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**Source**

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**Abstract**

Previously we established a series of catalytic antibodies (catAbs) capable of hydrolyzing DNA prepared by hybridoma technology. A group of these catAbs exhibited high reactivity and substrate specificity. To determine the molecular basis for these catAbs, we cloned, sequenced, and expressed the variable regions of this group of antibodies as functional F(ab) fragments. The nucleotide and deduced amino acid sequences of the expressed light chain (Vκ) germline gene assignments confidently belonged to germline family Vκ1A, gene bb1.1 and GenBank accession number EF672207 while heavy chain variable region V(H) genes belonged to V(H) 1/V(H) J558, gene V130.3 and GenBank accession number EF672221. A well-established expression system based on the pARA7 vector was examined for its ability to produce catalytically active antibodies. Recombinant F(ab) (rF(ab) ) fragments were purified and their hydrolyzing activity was analyzed against supercoiled pUC19 plasmid DNA (scDNA). The study of rF(ab) provides important information about the potential catalytic activities of antibodies whose structure allows us to understand their basis of catalysis. Molecular surface analysis and docking studies were performed on the molecular interactions between the antibodies and poly(dA9), poly(dG9), poly(dT9), and poly(dC9) oligomers. Surface analysis identified the important sequence motifs at the binding sites, and different effects exerted by arginine and tyrosine residues at different positions in the light and heavy chains. This study demonstrates the potential usefulness of the protein DNA surrogate in the investigation of the origin of anti-DNA antibodies. These studies may define important features of DNA catAbs.

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