

# Achievements in Human Monoclonal Antibody Discovery using Ecobody technology

VOL. 2



## Successfully obtaining human monoclonal antibodies with neutralizing activity against diverse SARS-CoV-2 variants

A research group led by Professor Yasuko Mori of the Division of Clinical Virology, Center for Infectious Diseases, Kobe University Graduate School of Medicine, recently published their findings in the *Journal of Virology* on the successful acquisition of universal neutralizing antibodies effective against various severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) variants, including Omicron BA.5. Neutralizing antibodies were obtained using our human monoclonal antibody discovery service.

We spoke with Professor Mori, who led the research, on the purpose of the study, the characteristics of the acquired neutralizing antibody, and the processes involved in obtaining it.

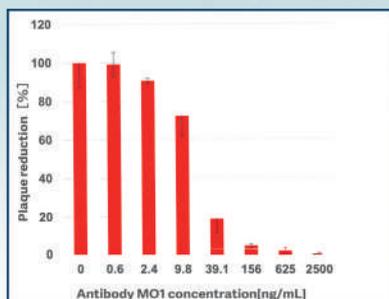


Figure 1: Analysis of the neutralizing activity of MO1 against Omicron BA.5

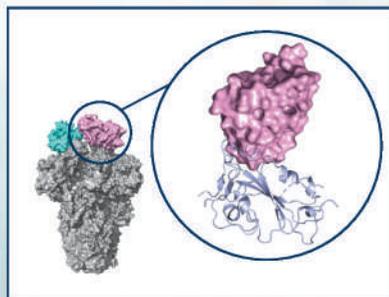


Figure 2: Three-dimensional structure of MO1 binding to the target spike protein

Figure 1: Plaque assay results showing that MO1 inhibits viral growth in a concentration-dependent manner. These data were provided by Professor Mori.

Figure 2: MO1 recognizes common sequence regions across various variants, including Omicron variants (D614G, Delta, BA.1, BA.1.1, BA.2, BA.2.75, BA.5). Analysis using purified binding target protein (RBD domain) showed binding affinities (Kd values) of 3.3 nM for BA.2 and 11 nM for BA.5. This figure was created based on public information from the Protein Data Bank (PDB ID: 8h3n).



## Can you tell us about the purpose of this study and the targets of the obtained antibodies?

Neutralizing antibodies present in the serum of individuals who have received the mRNA COVID-19 vaccine or have been infected with SARS-CoV-2 show neutralizing activity against both the Wuhan strain and various variants. Our study aimed to investigate the nature of these antibodies and to identify the common epitopes that they recognize. We targeted the S (spike) protein of the virus, which is necessary for viral entry, and sought to obtain neutralizing antibodies that could bind to it.



## Can you tell us about the characteristics of the antibodies you obtained and the significance of your research?

In this study, 10 monoclonal antibodies were obtained. Among them, the most useful antibody, “MO1”, demonstrated neutralizing activity against several variants, including the Wuhan strain, European strains, and Omicron variants BA.1, BA.2, and BA.5. The neutralizing potency of “MO1” was also very high. However, “MO1” did not show neutralizing activity against variants occurring after BA.5, such as BA.1 and XBB1. The significance of this study lies in proving that humans carry neutralizing antibodies that target variants up to BA.5.



Left: Shoji Ohuchi, CSO and CTO, iBody  
Right: Professor Yasuko Mori, Kobe University

## What is your impression of the Ecobody technology used to obtain antibodies?

Using Ecobody technology, we obtained 10 human monoclonal antibodies, one of which was a very powerful neutralizing antibody. We were surprised to find a high probability (one in ten) of obtaining a potent neutralizing antibody. The results were very good; therefore, we made a second request for antibody discovery, and we are already seeing good results with the antibodies obtained from this second project, although I cannot share the details at this moment.

## Can you share why you chose to use our service and your thoughts on your experience?

Speed was a priority for this antibody discovery project, and I appreciated the ability to speak directly with the technical staff at iBody. Quick and flexible responses were helpful. Consequently, valuable human monoclonal antibodies were obtained.

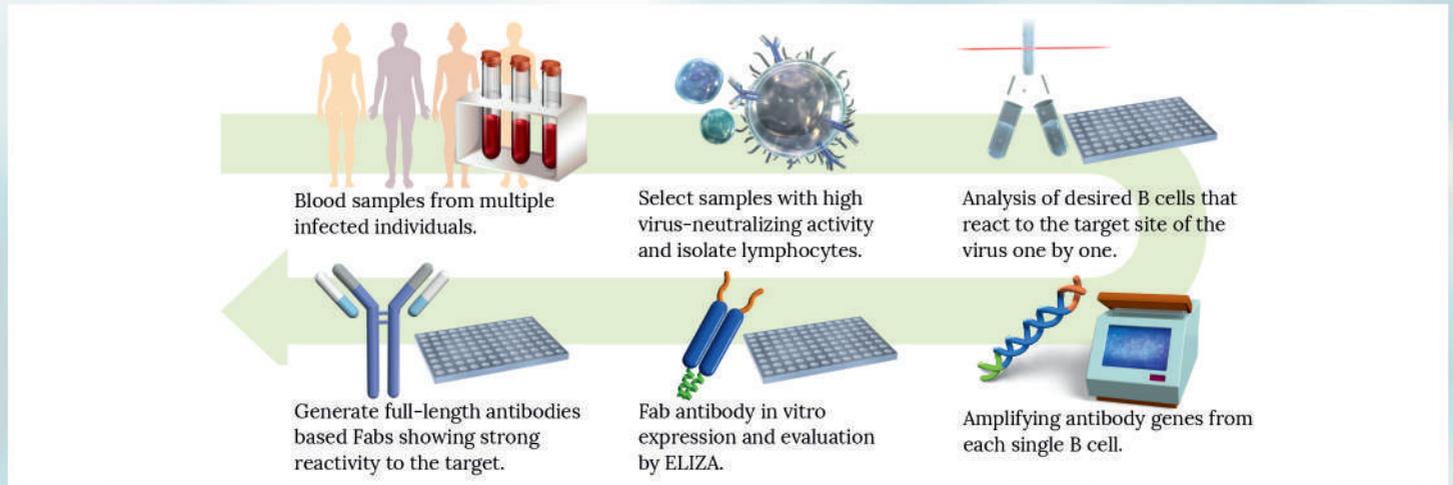


Figure 3 : Flow of Antibody discovery and evaluation

## About Ecobody Technology

iBody's proprietary technology efficiently discovers monoclonal antibodies using single-cell and cell-free antibody expression technologies (patented technology). This process involves amplifying antibody-encoding genes from individual B cells using single-cell reverse transcription polymerase chain reaction and expressing Fab antibodies in a cell-free system.

By conducting all steps in a cell-free environment, Ecobody technology enables the comprehensive and rapid discovery of the desired antibodies.

## ※In vitro antibody expression technology

In antibody expression using cell-free protein expression systems, there are challenges, such as insufficient expression levels and improper association of the expressed heavy and light chains.

Ecobody technology addresses these issues by adding an SKIK tag at the N-terminus to enhance expression levels, and a leucine zipper (LZ) tag at the C-terminus to promote the association of the H and L chains, enabling efficient production of Fab antibodies in vitro.

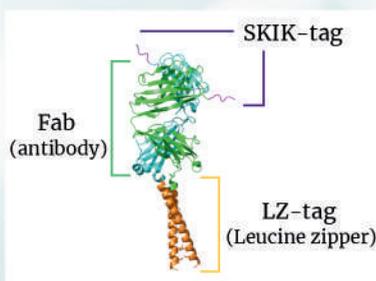


Figure 4: Patent information on the addition of SKIK and LZ tags to antibodies. This figure is based on public information from the Protein Data Bank (PDB ID: 6B9Y).

## Patent Information

Protein Expression Method (Japan Patent No. 6681625; U.S. Patent Number: 10975376; European patent No.EP3312278)

- Tagged antibody (Japan Patent No. 6744670)

For inquiries on monoclonal antibody generation, contact us.



<https://www.ibody.co.jp/en/>

Nagoya Life Science Incubator (NALIC) #417  
2-22-8, Chikusa, Chikusa-ku,  
Nagoya, 464-0858, Japan



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