

## 理学国際教育研究センター 研究セミナー

### **Exercise and mitochondria invigorating peptides as dual interventions for sarcopenia**

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専門分野: ケミカルバイオロジー、ペプチド化学

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場所: 中百舌鳥キャンパス A13 棟 3 階 323 室

事前参加申し込みは不要です。

会場まで直接お越しください。



Sarcopenia is generally accompanied with gradual loss of muscle mass, strength and function. Thus, the disease greatly impacts on old people's quality of life by reducing ability to perform daily tasks and increasing incidents of frailty, falls and fractures. Physical activity and healthy diet are only treatment options, since there is no FDA-approved medication. Mitochondrial dysfunction is linked to sarcopenia, resulting from cardiolipin (CL)-induced disruption of cristae structure in the inner mitochondrial membrane (IMM); therefore, preserving cristae and preventing CL remodeling offer effective strategies to maintain mitochondrial function. To identify reactive oxygen species (ROS)-blocking agents against mitochondrial dysfunction, a library of cyclohexylamine-containing cell-penetrating  $\alpha$ -helical amphipathic "bundle" peptides were screened. Among these, CMP3029 is selectively bound to abnormal mitochondria, preserving the cristae structure impaired by mitochondria-damaging agents. With a stronger affinity for CL compared with other IMM lipid components, CMP3029 exhibited high selectivity. Consequently, it protected cristae, reduced ROS production, and enhanced ATP generation.<sup>1</sup> Using an old mouse model of sarcopenia, the exercise-peptide dual-modality treatment showed dramatic improvement of exercise capacity, overwhelming its athletic ability than young mice control, especially in time exhaustion test using treadmill. Results highlight the peptide intervention as the first pharmacological agent for sarcopenia.

#### <Reference>

Shin et al., *J. Med. Chem.* **2024**, 67, 3385-3399.

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