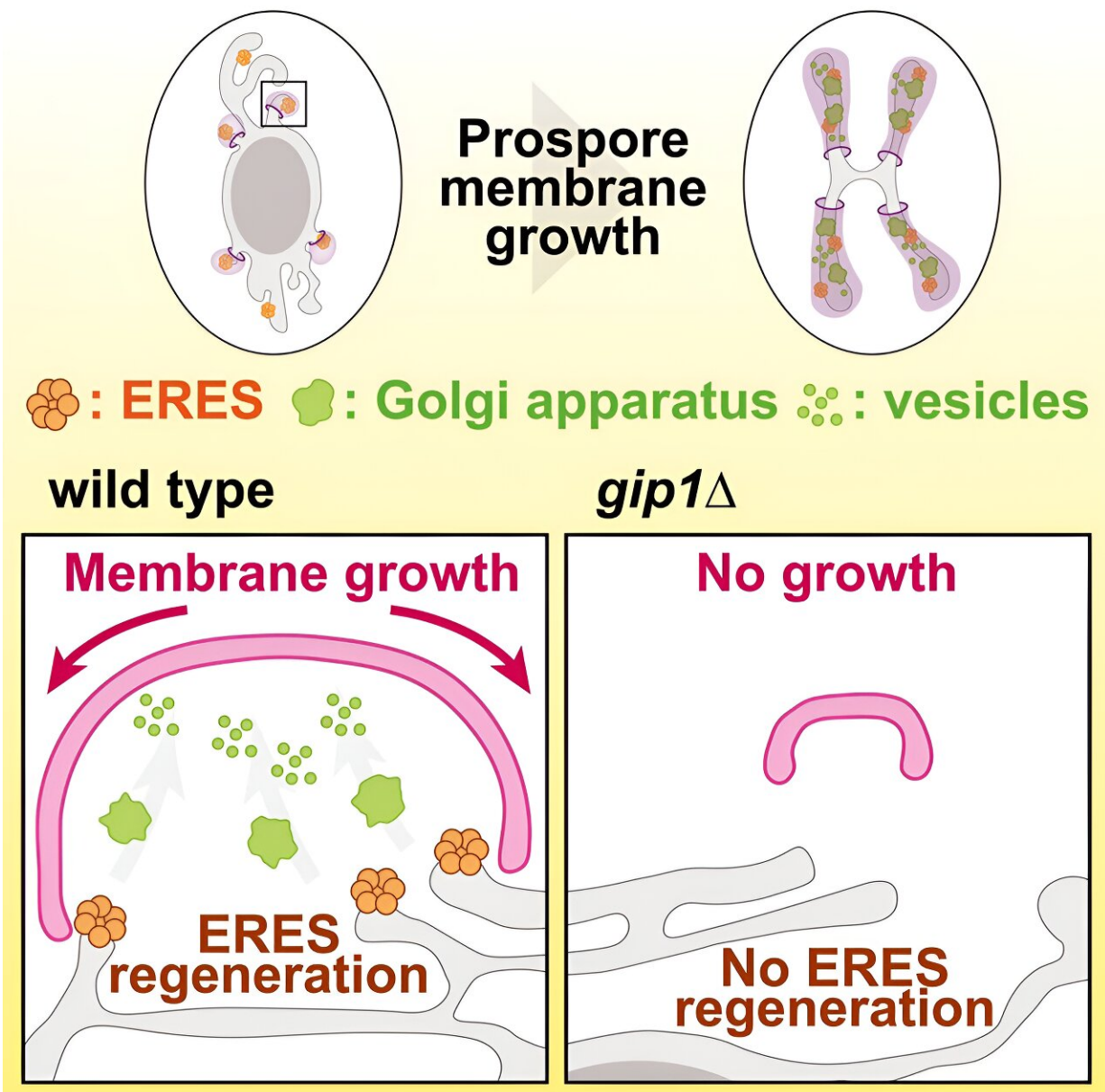


Elucidating the mechanism underlying de novo membrane formation during gametogenesis

September 11 2024



Credit: *iScience* (2024). DOI: 10.1016/j.isci.2024.110855.
[https://www.cell.com/iscience/fulltext/S2589-0042\(24\)02080-7](https://www.cell.com/iscience/fulltext/S2589-0042(24)02080-7)

Researchers at University of Tsukuba have meticulously examined the gametogenesis of budding yeast, a process involving meiosis and spore formation, using live imaging techniques. Their findings reveal that during sporulation, the endoplasmic reticulum exit sites, which represent the starting points of the secretory pathway, are remodeled. This remodeling enables cells to efficiently transport proteins and membrane lipids, facilitating the formation of nascent spore membranes.

A paper describing their research is [published](#) in the journal *iScience*.

Sexual reproduction, a common mode of reproduction among numerous species, involves gametogenesis in which offspring are produced through fertilization, conjugation, or mating.

In plants and animals, eggs and sperm differentiate from [germ cells](#) to form gametes. However, in budding yeast, spores are produced within diploid cells. During this process, de novo membrane structures form within the cytosol, encapsulating the meiotic haploid nuclei to produce spores.

Despite having this knowledge, researchers do not clearly understand the precise mechanism underlying the formation of these nascent membrane structures.

To gain insights into this process, researchers at the University of Tsukuba used live imaging techniques to meticulously observe [meiosis](#)

and sporulation in budding yeast, capturing the development of nascent membrane structures within cells.

They observed that although the [endoplasmic reticulum](#) (ER) exit sites and Golgi apparatus declined in numbers, they reassembled during sporulation. Furthermore, they identified Gip1, a meiosis-specific subunit of type 1 protein phosphatase, as a key molecule affecting this regulatory mechanism.

In Gip1-deficient cells, the [secretory pathway](#) could not be precisely located due to the defects in regenerating ER exit sites, resulting in the formation of abnormal spore plasma membranes. This finding suggests that cells efficiently transport membrane lipids and produce new cell membranes by reorganizing membrane traffic pathways during sporulation.

The results of this research have significant implications for human health, as numerous diseases related to gametogenesis and fertilization are caused by abnormalities in intracellular membrane traffic.

These findings can potentially enhance the current understanding, diagnosis, and treatment of related pathogenic mechanisms.

More information: Yasuyuki Suda et al, Remodeling of the secretory pathway is coordinated with de novo membrane formation in budding yeast gametogenesis, *iScience* (2024). [DOI: 10.1016/j.isci.2024.110855](https://doi.org/10.1016/j.isci.2024.110855). [www.cell.com/iscience/fulltext ... 2589-0042\(24\)02080-7](https://www.cell.com/iscience/fulltext...2589-0042(24)02080-7)

Provided by University of Tsukuba

Citation: Elucidating the mechanism underlying de novo membrane formation during

gametogenesis (2024, September 11) retrieved 11 September 2024 from
<https://phys.org/news/2024-09-elucidating-mechanism-underlying-de-novo.html>

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