Bio technology

Efficient intracellular mitochondrial delivery method (RevMiT method)

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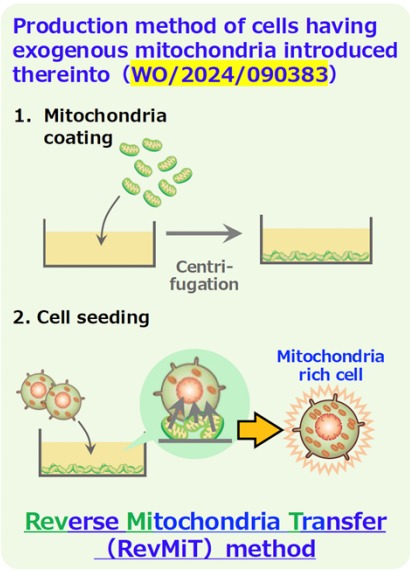
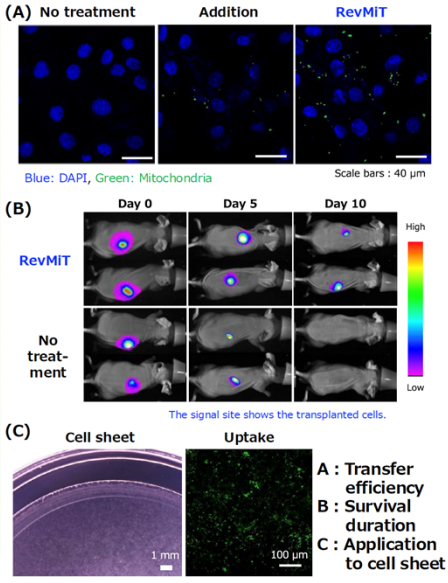
Purpose of Research

In recent years, it has been reported that introducing mitochondria into cells can enhance cellular functions. Therefore, introducing mitochondria into therapeutic cells used in cell-based therapies is expected to improve both cellular function and therapeutic efficacy. However, an efficient and reliable method for mitochondrial delivery into cells has yet to be established. In this study, we developed an efficient method for intracellular mitochondrial delivery and investigated its potential application in cell therapy.

Summary of Research

In this study, we developed a novel technique for efficient intracellular mitochondrial delivery by seeding cells onto culture plates coated with mitochondria—termed the **Reverse Mitochondria Transfer (RevMiT) method**. When cells were seeded onto the mitochondria-coated plates, mitochondria were effectively delivered into the cells. Cells treated with RevMiT exhibited enhanced proliferative capacity and increased ATP production, as well as improved survival after subcutaneous transplantation into mice. These findings suggest that intracellular mitochondrial delivery via RevMiT may serve as a valuable strategy to enhance the efficacy of cell-based therapies.





Comparison with Conventional or Competitive Technologies

- High efficiency of mitochondrial transfer
- High safety
- Simple operation

Expected Applications

- Cells for cell-based therapies
- Smart cells for bioproduction

Challenges in Implementation

- Improvement of production efficiency
- Safety assessment
- Establishment of a manufacturing environment and fundraising

What We Expect from Companies

- Establishment of manufacturing technology for mitochondria-coated plates
- Joint development of a GMP-compliant manufacturing environment
- Support for non-clinical and clinical trials
- Financial support, investment, or joint funding for commercialization
- Identification of market needs

Points

- Efficient intracellular delivery of mitochondria
- Enhanced cellular proliferation and ATP production
- Improved cell survival after transplantation
- Increased therapeutic efficacy

Future Developments

April 2026: Patent granted, publication in academic journals, and technology transfer
April 2028: Commercial launch of mitochondria-coated culture plates
April 2030: Clinical trials of cell-based therapeutics using mitochondria-coated culture plates

■Grant: JSPS Grant-in-Aid for Scientific Research (B)(2023-2025)
■Award: 3rd Cell Sheet Engineering Innovation Forum Poster Encouragement Award
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■Status :Proof-of-Concept Model Available

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