Antigenase: Antigen decomposing enzyme "Super catalytic antibody"

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Abstract

In 1998, we have succeeded to produce a promising functional molecule, "Super catalytic antibody" which could enzymatically and specifically destroy the targeted molecule, envelope gp41 molecule of HIV-1, with high catalytic efficiency (kcat/Km=2.8 x 105M-1min-1). The catalytic antibody was obtained by the immunization of a ground state molecule. We have already prepared several catalytic antibodies such as i41-7 (against the parent 41S-2 mAb), i41SL1-2 (against a CDR-1 peptide), HpU-9 (against Helicobacter pylori urease), ECL2B-2 (against chemokine receptor CCR-5 peptide). These light chains could enzymatically decompose the corresponding antigens with kcat/Km ranging from 10 4-105 M-1 min-1, which are comparable to that of trypsin. Most catalytic antibody light chains possess at least one catalytic triad composed of Asp, Ser and His in the structure, which functions as an active site of serine-protease. When the catalytic triad is not present, they do not show any catalytic activity. We investigated all sequences of the germlines of mouse _appa-light chains (93 germlines). Statistically, about 20% of the monoclonal antibodies are assumed to have the catalytic triad. Such antibodies are concentrated in discrete germlines such as cr1, bb1, bd2 and 19-25. This means that the antibody light chain based on such germline can inherently possess the ability to enzymatically cleave the antigen peptide or protein with high specificity to the antigen as an antibody. Namely, this antibody light chain can be referred as "Antigenase" (antigen decomposing enzyme).

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