

# Regenerative medicine

## Development of Meniscus Regeneration Therapy Using Human Umbilical Cord Tissue-Derived Mesenchymal Stem Cells and Atelocollagen Meniscus Regeneration Material

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### Project Outline

Knee meniscus injuries and dysfunction are seen in a wide range of age groups, including young people with sports injuries and middle-aged and elderly people with joint degeneration, causing pain and joint movement dysfunction, and are a significant factor in the development of knee osteoarthritis, which leads to a decline in physical activity and healthy life expectancy. In cases where surgery is indicated, resection is currently the most common treatment (76% in Japan, 94% in the U.S.), and novel medical treatments for functional recovery have been sought worldwide in recent years.

In this research project, we aim to develop a novel regenerative medicine for the meniscus by transplanting a three-dimensional composite of a high-strength atelocollagen crescent regeneration inducing material, which has been shown to be useful in human clinical studies, and mesenchymal stem cells isolated and cultured from cord tissue, which is highly available due to the existence of a human tissue bank, into the damaged area of the meniscus. The aim of the project is to develop a novel regenerative medicine for meniscus using autologous and allogeneic cells.

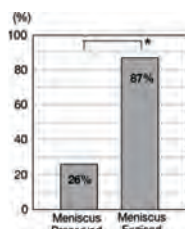


Fairbank T. J. *JBJS* 1948  
Tapper E. M. et al. *JBJS* 1969  
Henning C. E. et al. *Clin Sports Med* 1985



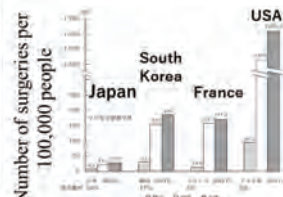
The "meniscal pathway" to osteoarthritis

Englund M. et al. *Nat Rev Rheumatol*. 2012



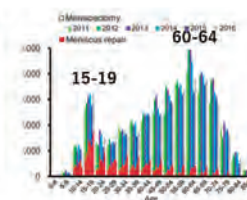
Occurrence of secondary knee OA after meniscectomy

Nakata K et al., *Arthroscopy* 2010



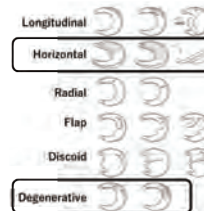
The number of meniscus surgeries in Japan is small compared to other countries

Nakata K et al., *Seikei · Saigaikeka* 2021



Age of surgical patients is bimodal, with resection more common in mature age

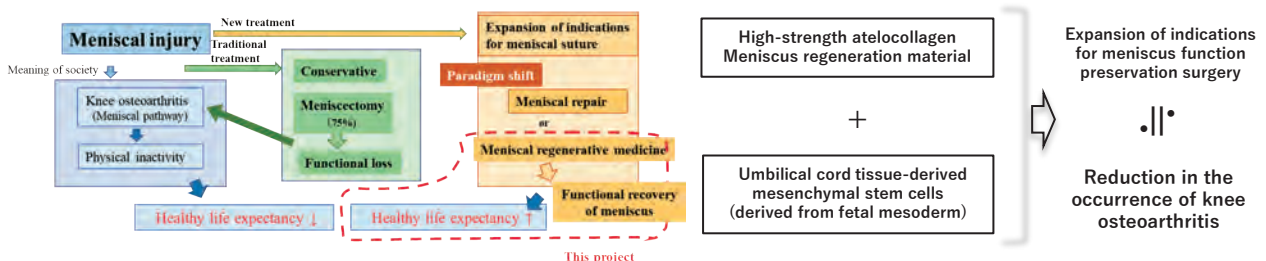
Kawata M et al., *PLOS ONE* 2018



Horizontal and degenerative tears are less likely to be eligible for preservation surgery

Nakata K et al., *Kansetsugeka* 2017

1. Standard treatment (meniscectomy) results in a high incidence of secondary knee osteoarthritis.
2. The rate of meniscus-preserving surgery should be increased to reduce the incidence of secondary knee OA.



Target Disease: Damaged meniscus with large defects or strong degeneration not amenable to conventional function-sparing surgery.

Patent information: Patent Application 2022-118591 (filed July 26, 2022).

Technology Features: Utilization of a composite of high-strength atelocollagen meniscus regeneration material that has been shown to be useful in clinical trials and umbilical cord tissue-derived mesenchymal stem cells that are highly available due to human tissue bank.

Marketability/developmental issues: Large-scale animal studies are required before clinical application.