



# Endocytosis and stress: From mechanisms to cellular physiology

Sébastien Léon

## ► To cite this version:

Sébastien Léon. Endocytosis and stress: From mechanisms to cellular physiology: Editorial. *Biology of the Cell*, 2021, 113 (11), pp.439-440. 10.1111/boc.202100072 . hal-03843268

**HAL Id: hal-03843268**

**<https://hal.science/hal-03843268>**

Submitted on 22 Nov 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## Editorial: Endocytosis and stress. From mechanisms to cellular physiology.

**Sébastien Léon.** Université de Paris, CNRS, Institut Jacques Monod, Paris, France

This issue presents a series of articles and reviews on the theme "Endocytosis and stress". The purpose of this issue was to cover various aspects of the functions of endocytosis, but also in a variety of model organisms to highlight how this conserved process has been exploited throughout evolution.

A series of reviews highlight connections between endocytosis and the properties of the extracellular environment, including signaling molecules, nutrient availability, or biophysical constraints, as well as the importance of endocytosis in cellular function, adaptation, and pathologies. The plethora of cellular functions regulated by endocytosis is well discussed by Giangreco et al. (1) who provide a series of examples illustrating the various functions of endocytic proteins in cellular physiology, and the pathologies derived from their malfunction. This includes the role of adaptor proteins in clathrin-mediated endocytosis (CME) and non-clathrin-mediated endocytosis (NCE), how this regulates signaling pathways, and the links with tumorigenesis. Two reviews then detail the connections between endocytosis and the regulation of signaling pathways. Wu, Chiang et al. (2) focus on the mechanisms by which Wnt signaling, a key pathway in development and morphogenesis in animals, is regulated by endocytosis and endosomal trafficking. They notably highlight work in *C. elegans* on the involvement in Wnt signaling and stress response. Seib & Klein (3) then discuss the role of endocytosis in the activation of Notch signaling. They mention the importance of endocytosis in generating pulling forces leading to Notch cleavage, a crucial step in Notch pathway activation, but also additional functions in the recycling of Notch ligands.

The interplay between membrane tension and clathrin-mediated endocytosis is carefully reviewed by Djakbarova et al. (4). The importance of membrane tension in physiological processes such as cell division, migration, or spreading is also underscored. In their monograph, the authors detail how membrane tension is established, regulated and how this regulates clathrin-mediated endocytosis.

Two additional reviews focus on the regulation of nutrient transporters by endocytosis. Ivanov and Vert (5) describe the exquisite molecular mechanisms by which metal transporters are regulated in plants and emphasize similarities and differences with other model systems. Kahlhofer et al. (6) focus on the regulation of nutrient transporter endocytosis by metabolism, and the importance of arrestin-related proteins in this process in fungal and animal cells. Both reviews highlight the importance of endocytosis in response to nutrient challenges.

This issue also includes several research articles. Foissner et al. (7) describe the effect of the drug Brefeldin A on endocytosis in the fascinating green algae *Chara australis*. The role of Brefeldin A on the endocytosis and polar distribution of the *Arabidopsis* borate exporter BOR1 is examined by Yoshinari et al. (8), who show a role for the ARF-GEF GNOM1 in this process. Buelto et al. (9) study the mechanism of endocytosis in glucose-starved *Saccharomyces cerevisiae* and demonstrate a role for the trans-Golgi network and clathrin adaptors in the endocytosis of nutrient transporters under these conditions. Finally, the article by Robinson et al. (10) describes the trafficking of the yeast glycerophosphoinositol transporter Git1 and how its endocytosis via the arrestin-like proteins Aly1/2 impacts on sphingolipids homeostasis.

I thank all the authors for their contributions and the numerous reviewers for their time and critical evaluation of these manuscripts.

### References

1. G. Giangreco, M. G. Malabarba, S. Sigismund, Specialised endocytic proteins regulate diverse internalisation mechanisms and signalling outputs in physiology and cancer. *Biology of the cell* **113**, 165-182 (2021).
2. Y. C. Wu, Y. C. Chiang, S. H. Chou, C. L. Pan, Wnt signalling and endocytosis: Mechanisms, controversies and implications for stress responses. *Biology of the cell* **113**, 95-106 (2021).
3. E. Seib, T. Klein, The role of ligand endocytosis in notch signalling. *Biology of the cell / under the auspices of the European Cell Biology Organization*, (2021).
4. U. Djakbarova, Y. Madraki, E. T. Chan, C. Kural, Dynamic interplay between cell membrane tension and clathrin-mediated endocytosis. *Biology of the cell* **113**, 344-373 (2021).
5. R. Ivanov, G. Vert, Endocytosis in plants: Peculiarities and roles in the regulated trafficking of plant metal transporters. *Biology of the cell* **113**, 1-13 (2021).
6. J. Kahlhofer, S. Leon, D. Teis, O. Schmidt, The alpha-arrestin family of ubiquitin ligase adaptors links metabolism with selective endocytosis. *Biology of the cell* **113**, 183-219 (2021).
7. I. Foissner, M. Hoeflberger, M. C. Hoepflinger, A. Sommer, A. A. Bulychev, Brefeldin A inhibits clathrin-dependent endocytosis and ion transport in *Chara* internodal cells. *Biology of the cell* **112**, 317-334 (2020).
8. A. Yoshinari, Y. Toda, J. Takano, GNOM-dependent endocytosis maintains polar localisation of the borate exporter BOR1 in *Arabidopsis*. *Biology of the cell* **113**, 264-269 (2021).
9. D. Buelto, C. W. Hung, Q. L. Aoh, S. Lahiri, M. C. Duncan, Plasma membrane to vacuole traffic induced by glucose starvation requires Gga2-dependent sorting at the trans-Golgi network. *Biology of the cell* **112**, 349-367 (2020).
10. B. P. Robinson et al., Alpha-arrestins Aly1/Art6 and Aly2/Art3 regulate trafficking of the glycerophosphoinositol transporter Git1 and impact phospholipid homeostasis. *Biology of the cell* **114**, 3-31 (2022).