic targets. Mabylon has the capacity to screen up to 2,000 blood samples a day, using surplus blood from diagnostic procedures or samples from selected patient populations, to find antibodies that react to a panel of endogenous antigens (Fig. 1). Hits are correlated against encrypted clinical data—including diagnoses, family history and medication—to find novel targets and biomarkers. The fully human antibodies are identified and rapidly cloned using B cell screening technologies and antibody-expression platforms. The process takes two to three weeks from B cell screening to expressed monoclonal antibodies.

"Finding the best functional antibody is the challenge in this kind of research and development (R&D) approach. Our technology allows this to happen very efficiently," said Niccolò Pengo, CSO.

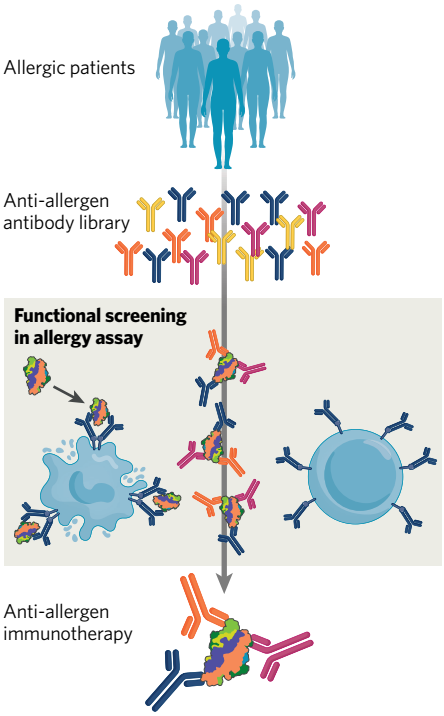

Fig. 1 | The development of anti-allergen immunotherapies. At the heart of Mabylon's discovery platform are the speed of its antibody discovery technology and the focus on functional assays for best antibody selection.

Focusing on allergies and neurodegeneration

"Our initial focus was on neurological disease, driven by Aguzzi's neurology expertise. Then, a family member of one of Mabylon's directors developed a peanut allergy and suffered from anaphylactic shock; this gave us a push into applying our technology to develop therapeutics for this potentially very dangerous disorder, for which there is a high and urgent medical need," said Barberis.

Mabylon is working on the two sides of its pipeline in parallel. The lead anti-peanut allergen monoclonal-antibody cocktail, MY006, was isolated from allergic patients. In vitro and in mouse models it blocked the allergic response to peanut allergens.

"We created a library of antibodies in a short time. We were also able to learn about the allergy process itself, and find out which antibodies were the most crucial," said Pengo.

As a next step, Mabylon created an MY006 multispecific-antibody construct combining the most important antibodies. This approach could also create a therapeutic targeting a number of different allergens, for example both peanuts and tree nuts.

MY006 is ready to move into investigational new drug (IND)-enabling studies in 2024. It has potential in providing year-round protection with regular three-monthly injections, or as a prophylactic for use in at-risk situations.

"We also believe that MY006 could be used in combination with active immunotherapy, by protecting against side effects. This would allow the dose of the active immunotherapy to be increased more quickly, making the treatment process—which involves repeated exposure to peanut proteins—safer, faster, less complex and more effective," said Pengo.

Antibodies for use in birch and grass pollen allergy are also in preclinical development, with lead identification planned for this year.

Regarding its neurological disease program, in October 2021 Mabylon and SciNeuro Pharmaceuticals signed an agreement to collaborate on multiple targets in serious neurological diseases. The lead product in the neurological program is its antibody to the TAR DNA binding protein-43 (TDP-43), which is in development in frontotemporal degeneration (FTD) and amyotrophic lateral sclerosis (ALS). The antibody was identified among the 0.04% TDP-43 reactive samples out of 60,000 patients screened. Mabylon is also developing antibodies for the potential treatment of neuroinflammation, with a development lead planned for 2024, and for Alzheimer's disease, expected to move into preclinical trials in 2024.

Building the business

Mabylon is financed by private investors and institutions and is seeking to broaden its investor base.

"Our business development strategy so far, set by our investors and board of directors, has been to seek opportunities for license and collaboration partnerships to take our product candidates into clinical development. While we plan to continue this, our investors are opening up to moving one program into clinical development on our own," said Barberis. "This will be MY006, our most advanced lead candidate."

CONTACT
Alcide Barberis, CEO
Mabylon
Schlieren, Switzerland
Email: barberis@mabylon.com