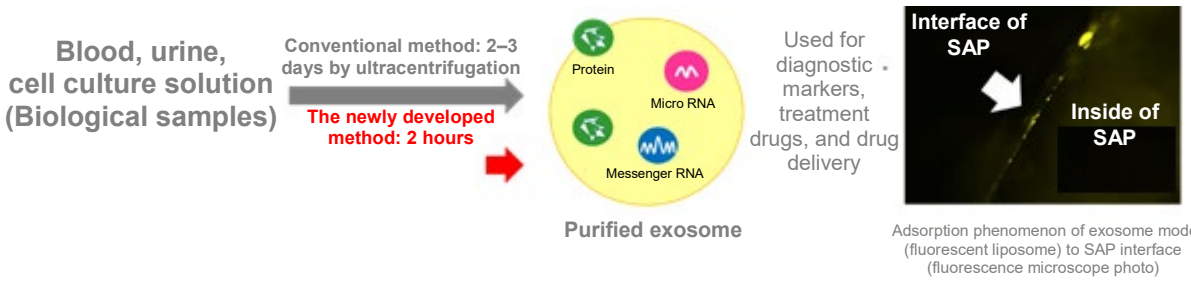
January, 24th. 2022

Tokushima University
Sanyo Chemical Industries, Ltd.

# Development of an exosome purification method using a Superabsorbent Polymer
# Recruitment of co-creation partner companies for practical application

The research group of Associate Professor Tatsuya Tominaga of Bioanalytical Technology, Tokushima University Graduate School of Biomedical Sciences and Professor Koichi Ute of Chemical Science and Technology, Tokushima University Graduate School of Advanced Technology and Science, and Sanyo Chemical Industries, Ltd. (hereafter Sanyo Chemical) have developed a purification method to recover exosomes[*1] with high accuracy and yield using a superabsorbent polymer (SAP).
Through this technology, the research group of Tokushima university and Sanyo Chemical aim to contribute toward prevention of diseases and extension of healthy life expectancy. We will recruit co-creation partner companies for business development to realize early social implementation.



Adsorption phenomenon of exosome model (fluorescent liposome) to SAP interface (fluorescence microscope photo)

[Background of the study]

Exosomes are small particles secreted from cells. They are biological substances that transmit various types of information between cells. They have attracted attention in recent years as they can be used for the diagnosis and treatment of diseases. However, there are challenges with the recovery and purification methods used in industrial applications.

Currently, exosomes are primarily purified via ultracentrifugation[*2] and polymer precipitation[*3]. However, exosomes obtained by these purification methods are low in purity and contain many impurities. In addition, an appropriate separation method is lacking for other purification methods; their operations are complicated, recovery time is long, or process is expensive.

[Outline of technology]

The research group of Tokushima university identified a method to specifically separate exosomes by incorporating impurities into an SAP and adsorbing exosomes to the surface of the SAP when processing samples such as urine.

The SAP is a hydrophilic polymer with a cross-linking structure that absorbs and retains water at several hundred to thousand times its own weight, swells rapidly, and becomes a gel. In the separation method using the SAP, the mesh size and surface adsorption of the cross-linked SAP substantially affect the separation accuracy. Since the beginning of the world's first commercial production of SAPs in 1978, Sanyo Chemical has developed high-value-added SAPs according to various needs and has accumulated various relevant expertise. A purification method suitable for the recovery and purification of exosomes was successfully established by combining the basic concept and evaluation technology of the research group of Tokushima

and the knowledge regarding the design and manufacture of SAPs by Sanyo Chemical.

This purification method is characterized by the ability to recover and purify a large amount of highly pure exosomes in a relatively short time compared to the conventional purification method. With this purification method, the highly pure exosomes can be used readily. This will not only lead to early diagnosis of various diseases and determination of treatment strategies but is also expected to cause innovation in drug discovery and development.

We are considering accelerating the practical application of this new purification method through cooperation with partner companies and contributing to disease prevention and extension of healthy life expectancy.

< Reference >

*1 Exosome

It is a membrane vesicle approximately 50–150 nm in diameter that is secreted from most cells. As transportation of exosomes to other cells causes functional and physiological changes, their use in diagnostic and regenerative medicine applications are being developed.

*2 Ultracentrifugation purification

It is a method to collect fractions of exosomes by centrifugation and is the standard method used in many medical studies. Although much research has been conducted, there are challenges in industrial applications, such as need for large equipment, and it takes time to separate and purify a single sample. Therefore, a rapid and simple method is required.

*3 Polymer precipitation

This method uses polymers to precipitate and purify exosomes. This method is inexpensive and simple. However, precipitates generally contain a large amount of impurities, and applications for diagnosis and treatment are considered difficult.

＜Press Contacts＞

Tokushima University

Research Administration and Collaboration Planning Division

+81-88-615-2392

kssankik@tokushima-u.ac.jp

Sanyo Chemical Industries, Ltd.

PR Department:

pr-group@sanyo-chemical.group