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An Improved Helper Phage System for Efficient Isolation of Specific Antibody Molecules in Phage Display

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ABSTRACT

Phage display technology has been applied in many fields of biological and medical sciences to study molecular interactions and especially in the generation of monoclonal antibodies of human origin. However, extremely low display level of antibody molecules on the surface of phage is an intrinsic problem of a phagemid-based display system resulting in low success rate of isolating specific binding molecules. We show here that display of single-chain antibody fragment (scFv) generated with pIGT3 phagemid can be increased dramatically by using a genetically modified Ex-phage. Ex-phage has a mutant pIII gene that produces a functional wild-type pIII in suppressing E. coli strains but does not make any pIII in non-suppressing E. coli strains. Packaging phagemids encoding antibody-pIII fusion in F+ non-suppressing E. coli strains with Ex-phage enhanced the display level of antibody fragments on the surfaces of recombinant phage particles resulting in an increase of antigen-bin!

ding reactivity more than 100 folds compared to packaging with M13KO7 helper phage. Thus, the Ex-phage and pIGT3 phagemid vector provide a system for the efficient enrichment of specific binding antibodies from a phage display library, and thereby, increases the chance of obtaining more diverse antibodies specific for target antigens