High Resolution Data Collection for Crystals of a Recombinant Antigen-Binding Fragment Complexed with Single-stranded DNA

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Introduction: Anti-DNA antibodies have been implicated in autoimmune diseases such as systemic lupus erythematosus. High-resolution crystal structures of anti-DNA antibodies are important because they serve as templates for designing inhibitor molecules that could be potentially useful in treating lupus. Crystals of a recombinant antigen-binding fragment (Fab) complexed with dT₅ have been obtained and the structure has been determined using data collected at two NSLS beamlines.

Results: The crystals occupy space group P6₃22 with a=171.8 Å, c=144.6 Å, and there are two Fab per asymmetric unit. These crystals diffract to only 2.5 Å resolution using a rotating anode X-ray source, therefore, the high-resolution data that was needed could only be obtained at a synchrotron facility.

X-ray diffraction data were collected to 2.1 Å resolution from two crystals at beamlines X8C and X12B of the National Synchrotron Light Source at Brookhaven National Laboratory. A total of 68° of data were collected at the two beamlines using Quantum 4 CCD detectors with an oscillation angle of 0.25-0.5°, an exposure time of 10 minutes per degree of oscillation, a detector distance of either 200 mm or 220 mm and a detector offset angle of zero. The merged data set is 99% complete to 2.1 Å resolution, with an R$_{sym}$ on I of 0.079, <$I$/<sig(I)> of 19.3, and average multiplicity of 6.8. Phases have been determined using molecular replacement and the structure has been refined to R-work = 0.225 and R-free = 0.260.

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