

# Functional and Causal Role of Sleep on Memory Consolidation in Human

## Project Leader

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## 1. Objective

### This project is aimed at:

Uncovering the functional and causal role of sleep for consolidating our memory is crucial to understand how we memorize facts and events in our daily life. We are studying the neuronal basis for memory processing using various techniques such as functional magnetic resonance imaging (fMRI), psychophysics, and electrophysiology in both humans and non-human primates (see References below). In this project, we will be focusing on human brain-wide network dynamics during sleep for memory consolidation. By combining high-field MRI and other techniques such as EEG, tCS, and TMS, we aim to clarify the functional/causal role of sleep for how we memorize facts/events.

## 2. Project Outline

### To that end, the project will consist of the following phases:

- (a) Development of high spatiotemporal measurement of brain-wide neuronal activity in humans.
- (b) Analysis of brain activation during nap/sleep for memory consolidation.
- (c) Causal effect of brain stimulation during nap/sleep on memory consolidation.

## 3. Expected Performance

### In this project, the successful candidate would be expected to:

- (a) publish two or more research papers by the end of 3-year PhD course.
- (b) develop the ability to conduct research independently.
- (c) work as a teaching or research assistant.

## 4. Required Skills and Knowledge

### The successful candidate for this project will have the following knowledge and skills:

- (a) Good communication and writing skills in English.
- (b) Strong research background in neuroscience, or related areas.
- (c) Familiarity with Matlab, statistical methods and programming skills is a plus.

## References:

1. Keeratitivattayut *et al.* eLIFE. 2018 (DOI: 10.7554/eLife.32696)
2. Sarabi *et al.* PLOS one. 2018 (DOI: 10.1371/journal.pone.0196866)
3. Nakahara *et al.* Nature communications. 2016; 7: article number 11827.
4. Takeda *et al.* Neuron. 2015; 86: 840-852.
5. Matsui *et al.* Nature Methods. 2007; 4: 161-168.

**See our webpage:**

<https://www.kochi-tech.ac.jp/english/research/organization/center05.html>

<https://sites.google.com/view/nakahara-lab/home>

<https://researchmap.jp/nhk>

<https://researchmap.jp/takeda.masaki/?lang=english>

**See our admission guidelines:**

[https://www.kochi-tech.ac.jp/english/admission/ssp\\_aft19oct/ssp\\_application\\_guideline.html](https://www.kochi-tech.ac.jp/english/admission/ssp_aft19oct/ssp_application_guideline.html)

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