Programmable and Safe Cleavable Linkers for Targeted Drug Delivery (#8115)

Tailored, stable therapeutic technology that minimizes off-target effects

This innovative pyrrole-based linker technology enhances targeting, pharmacokinetic, and pharmacodynamic properties of drug molecules by allowing them to be easily attached to carriers or modifiers and released at predetermined rates. The linkage can be programmed to release its cargo in the bloodstream, from implantable materials, or only after being taken up into cells. In any formulation, cleavage can be set to occur over times ranging from minutes to weeks. A companion technology from this Georgia Tech research team uses substituted furans rather than pyrroles, which are generally regarded as metabolically unstable and therefore potentially toxic. These cleavable linkers, however, have been created using furan variants that resist such undesired side processes and off-target effects.

Benefits/Advantages

- **Versatile**: Provides an attachment for various types of drugs, including but not limited to small-molecule drugs, peptides, oligonucleotides, polynucleotides, peptides, and proteins
- **Low risk**: Uses molecular linkages that are nontoxic in both administered and metabolized forms
- **Targeted**: Allows for superior control of delivery and release rate to tissues and cells of interest

Potential Commercial Applications

The primary application for this technology is drug delivery, although a holistic commercialization strategy could include tailored synthesis and testing services for highly efficient targeting, solving key problems related to pharmacokinetics, biodistribution, and tailored exposure and residence times.

Background/Context for This Invention

The linkers at the core of this invention are not traceless, but they are uniquely tailorable with behavior (cleavage rate) independent of parameters that can vary widely between different patients and disease states. They are therefore ideal for applications in which the active agent can tolerate functionalization with a pyrrole or furan unit to allow for facile modification and release.

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More Information

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Publications

Azanorbornadienes as Thiol-Reactive Cleavable Linkers, Organic Letters, August 5, 2020

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/programmable-and-safe-cleavable-linkers-targeted-drug-delivery

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot