

21st Lecture on Molecular Engine

第21回発動分子科学セミナー

7th WRHI SatelliteLab Seminar

第7回WRHIサテライトラボセミナー

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“Rapid discovery, manufacturing, and delivery of bioactive proteins and antisense oligonucleotides”



Antisense oligonucleotides, proteins and other biopolymers serve as a foundation of modern therapeutics for the treatment of diseases ranging from cancer to diabetes. The discovery, manufacturing, and delivery of these biomolecules into cells is often a challenge and limits rapid translation to the clinic. Here I describe our latest findings on the development of a platform for discovery of peptide drug leads from 100 million-member synthetic libraries. Our best lead compounds efficiently disrupt cancer-specific protein-protein interactions in cells. We also aim to overcome the cytosolic delivery barrier with cell-penetrating peptides, chemical vectors that facilitate cellular permeation and nuclear targeting of antisense cargoes. The properties of these peptide-based materials were positively altered with macrocyclization chemistry, specifically by cysteine arylation. These modifications impart the ability to cross biological barriers, including the blood-brain barrier and plasma membrane, allowing the therapeutic biopolymers to strike their target and correct cellular function. We applied machine learning algorithms to our vast data set on cellular penetration and predicted novel peptide materials to transport into cells large oligonucleotides (6,500 Da) that may treat Duchenne muscular dystrophy. Manufacturing our new cell-penetrating drug leads and oligonucleotides is hindered by the rate at which we synthesize them, which is far slower than Nature’s production pace of seconds. Realizing this, we have built table top machines that use man-made chemistry to synthesize peptides in minutes and proteins in hours.

日時：2019年11月28日（木）

16:00～17:30

場所：B2棟 B223室

連絡先：上野 隆史（内線 5844）



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