Ligand Conformations in an Enzyme: A Study using Paramagnetic NMR Spectroscopy

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Poster presentation

Enzymes can stabilize substrate conformations that are close to the transition state of the catalyzed reaction. Paramagnetic tags [1] have become an integral part of NMR based structural biology, because restraints from paramagnetic NMR complement conventional NMR methods. Here, we investigate the possibilities to determine the conformation of a covalent sugar-like ligand bound to an enzyme using paramagnetic NMR information. With the CLaNP-5 lanthanoid tag [2] attached to the enzyme, we measured pseudo-contact shifts (PCS) and residual dipolar couplings (RDCs) for the enzyme and ligand nuclei. To evaluate the field-dependent parameters, measurements were done at three field strengths, 600 MHz, 850 MHz and 1200 MHz. From the PCSs on protein nuclei, we determined the susceptibility tensors associated with the paramagnetic tags. With these, the PCSs and RDCs of the ligand can be used to model its conformation. This approach offers a promising way for determination of the conformation of covalent adducts using solution NMR spectroscopy.

References

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