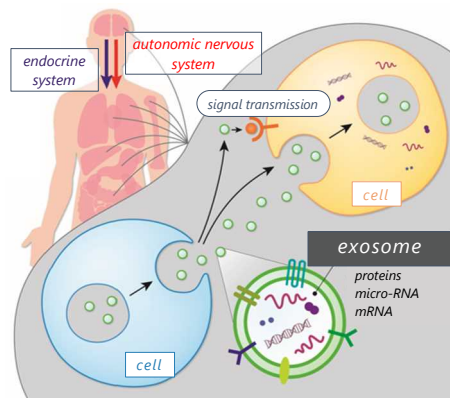


Interpreting mental states through exosomes

Progress until FY2022

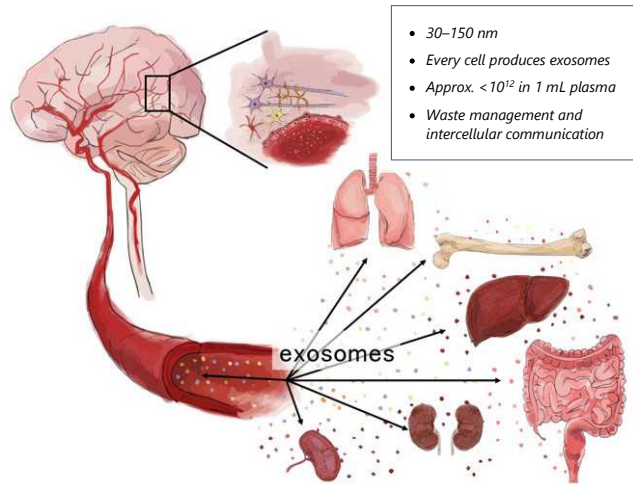
1. Outline of the project

In R&D Theme 2, we develop **technologies to evaluate our mental states through exosomes in our body fluid**. Information of mental states will be provided to Jizai-hon-yaku-ki system, and used to optimize the quality of communication aids.



The endocrine and autonomic nerve systems link our physical and mental states. Exosomes are believed to play an additional role in this body–mind relationship.

Our body fluid (like saliva and blood) contains small particles, **exosomes**, produced in cells of various organs. One of their functions is to manage metabolic waste. But they also have another interesting role — intercellular communication. Increasing attention has been paid to this function of exosomes, as they might work as biomarkers of bodily and neurodegenerative diseases.



Illustrative summary of exosomes

Source: https://www.rcast.u-tokyo.ac.jp/ja/research/people/staff-hoshino_ayuko.html

It is pointed out that the uptake of exosomes into the brain is connected to (changes in) the state of the brain. However, **little is known about the relationship between one’s exosomes and mental state**.

Here, our R&D Theme 2 aims to unravel the interactions of the brain and other organs mediated by exosomes through biochemical examinations and AI-based data analysis.

2. Outcome so far

1. Found the difference in exosomes between ASD and non-ASD people;
2. Suggested the possibility of evaluating the rehabilitation effect of ASD people by exosomes.

Outcome 1: We compared the size, number, and characteristics of exosomes taken from two groups of participants: those diagnosed with autism spectrum disorders (ASD) and those with typical development. We found that **ASD participants are likely to have**

- larger-sized exosomes;
- more exosomes in their blood plasma;
- exosomes with less amount of proteins

than non-ASD participants.

Outcome 2: Through proteomic analysis of exosome proteins, it was suggested that **exosome could be used for the evaluation of the effect of rehabilitation in ASD people**.

So far, we are conducting experiments to unravel the interactions of the brain and other organs mediated by exosomes, primarily focusing on developmental conditions like ASD.

3. Future plans

Our R&D Theme 2 will further investigate the interactions of brain and other organs mediated by exosomes. We have started **the analysis of exosomes from rodents that suffered from social stress**, which will unravel how negative experiences are reflected in one’s exosomes.

We also plan to combine these findings with our R&D Theme 1 (neurophysiology) to offer a multi-dimensional interpretation of one’s mental state.

(Tokyo U: A. Hoshino, Nasiri Kenari)