

# WHITE PAPER 002

## Transient Modulation of Cellular Gene Expression Using iPSC-Derived Exosomes Loaded with OSK mRNA

### Public Summary Edition

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### Executive Summary

Advances in regenerative biology, extracellular vesicles, and messenger RNA technologies have created new opportunities for exploring cellular resilience and healthy aging.

This white paper outlines a research platform under development at Next Aevolux Laboratories that combines iPSC-derived exosomes, transient OSK mRNA expression, and advanced delivery technologies for scientific investigation of cellular function and epigenetic regulation.

The concepts described herein are intended for research and technology evaluation purposes only.

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### Background

Aging is associated with gradual changes in cellular function, stress response pathways, and epigenetic regulation.

Recent scientific studies suggest that transient activation of selected reprogramming-associated transcription factors may influence biological pathways associated with cellular resilience and tissue maintenance.

At the same time, extracellular vesicles and exosomes have emerged as promising biological delivery vehicles due to their natural biocompatibility and signaling properties.

These developments provide a foundation for exploring next-generation delivery systems for regenerative biology research.

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# Technology Platform Concept

The proposed platform integrates three research areas:

## 1. Exosome Engineering

Development of advanced extracellular vesicle platforms derived from induced pluripotent stem cells (iPSCs).

Research focuses include:

- Exosome production and characterization
  - Cargo loading technologies
  - Biological compatibility
  - Scalable manufacturing approaches
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## 2. Transient OSK mRNA Delivery

Investigation of transient expression systems utilizing messenger RNA encoding selected reprogramming-associated transcription factors.

Research objectives include:

- Controlled gene expression
  - Cellular response evaluation
  - Epigenetic pathway analysis
  - Safety-oriented platform design
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## 3. Advanced Hybrid Delivery Systems

Exploration of hybrid delivery technologies combining biological vesicles and nanotechnology-based carriers.

Research areas include:

- Enhanced intracellular delivery
- Improved cargo protection
- Targeted transport strategies

- Future translational applications
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## Potential Research Applications

The platform may support future research in areas including:

- Cellular resilience
- Healthy aging biology
- Regenerative biology
- Extracellular vesicle science
- Advanced delivery technologies
- Computational biology and AI-assisted discovery

The platform is intended as a research tool for scientific investigation and technology development.

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## Future Directions

Next Aevolux Laboratories continues to explore innovative approaches at the intersection of:

- Regenerative Biology
- Exosome Engineering
- Advanced Delivery Systems
- Cellular Resilience Research
- Artificial Intelligence-Driven Scientific Innovation

Future work may include laboratory validation, platform optimization, analytical characterization, and collaborative research initiatives.

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## Confidentiality Notice

This document is a public summary edition.

Certain experimental methodologies, technical parameters, manufacturing processes, analytical data, and proprietary platform details have been intentionally omitted or generalized to protect ongoing research, intellectual property, and future technology development.

Additional technical information may be available through research collaboration discussions with Next Aevolux Laboratories.

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## **Disclaimer**

This document is intended for scientific, educational, and informational purposes only.

The information presented does not constitute medical advice and should not be interpreted as claims regarding the diagnosis, treatment, cure, prevention, or mitigation of any disease.

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