TITRE : Curved protein-mediated membrane reshaping

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Ce stage peut être poursuivi en thèse : OUI

Si oui, la thèse est-elle financée : NON

SUJET du stage :

It is vital for cells to generate transport vesicles inside the cells via a process called **endocytosis**. These vesicles allow cells to transport nutrients or proteins to different organelles to fulfill specific cellular functions. To generate these vesicles, mechanistically, a small patch of a membrane is deformed into a spherical bud. This bud is connected to the donor membrane via a narrow tubular neck. To generate a vesicle, the neck is cut to detach the bud from the donor membrane (Fig. 1A). A rich set of cell biology studies have shown that many proteins are involved in the process of generating transport vesicles in cells. Here, we are interested to understand how a **curved membrane protein called sorting nexin 9** (SNX9) contributes to vesicle generation. On the plasma membrane, SNX9 has been shown to be recruited to the membrane neck (Fig. 1A). Furthermore, a recent cell biology study suggested that SNX9 can constrict the membrane neck. However, there is no direct evidence supporting this hypothesis.

In this project, we aim to reveal **physical mechanisms** underlying SNX9-mediated membrane remodeling by using **biophysical methods** and in a quantitative manner. We will establish a **cell-free system** using purified SNX9 and artificial model membranes. To generate membrane geometry like that of the cellular tubular neck, we will pull **membrane nanotubes from giant membrane vesicles using optical tweezers** (Fig. 1B). We will measure **forces** applied by SNX9 on the tubes using optical tweezers and we will correlate tube radius and SNX9 density on the tube using confocal laser scanning microscopy.

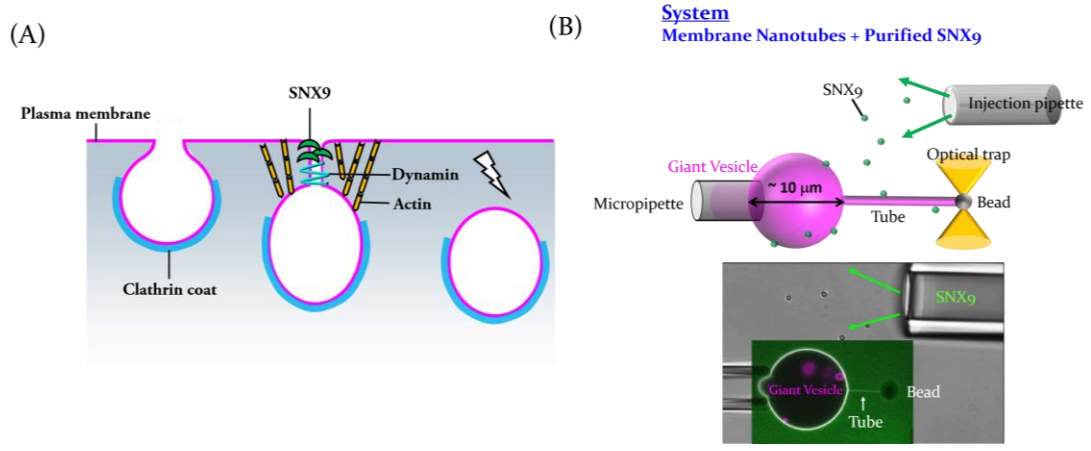

Figure 1. (A) SNX9 is involved in vesicle generation on the plasms membrane in endocytosis. (B) Schematic of the experimental system. The green signal is from SNX9 and the purple signal is from the vesicle.