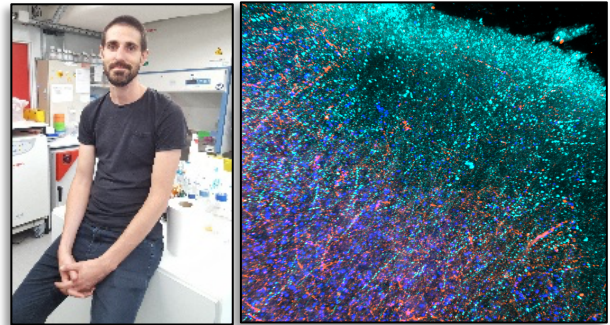


# 82th Engineering in Medicine and Biology Seminar

## Speaker

### Raphael Gaudin, PhD

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**Date:** Oct 24<sup>th</sup> 2025 (Fri)

**Time:** 10:00AM~11:30AM

**Location:** Institute of Industrial Science, The University of Tokyo  
As Building Room 311, 4-6-1, Komaba,  
Meguro-ku, Tokyo

## Physiological regulation of synaptic activity and perturbation by viruses

### Abstract

The synapse is a key structure allowing the transfer of information from neuron to neuron, underlying all brain functions. The remodelling of synaptic structures allows the integration of new information, an indispensable feature to code for complex processes, such as neurocognition and learning. This plasticity can be physiologically regulated by biological cues, such as extracellular vesicles (EVs) and conversely, neurotropic virus infections can perturb synaptic composition and function, potentially leading to neurocognitive disorders. During the talk, I will present new data about the characterization of brain-derived EVs and their role in regulating the electrical activity of human brain explants. Then, I will exemplify how viruses can alter synaptic plasticity and highlight innovative strategies to mitigate the consequences of brain infections. Our work uses a combination of advanced 3D culture models (stem cell derived cerebral organoids and organotypic culture of human cortex), microfluidics, live imaging, proteomic-based drug discovery, and machine learning frameworks, that will be described along the presentation.

### Recent selected articles from the Gaudin lab

1. [Iwasaki Y et al.](#), Organotypic culture of post-mortem adult human brain explants exhibits synaptic plasticity. *Brain Stimulation*. 2024 Aug.
2. [Brychka D et al.](#), Targeting monocytic Occludin impairs transendothelial migration and HIV neuroinvasion. *EMBO Reports*, 2024 July.
3. [Partiot E et al.](#), Brain exposure to SARS-CoV-2 virions perturbs synaptic homeostasis. *Nature Microbiology*. 2024 Apr.
4. [Partiot E, Gorda B, et al.](#), Organotypic culture of human brain explants as a preclinical model for AI-driven antiviral studies. *EMBO Molecular Medicine*. 2024 Mar. Journal's cover.



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