Oligonucleotide-mediated gene silencing has the potential to become a major therapeutic strategy. Clinical progress in this field has largely depended on advances in the chemistry of oligonucleotides: for example, the oligonucleotides early in clinical trials today are delivered at about 100 fold smaller doses than the chemistry of a decade ago, and yet show increased activity and specificity. We will describe several ways in which the chemistry of an oligonucleotide can influence its binding partners inside cells and thus its biological activity, focusing on results in triplet repeat disorders and asthma.

We will also discuss the development of a novel class of aptamer-polymer hybrids called AptaMIPs. Aptamers are nucleic acid species that bind targets with high affinity and specificity. By making a polymerisable aptamer, we have now been able to develop imprinted polymers with the outstanding binding properties of aptamers but the stability advantages of a polymer.