YUMAB GmbH
www.yumab.com

YUMAB: boosting anti-infective antibody and vaccine development

YUMAB, a global provider of fully human monoclonal antibody discovery and development, has relocated its headquarters to Germany's hotspot of infectious research and is advancing new opportunities for the expedited development of prophylactic and therapeutic antibodies and vaccines to fight infectious diseases.

Biotechnology company YUMAB, a global provider of fully human monoclonal antibody (mAb) discovery and development, has recently relocated its headquarters and research and development labs to Science Campus Braunschweig-South, Germany's infectious disease research hotspot. YUMAB is now colocated with the Helmholtz Centre of Infection Research (HZI), the Leibniz Institute-German Collection of Microorganisms and Cell Cultures (DSMZ) and the German Centre for Infection Research (DZIF): three world leaders in the fight against infectious diseases that provide an ideal environment for YUMAB to expand its global collaboration network in this space.

YUMAB's antibody platform enables the development of fully human antibodies, from the company's universal libraries (10^{11}) and from patient-derived libraries, against any type of antigen, even against full virus particles, bacterial and fungal cells. This approach delivers fully human mAbs with broad ranges of specificities and minimal immunogenicity that are ideal for the development of diagnostics and therapeutics.

"Recent conceptual and technological advances in mAb development could have an enormous impact on the field of infectious diseases, particularly in the context of emerging infectious disease (EID) outbreaks, in which the process of vaccine development for new pathogens may be difficult and prolonged," argued Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases, in a recent perspective in the *New England Journal of Medicine*[1]. "The rapid development and strategic deployment of effective, highly specific preventive and therapeutic interventions have the potential to alter the course of an epidemic."

Since the US Food and Drug Administration's 1998 approval of MedImmune's Synagis (palivizumab) for the prevention of respiratory syncytial virus infection in newborns, only four other anti-infective neutralizing mAbs have been approved: GlaxoSmithKline's Abthrax (raxibacumab) and Elusys' Anthim (obiltoxaximab), both for inhalational anthrax, in 2012 and 2016, respectively; Merck's Zinplava (bezlotoxumab) for *Clostridium difficile* infection in 2016; and TaiMed Biologics' Trogarzo (ibalizumab-uiyk) for HIV in 2018. But with the anti-infective mAb development pipeline now representing one of the most active areas in mAb development[2], YUMAB is poised to join the race to develop next-generation mAbs to fight infectious diseases.

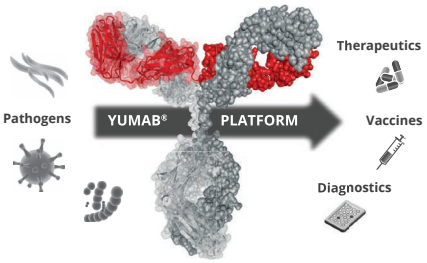

Fig. 1| Driving anti-infective mAbs with YUMAB's fully human mAb and target discovery and development platform.

The YUMAB edge in infectious disease

In the fight against pathogens, the adaptive immune system generates T cells and antibody-producing B cells that can provide lifelong immunity as a second line of defense if innate immune mechanisms fail. Prophylactic vaccination mimics an infection and achieves similar protection. However, immunization can fail owing to immunosuppression, lack of previous immunity, outbreaks of emerging pathogens or imperfect vaccine design, requiring other strategies to stop or prevent an infection.

mAbs offer the possibility to fight infections prophylactically and therapeutically, but pathogen variability, mutational resistance, multiple entry and pathogenic mechanisms challenge efficacy. Emerging strategies include the use of mAbs that target crucial pathogen epitopes, oligoclonal antibodies and antibody–drug conjugates, all of which require robust and rapid antibody development platforms.

YUMAB uses either its universal antibody libraries, which represent the entire natural human antibody repertoire, or immune libraries generated from infected or vaccinated patients for initial in vitro discovery. Bypassing animal immunization eliminates potential epitope preference by the host immune response, which can misguide antibody responses to non-neutralizing epitopes. Moreover, in vitro selection results in high success rates and can identify antibodies of broad specificity for better diagnostics, vaccines and drugs (**Fig. 1**).

Two YUMAB founders, Stefan Dübel and Michael Hust, have long track records in the development of neutralizing antibodies against HIV, Ebola, Venezuelan and Western equine encephalitis viruses, and bacterial toxins from *Clostridium botulinum* and *Bacillus anthracis*; protective antibodies against wild-type Marburg virus; and super-humanized antibodies against *Aspergillus fumigatus* and *Clostridium diphtheria* toxins.

The combination of deep expertise in infectious disease and an advanced fully human mAb discovery and development platform makes YUMAB an ideal partner to drive infectious disease programs from basic research to clinical translation. The fully human mAbs developed at YUMAB can be tailored to the specific needs of any kind of mAb development program, at any stage, and with the properties needed for novel prophylactic or therapeutic strategies against infectious diseases.

Partnering to fight infectious diseases

YUMAB is committed to accelerating the development of its customers' anti-infective mAb pipelines with its antibody discovery and lead optimization platform, which has already generated fully human therapeutic mAb lead candidates in other areas.

YUMAB's flexible and broad collaboration strategy maximizes the impact of its antibody technology and is well suited for the development of novel mAb-based solutions in the infectious disease space.

According to YUMAB's CEO, Thomas Schirrmann, "YUMAB's platform provides access to biological drug candidates that have evolved over millions of years of exposure to pathogens. We can rapidly develop advanced antibodies from patient libraries and identify novel immunogenic targets for vaccine development. With our relocation to one of the world's hotspots for infectious disease research, we can take these developments to the next level."

1. Marston, H. D., Paules, C. I. & Fauci, A. S. *N. Engl. J. Med.* **378**, 1469–1472 (2018).
2. GBI Research. *Industry Pipeline for Monoclonal Antibodies Encompasses Over 2,800 Programs, says GBI Research.* http://gbiresearch.com/media-center/press-releases/industry-pipeline-for-monoclonal-antibodies-encompasses-over-2800-programs-says-gbi-research (2017).

contact
Thomas Schirrmann, CEO
YUMAB GmbH
Braunschweig, Germany
Tel: +49 531 4811 700
Email: info@yumab.com