



## SUPPORTING INNOVATION AND TECHNOLOGY TRANSFER IN ONCOLOGY

### SELKISS

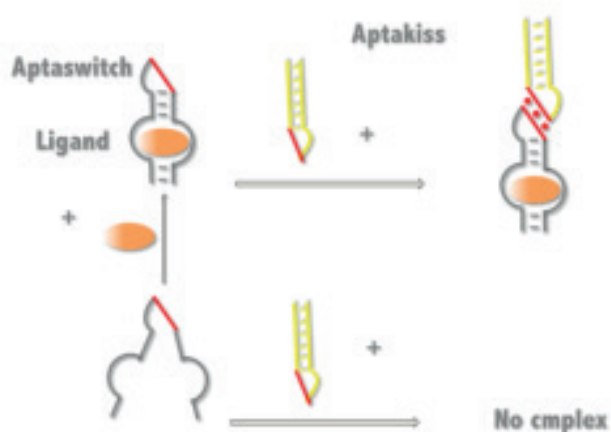
### SELECTION OF FUNCTIONAL APTAMERS AGAINST FREE MOLECULES IN SOLUTION FOR BIOSENSING



#### CONTEXT & BACKGROUND

Aptamers are oligonucleotides obtained by in vitro selection within randomly synthesized libraries of huge diversity (up to  $10^{15}$  different candidates). They can be raised against many different targets and exhibit strong binding affinity and exquisite specificity. Aptamers rival antibodies and are promising molecules for diagnostics and therapeutics.

**We developed a functional screening process -SELKISS- that takes advantage of a conformational change of the aptamer induced by binding to its target molecule.**



Durand G, Dausse E, Goux E, Fiore E, Peyrin E, Ravelet C, Toulmé J\*. Nucleic Acids Res. 2016 May 19;44(9):4450-9.

Durand G, Lisi S, Ravelet C, Dausse E, Peyrin E, Toulmé JJ\*. Angew Chem Int Ed Engl. 2014 Jul 1;53(27):6942-5.



#### INNOVATIVE COMPONENT & TECHNOLOGY

The aptamer raised against a given target molecule is engineered in such a way that it switches between an open and a closed conformation upon association to its target, hence its name aptaswitch. The closed conformation of the aptaswitch is recognized by an RNA hairpin termed aptakiss, that engages loop-loop interaction, so-called "kissing" interaction. The aptakiss does not bind to the open form of the aptaswitch (figure above). Therefore the formation of the aptaswitch-aptakiss complex signals the presence of the ligand both quantitatively and specifically. The ternary complex can be monitored by different methods (fluorescence, SPR, ...). In contrast to the regular SELEX technology, SELKISS provides key advantages: i) direct selection of functional aptamers, without further a posteriori engineering, ii) against a free target in solution. This results in a reduced selection time and cheaper procedure thus providing a competitive advantage and a significant added value.

#### SCOPE

Quantitative detection of biomarkers or drugs by aptamer-based biosensors.

#### KEYWORDS

Aptamer, biosensor, biomarker, diagnostic, companion test, pharmacokinetics



#### OBJECTIVES

Design of specific and sensitive biosensors for diagnostics, easy to adapt to point of care or to companion tests.



## DEVELOPMENT & MATURATION STAGE

Proof of concept established on model molecules. Present TRL level: 3. Validation being carried out with relevant targets in oncology. Expected TRL: 6



## TARGET POPULATION

Patients for which non invasive diagnostics is requested -and for which biomarker(s) is (are) available-.  
Monitoring of treatment efficiency.  
Treatments with narrow therapeutic index.  
Pharmacodynamic analysis.



## STRENGTHS & COMPETITIVE ADVANTAGES

- Technological advantages of aptamers over antibodies.
- SELKISS process with strong added value.
- Methodology for screening oligonucleotide libraries against free targets in solution.
- Functional screening leading to aptamers ready for biosensing.
- Easy identification of counterfeiting.
- Competitive cost-quality-processing time.
- Licensing of the SELKISS technology to Novpatech, a recently created start up by J.-J. Toulmé (CSO) and Marine FaussillonLaville (CEO).



## INDUSTRIAL APPLICATIONS & OPPORTUNITIES

Specific and sensitive biosensors for diagnostics, easy to adapt to point of care or to companion tests



## INTELLECTUAL PROPERTY & PATIENT CO-OWNER(S)

Patent filed: WO2015071385

On: November 13, 2014

Inventors : Jean-Jacques TOULME, Eric DAUSSE,

Guillaume DURAND, Eric PEYRIN, Corinne RAVELET

Co-owners: University of Bordeaux, Inserm, University Grenoble Alpes.