Phage Display-Based Development of Diagnostically and Therapeutically Useful Human Antibody Medicines

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Phage display has been utilized for making recombinant antibody fragments (Fab or single chain Fv) of human, mouse, or other species origin. After construction of antibody combinatorial library, antigen-specific recombinant antibody fragments can be easily isolated by biopanning of phage library displaying antibody fragment as a fusion protein with coat protein III against antigen proteins, live cells or fixed cells. Using this technique, a variety of human recombinant antibody fragments can be retrieved from bone marrow cells, lymph node cells, or peripheral blood cells of patients with infectious diseases, autoimmune diseases, and cancer. To develop diagnostically and therapeutically useful human antibody medicines, we should do first is to select recombinant antibody fragments not only with antigen-binding activity but also with bioactivity such as virus- or toxin-neutralization, or tumor-specific cytotoxicity. To achieve this goal, several steps of antibody phage display may be improved; 1) larger size of library should be constructed for possible isolation of minor population in antibody repertoire, 2) biopanning procedure should be improved for isolation of antibody fragments reactive with immunologically minor epitopes on the antigen, 3) screening procedure should be based on the measurement of the bioactivity as well as the antigen binding activity, 4) if necessary, affinity and specificity of selected antibody fragment should be improved. In this presentation, I would like to discuss how to isolate clinically useful recombinant antibody fragments efficiently by phage display system introducing the results of our trials.