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Therapeutic Applications of Mitochondrial Autophagy

【Keywords】

mitochondria	autophagy	mitophagy	muscle	aging

■Summary

Mitochondrial autophagy (mitophagy) maintains mitochondrial quality and quantity through autophagic degradation of abnormal or excess mitochondria. Activation of mitophagy will prevent aging-associated mitochondrial dysfunction. Also, suppression of mitophagy will delay certain pathological processes in which mitophagy degrades mitochondria excessively (Fig. 1). Thus, our laboratory aims to develop therapeutic technology to induce or inhibit mitophagy.

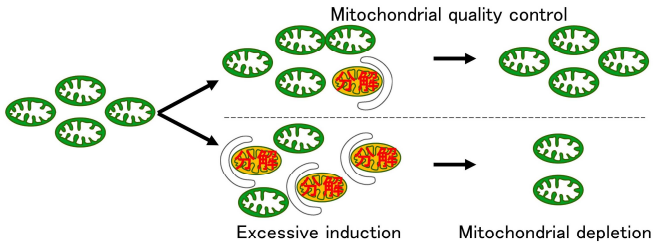

Fig 1. Physiological effect of mitophagy

■Subject Details/Topic

- We have identified compounds that can induce mitophagy by high-throughput screening, some of which were confirmed to be effective in animals
- We have identified the molecular targets to suppress mitophagy

○Advantages

- Development of monitoring system for mitophagy in various cells and organisms (Fig. 3).
- Establishment of high-throughput screening (HTS) system for mitophagy in mammalian cells
- Identification of mitophagy inducers by using this HTS system (Fig. 2).
- Advantages in the study of mitophagy regarding molecular mechanism and physiological functions.

○Applications

- Delay of aging. Rejuvenation. Treatment and prevention of aging-associated diseases.
- Prevention of muscle atrophy (prevention of frailty).
- Improvement of prognosis of cardiac diseases.

○Future prospects

- Verification of anti-aging effects of our identified mitophagy inducers.
- Development of method to suppress mitophagy and verification of its preventive effect on muscle atrophy.

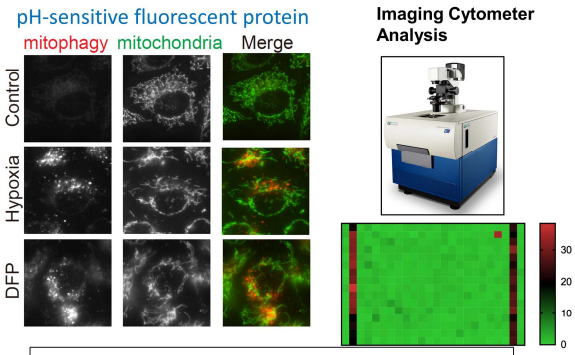

Fig 2. High-throughput screening system for mitophagy

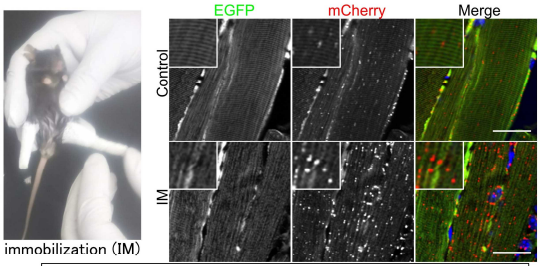

Fig 3. Observation of mitophagy induced during skeletal muscle disuse atrophy by mitophagy monitoring mice.

■We hope to collaborate with…

Drug discovery for skeletal muscle atrophy, cardiac disease, and aging-related diseases

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