

# ADLib® SYSTEM TO SPEED GENERATION OF THERAPEUTIC ANTIBODIES

Besides breakthrough discoveries such as regenerative medicine using pluripotent stem cells, another discovery currently attracting a great deal of attention in medical circles is antibody drugs. These are drugs which use an organism's immune system to fight disease and, already, around thirty different antibody drugs have been approved around the world, including anti-rheumatic drugs and anti-cancer drugs. However, the downside of these antibody drugs is that it takes a long time to produce antibodies that are effective in treating disease and it is difficult to produce antibodies to some antigens. A completely new technique that will significantly shorten this development time and open up a new antibody market is about to be put into practical use by a Japanese bio-venture company. Takashi Sasaki reports.

Whenever we eat or breathe, unnecessary molecules enter our bodies, and it is the immune system that identifies harmful pathogens and suchlike from among these molecules and eliminates them. The battle between the immune system and non-self antigens is constantly being fought in many different living organisms, not just human beings and animals, and one of the key roles in this process is performed by antibodies.

Antibodies are proteins made in response to antigens, and they are found in large quantities in the bloodstream and body fluids.

When pathogens or other antigens enter the body, antibodies protect the body by attaching to them and dissolving them or detoxifying them. Put very simply, an antibody drug is medication that directly removes the cause of the disease by administering exogenously-generated antibodies to the patient.

Many of the drugs currently available are used as symptomatic treatments, relieving the symptoms of disease or taking away pain. There are also some drugs which attack specific target substances such as pathogens or cancer cells, but since they are artificially synthesized substances, there is a risk—depending on the constitution on the patient—that they will not work or may cause serious side effects. Antibody drugs, on the other hand, are substances naturally equipped in the body and act only on the specific antigen that is the cause of disease and are, therefore, believed to offer a radical cure as well as having few side effects.

Tokyo-based biotech-venture company Chiome Bioscience Inc. is focusing its efforts



Masa Fujiwara, D.V.M., President & CEO of Chiome Bioscience Inc.

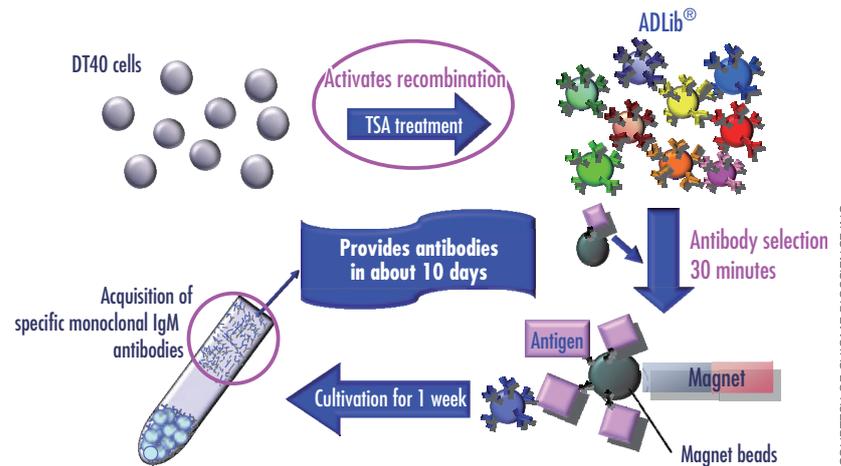
TAKASHI SASAKI

on a technique for creating antibodies known as the complete human ADLib® (Autonomously Diversifying Library) system. The ADLib® system was originally developed just over ten years ago by Kunihiro Ohta, a Unit Leader at RIKEN, Japan (now a professor at the University of Tokyo). The system can generate various antibodies by applying special chemical treatment to DT40 cells, a cultured cell line derived from chickens, to activate genetic recombination. Chiome Bioscience uses magnetic beads, fine magnetic particles that bond with specific antigens, to select specific antibodies that will react with pathogens, etc. from its libraries of diverse antibodies produced in this way. It also intends to generate antibodies that are effective in treating diseases in humans by cultivating these antibodies and converting a part of the antibody genes of chicken cells into human antibodies.

The main reason the ADLib® system—the first of its kind in the world—is attracting enormous interest is the speed with which it can generate antibodies. Whereas conventional techniques like the mouse-human hybridoma technique for generating antibodies in individual mice and other animals and the phage display technique that uses coliforms took anywhere between seven and sixteen weeks, all of a sudden it is now possible to shorten this period to around ten days.

Masa Fujiwara, president & CEO of Chiome Bioscience Inc., says that his first impression of the ADLib® system was, “If this technology becomes established, it could

### How antibodies are obtained with the ADLib® system



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revolutionize the world of medicine.” In the future, he adds, the ADLib® system could realize “the ultimate made-to-order medicine,” identifying the optimum antibody for an individual patient and then producing a safe effective antibody drug.” And given the ADLib® system’s ability to produce antibodies in a short space of time, it may even be able to prepare an effective drug before a particular disease becomes a pandemic.

One of the antibody drugs developed using the ADLib® system that is on the verge of clinical application is a treatment for systemic inflammatory response syndrome (sepsis). Sepsis is a type of infection in which bacteria multiply in the bloodstream. It is a disease that often occurs in premature babies and elderly people with a low resistance to illness and people who have undergone chemotherapy, and it affects tens of millions of people worldwide. Already, beneficial effect of the antibodies has been confirmed in animal studies and the antibodies could be available as a new drug in as little as four or five years from now.



*Takashi Sasaki is a freelance writer.*