Aptasensors: detecting small molecules with a kiss.

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Aptamers are oligonucleotides identified through a combinatorial procedure from a pool of up to 10^{15} different randomly synthesized candidates. They generally exhibit high affinity and specificity for a pre-determined ligand thanks to their 3D shape, making them potential rivals of antibodies.

Besides developments in the perspective of therapeutic applications, aptamers receive increasing attention as bio- and nano-technological tools. Taking advantage of a previously published work we designed new sensors for the detection of analytes of interest.

Kissing complexes result from the interaction between two nucleic acid hairpins displaying complementary loops. We engineered hairpin aptamers in such a way that they switch from unfolded to folded conformations upon binding to their cognate ligand, hence the generic name "aptaswitch". The folded state is recognized by a short RNA hairpin termed "aptakiss" that engage loop-loop (kissing) interactions. We show that the aptaswich- aptakiss sensing complex allows the specific detection of adenosine or GTP by surface plasmon resonance thanks to a biochip-immobilized aptakiss. These analytes can also be detected in solution by fluorescence anisotropy. The potential of these biosensors will be described.

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