

“Super catalytic antibodies” cleaving targeted molecules of viruses and bacterium

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Abstract

It has been a long time-dream for many scientists to obtain a functional protein which can specifically recognize and furthermore enzymatically decompose the targeted antigens such as viral coat proteins or tumor associated proteins. At last, we have succeeded to produce such a novel functional protein referred as “Super catalytic antibody“. 1. “Super catalytic antibody“ destroying envelope gp41 molecule of HIV-1 The monoclonal antibody (41S-2 mAb) was raised against the sequence, which is highly conserved in env protein of many HIV-1 strains. The light chain (41S-2-L) degraded the gp41 derived-peptide (TPRGPDRPEGIEEEGGGERDRD) into amino acids with high catalytic activity ($k_{cat}/K_m=2.8 \times 10^5 M^{-1}min^{-1}$). Moreover, 41S-2-L completely destroyed the intact gp41 molecule within 16 hr, whereas it failed to decompose HSA and BSA under the same reaction condition, suggesting the high specificity to antigens. 2. “Super catalytic antibody“ destroying Helicobacter pylori urease We have established the mAbs by immunizing purified H.pylori urease (HpU-1~26). The catalytic activities of the light chain of HpU-2, 9, and 18 were investigated using the synthetic peptide SVELIDIGGNRRIFGFNALVDR (aa 183 to 204 of α -subunit of the urease) which is the epitope sequence of HpU-2. The light chains could degrade the epitope peptide as showing biphasic reaction profile. Moreover, it destroyed H.pylori urease but not BSA. 3. “Super catalytic antibody “destroying a conserved sequence of influenza virus A A mAb (HA1-2) was produced by the immunization of a synthetic peptide whose sequence corresponds to a conserved region of influenza virus A-1 and -2. The light chain displayed a catalytic activity cleaving the antigenic peptide of the influenza virus A within 100 hr, as showing biphasic reaction profile.