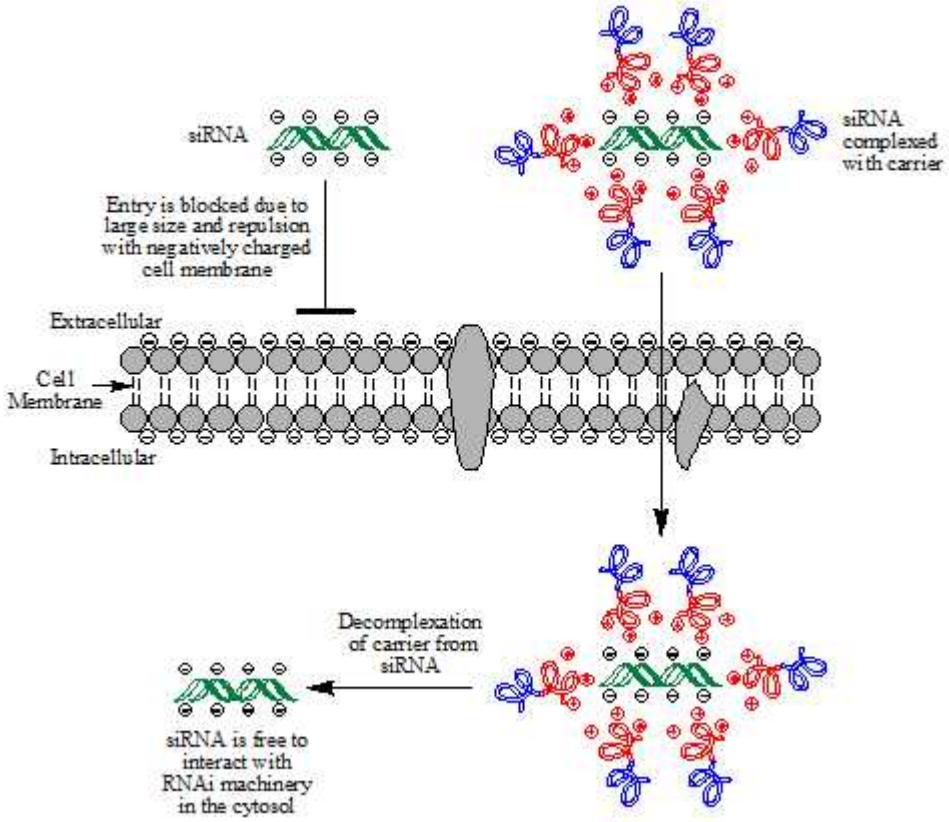
Docket #: S11-198

New co-oligomers for the non-covalent complexation, delivery, and release of siRNA and oligonucleotides

Researchers at Stanford University have designed, synthesized, and evaluated new classes of tunable, biodegradable co-oligomers that allow for the non-covalent complexation, delivery, and release of free functional siRNA and other oligonucleotides in cells and tissues. The co-oligomers are made in a single step without metal contamination and can be tuned to exhibit a variety of properties as needed for complexation, delivery and release. The speed of synthesis offers advantages in accessing optimal properties for siRNA complexation, delivery and release. These co-oligomers create complexes with nucleic acids, such as siRNA. The resulting complexes can be delivered across biological barriers, including the cell membrane to release functional siRNA inside the cell. The physical properties and performance of the co-oligomers can be tuned by varying the co-oligomer composition and length. The siRNA complexes can be further optimized by mixing two or more distinct co-oligomers. Initiation of oligomer formation can be done with targeting agents or optical probes. The co-oligomers are shelf stable but biodegrade, producing non-toxic byproducts. Up to 90% knockdown is observed in unoptimized experiments.



Applications

- **Therapeutic** - enables the delivery of therapeutic siRNAs and related oligonucleotides to treat cancer, HIV and other infections, and genetic diseases
- **Research tool** - to deliver siRNA and related oligonucleotides in model cellular systems or model organisms to elucidate pathways, targets and systems biology of cellular networks

Advantages

- **Simple** - synthesis of these co-oligomers is uniquely short (1-2 steps), facile, and metal free and can form non-convalent complexes of both modified or unmodified oligonucleotides
- **Saves time** - provides a fast means of finding desirable properties for cell uptake
- **Flexible** - allows co-oligomer and co-oligomer siRNA complex properties to be fine tuned

- **Biodegradable** - complexes are shelf stable but biodegrade releasing free siRNA in cells and non-toxic byproducts
- **Intracellular release** - method of degradation provides for release of cargo inside a cell
- **Targeted** - initiation can be done with targeting agents allowing for targeted delivery

Publications

- International Patent application, Serial No. PCT/US2012/053797

Patents

- Published Application: WO2013036532
- Published Application: 20140350077
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Innovators

- Paul Wender
- Robert Waymouth
- Christina Cooley
- Erika Geihe Stanzl

Licensing Contact

Chris Tagge

Technology Licensing Program Manager

Email