# Weak interactions in drug design and asymmetric catalysis

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Cooperative interactions, even if they are weak in nature, can lead to significant changes in reactivity. Our observations on C-H···π and P=O···H interactions in coordination chemistry led us to the design of metal complexes to probe the importance of weak interactions.

In the first instance, we probed the role of P=O···H-N interactions in metal-DNA complexes. Our rationale was based on the observations made by many that H-bond donors are important in breaking the DNA superstructure in metal based drugs. We hypothesised if H-bond donors are important, H-bond acceptors should also be capable of distorting the DNA-superstructure as the double helix critically depended on complementary hydrogen bonds in G-C and A-T pairs. Our results in this area based on metal based P(III) and P(IV)=O complexes would be presented.

A second example comes from our studies on asymmetric catalysis where a very small energy difference between the diastereoisomeric transition states is necessary for chirality induction. We decided to design complexes that have strategically placed H-bond donors and H-bond acceptors such that we could tune asymmetric induction. Our efforts in this area involved making new ligands with -OH and -OBn (Bn is benzyl) substitutents at strategic locations in a chiral ligand.