

April 5, 2019

The Jikei University School of Medicine
Meiji University
Bios Co., Ltd.
PorMedTec Co., Ltd.
Sumitomo Dainippon Pharma Co., Ltd.

Five Partners Commence Joint R&D on Renal Regenerative Medicine

The following five partners, The Jikei University School of Medicine (Minato-ku, Tokyo), Meiji University (Chiyoda-ku, Tokyo), Bios Co., Ltd. (Taito-ku, Tokyo), PorMedTec Co., Ltd. (Kawasaki City, Kanagawa Pref.) and Sumitomo Dainippon Pharma Co., Ltd. (Chuo-ku, Osaka) announced today that they have started collaborative efforts including joint research and development with the goal of developing renal regenerative medicine using the iPS cell-based organogenic niche method and to achieve its commercialization in the 2020s.

The organogenic niche method is a differentiation-inducing method built upon the findings of the research conducted by Prof. Takashi Yokoo et al. (Division of Nephrology and Hypertension, Department of Internal Medicine, The Jikei University School of Medicine). In this method, the site where an embryonic organ develops in an animal's early fetus (organogenic niche) is injected with progenitor cells of the target organ from another animal to induce development of the target organ.

The renal regeneration method proposed here is intended to regenerate a functional kidney in the organogenic niche in the following way: Human iPS cell-based differentiation-induced nephron progenitor cells^{*1} are injected into a renal anlagen^{*2}, which is collected from the early fetus of a genetically engineered pig bred specifically for application to human renal regenerative medicine. This engineered pig is based on the research conducted by Director/Prof. Hiroshi Nagashima et al. (Meiji University International Institute for Bio-Resource Research).

As a regenerative medicine biotech company, Bios and PorMedTec were established to respectively develop and apply the technologies required for the organogenic niche method and genetically engineered pigs. Sumitomo Dainippon Pharma is responsible for commercializing any renal regenerative medicine developed in cooperation with its four other partners.

The following sets out the steps in the organogenic niche method that the five partners will work on:

1. Nephron progenitor cells are differentiation-induced from human iPS cells.
2. Nephron progenitor cells are injected into a renal anlagen with the bladder of a genetically engineered pig embryo.
3. The renal anlagen with the bladder injected with nephron progenitor cells is transplanted into the patient to initiate the early organ development program.
4. Urinary tract surgery is performed in the patient who has undergone renal anlagen transplantation to facilitate its development into a functional kidney.

According to the July 2018 data published by the International Society of Nephrology (ISN), the number of patients requiring kidney transplantation and similar procedures was estimated to be 5.3 million to 10.5 million worldwide. In addition, according to the January 2019 data published by the Japan Society for Transplantation, 1,750 kidney transplants were performed in 2017, as against a total of approx. 12,500 patients who had applied to undergo this procedure. Thus, there are many patients who are looking forward to benefiting from renal regenerative medicine given the current obstacles, such as the lack of donor organs and high medical expenses.

The goal of the five partners is to contribute to improved healthcare through the development and application of renal regenerative medicine in the clinical setting and providing it to patients in need of kidney transplantation.

The primary development roles are distributed among the partners as follows:

| Main area | Responsible organization |
|---|---|
| Basic research on the clinical application of renal regenerative medicine using the organogenic niche method; the development of techniques for transplanting a renal anlagen with the bladder* | The Jikei University School of Medicine, Bios and Sumitomo Dainippon Pharma |
| Development of genetically engineered pigs for human renal regenerative medicine | PorMedTec and Meiji University, Sumitomo Dainippon Pharma |

*: Development of transplantation technology will be implemented with the cooperation of Prof. Eiji Kobayashi et al. (Department of Organ Fabrication, Keio University School of Medicine).

Representatives of the organizations involved are as follows:

| Organization | Representative |
|---|--|
| The Jikei University School of Medicine | Prof. Takashi Yokoo, Division of Nephrology and Hypertension, Department of Internal Medicine |
| Meiji University | Director/Prof. Hiroshi Nagashima, Meiji University International Institute for Bio-Resource Research |
| Bios | Akio Hayashi, Representative Director and President |
| PorMedTec | Akira Morooka, President & CEO |
| Sumitomo Dainippon Pharma | Toru Kimura, Member, Board of Directors, Senior Executive Officer; Regenerative & Cellular Medicine Office |

Reference Information:

*1 Nephron progenitor cell: A type of renal progenitor cell that functions as the kidney “bud”, with the potential to differentiate into the constituents of the kidney, such as the glomerulus, proximal tubule, and distal tubule.

*2 Renal anlagen: A fetal kidney, corresponding to the metanephros in a mammal. When a renal anlagen is transplanted into the lower abdomen of a host animal, the blood vessels of the host animal begin infiltrating the renal anlagen, thereby maintaining its growth and helping urine and hormones, such as erythropoietin, to be produced, functioning in the way that a normal kidney does.

- The Jikei University School of Medicine
TEL: +81-3-3433-1111 (extension number 3220)

- Bios Co., Ltd. person in charge: Mr. Fujishiro
TEL: +81-3-3837-0810

- PorMedTec Co., Ltd. person in charge: Mr. Morooka
TEL: +81-44-387-3345 (website: <https://p.porimedtec.com/>)
E-mail: a.morooka@porimedtec.com

- Corporate Communications, Sumitomo Dainippon Pharma Co., Ltd.
TEL: +81-6-6203-1407 (Osaka), +81-3-5159-3300 (Tokyo)