PRIMA
Advanced Materials Moving Forward

A **SUCCESS** STORY

A PLLA VASCULAR SCAFFOLD COATED WITH STEM CELL-DERIVED NANOVESICLES FOR **CRITICAL LIMB ISCHEMIA**

A research group led by Prof. Rosaire Mongrain of McGill University, in collaboration with Prof. Jeong-Kee Yoon's group at Chung-Ang University (Korea), partnered with two companies: Seido Photonics, a division of Aurios Medical Canada, which specializes in the development of high-precision laser machining systems for the manufacture of biological substrates, and Dotter Inc., a Korean company specializing in the development of advanced medical devices for the cardiovascular field. Together, they sought to design, develop, and evaluate a bioresorbable vascular system involving a stent made of PLLA (poly-L-lactic acid). This stent is characterized by bio-ink, which contains nanovesicles coated on its surface, allowing the system to regenerate vascular tissue affected by critical limb ischemia (lack of blood supply) while simultaneously supporting the vessel wall.

This collaborative Quebec-Korea project led to the development of experimental and numerical methods to help study nanoparticle pharmacokinetics while optimizing stent design methods in an effort to improve medical treatments. The results obtained in the laboratory and preclinical models have been very promising.

On the technological front, the project led to the development of innovative processes that provide better control over diffusion properties in vascular tissues and drug release while improving the adhesion and integrity of stent coatings. These processes could be adapted to other tissues and medical applications. A numerical model was also developed to simulate and optimize the performance of the drug-eluting stent, which will likely be adopted by the Korean industrial partner. Prototypes could potentially be manufactured in Quebec, thanks to the local industry's expertise.

From an economic standpoint, the project has already helped the Quebec company secure a new sale in a related field as it continues to anticipate additional medium- and long-term commercial benefits.

This decade-long collaboration between the Quebec and Korean companies helped them leverage their shared results while creating new links between their university research groups, both of which share similar themes. Prof. Mongrain's group (McGill) benefited from Korean expertise in the manufacture of polymeric stents and nanovesicle coatings while providing its own design-related skills. This collaboration is expected to persist with a new project that is currently under development.

> ***The Seido Photonics division of Aurios Medical Canada was delighted to be part of this collaborative project led by Prof. Mongrain at McGill. The project helped to grow our partnerships in Korea as also gave us greater exposure to the research community in Quebec and Korea. These collaborations are ongoing and expanding thanks to this PRIMA Korea-Quebec call. We are very excited about the scientific outcomes and also feel the results will be an important marketing tool for us in the future.***
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> - **Andrew Burns**,
> COO, de Seido Photonics, division de Aurios Medical Canada

SECTORS
Health

APPLICATIONS
Vascular scaffold

TRL
Start 5, End 7

DURATION
36 months (2021-2024)

McGill Seido AM DOTTER