$1^{st} PR^2$  seminar



2025 March 14<sup>th</sup>, 16:30-17:30 Shared Seminar Room 1, 1<sup>st</sup> Floor, Bldg. No. 1 https://www.infront.kyoto-u.ac.jp/en/access/

## Design of an Artificial Peptide Inspired by Transmembrane Mitochondrial Protein for Escorting Exogenous DNA into the Mitochondria



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## Abstract

Mitochondria are crucial for cellular function, but their own genome, mitochondrial DNA (mtDNA), often gets mutations, which lead to mitochondrial dysfunction and diseases. To recover the desperate condition by supplying genes, this study developed a peptide-based gene delivery carrier inspired by a mitochondrial transmembrane protein, mitoNEET. The nanoparticles direct the encapsulated genes to the mitochondria, enabling efficient uptake and expression. Delivery of exogenous mtDNA to mtDNA-depleted p0 cells restored multiple mitochondrial functions. This scalable approach holds promise for mitochondrial gene therapy and advanced genome-editing applications, offering a comprehensive breakthrough in treating mitochondrial dysfunction.

## Biography

Naoto Yoshinaga received his PhD in 2019 from The University of Tokyo, where he studied with Prof. Kazunori Kataoka and Prof. Cabral Horacio. He currently holds a dual position: a postdoctoral researcher at the Center for Sustainable Resource Science at RIKEN and a project assistant professor at the Institute for Advanced Bioscience at Keio University. His work focuses on developing nucleic acid delivery systems using functional peptides and polymers.

Host: Koichiro Maki (maki@infront.kyoto-u.ac.jp)

This seminar is supported by KAKENHI (JP719233300010) and is associated with the 49<sup>th</sup> Biomechanics Seminar.