

## Molecular Beacons: novel design leads to higher specificity

An new way to create molecular beacons using non-nucleosidic building blocks enables a more specific hybridisation with a given nucleotide sequence and a cheaper and simpler synthesis without the need for expensive fluorophores and quenchers. Further, using this new type of probe, any desired nucleotide sequence can be detected, irrespective of its location on a gene.

**Keywords** Molecular beacon, Diagnostics, Excimer, Oligonucleotide Probes

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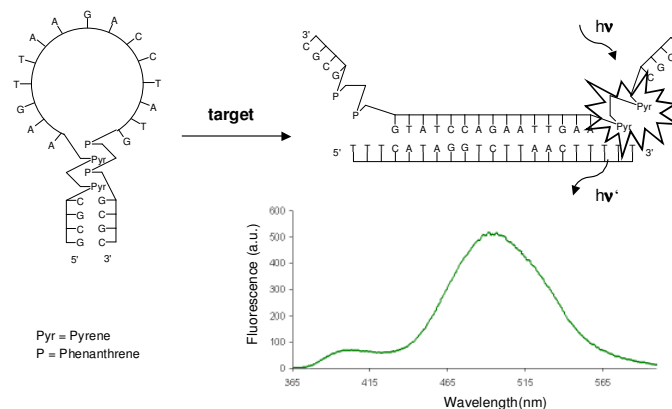
**Reference** in preparation

**Background** Molecular beacons (single stranded oligonucleotide hybridization probes that form a stem-and-loop structure) are widely used as detector probes in diagnostic assays. Usually, a fluorophore is linked to the end of one arm and a quencher molecule to the end of the second arm; when the molecular beacon hybridizes to a target sequence the quencher is separated from the fluorophore and a fluorescence signal is observed.

A serious problem of common molecular beacons is their unspecificity due to the cross-hybridization of the stem region, which is composed of natural nucleosides with sequences similar to the target.

**Invention** An entirely novel design of the stem region prevents the unspecific cross-hybridization of the usual nucleoside substitutes (poly-aromatic hydrocarbons) to their counterparts in the stem region. In addition, the excimer formation of the pyrene building blocks in the stem region take over the function of a fluorophore. The hybridization is monitored by the emission of a light signal which is stimulated by irradiation. As a further variation, the excimer formation can be inhibited by the presence of a polyaromatic hydrocarbon, such as phenanthrene or 1,10-phenanthroline (see Figure).

The use of the pyrene building blocks replaces the need of a fluorophore and a quencher and therefore simplifies the synthesis of the beacons.



**Applications** Use as probes as diagnostic markers in early diagnosis of genetic diseases, proof of parenthood, in forensic cases, for identification of SNP (single nucleotide polymorphism), as a research tool (e.g. in PCR)

**Patent Status** Patent application filed

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