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Structural changes of *Chlamydomonas reinhardtii* cells during lipid enrichment and after solvent exposure

Sakina Bensalem^{a,b}, Filipa Lopes^b, Pierre Bodénès^{a,b},
Dominique Pareau^b, Olivier François^c, Bruno Le Pioufle^{a,*}

^a CNRS, SATIE, Ecole Normale Supérieure Paris Saclay, Université Paris-Saclay, 61 av du Pdt Wilson, 94230 Cachan, France

^b LGPM, EA 4038, CentraleSupélec, Université Paris Saclay, 3 Av. Joliot Curie, 91190 Gif-sur-Yvette, France

^c ESIEE-Paris, ESYCOM EA 2552, Université Paris Est, 93160 Noisy Le Grand, France

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ABSTRACT

Data are related to Confocal Laser Scanning Microscopy (CLSM) observations of lipid-enriched *Chlamydomonas reinhardtii* cells under different conditions. Firstly, the impact of stress conditions (nitrogen starvation) on the cell wall structure is assessed. Secondly is described the effect of solvents, in the context of lipid extraction, on the microalga's cell, particularly its lipid droplets, in the perspective of understanding the mechanisms behind solvent extraction of lipids. Furthermore, the role of the cell wall as a barrier to the solvent extraction action is highlighted.

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Specifications table

Subject area	Physics and biology
More specific subject area	Bioprocess engineering
Type of data	Confocal microscopy images

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* Corresponding author.

E-mail address: bruno.lepioufle@satie.ens-cachan.fr (B. Le Pioufle).

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How data was acquired	Images were acquired by confocal microscope LSM 700 (Zeiss)
Data format	Raw
Experimental factors	<i>Chlamydomonas reinhardtii</i> cells were submitted to 7 days of nitrogen stress conditions in order to induce lipid accumulation
Experimental features	Fluorescent dyes were used to observe the microalga's lipid droplets and cell wall
Data source location	<i>Chlamydomonas reinhardtii</i> SAG-34.98 (Wild type) was obtained from the University of Goettingen (EPSAG, Germany). They were collected from a soil in the United States, MA.
Data accessibility	Dataset is within this article
Related research article	Understanding the mechanisms of lipid extraction from microalga <i>Chlamydomonas reinhardtii</i> after electrical field solicitations and mechanical stress within a microfluidic device (Bensalem et al., 2018) [1] (In revision)

Value of the data

- The presented data provides information on the role of the cell wall as a barrier to molecules extraction; this information is of prime importance for lipid extraction from microalgae
- The data will be helpful to relate the microalga's cell wall structure and the ability of a given solvent to extract lipids
- The data gives significant information that might be crucial to highlight mechanisms of solvent extraction action, especially the role of the cell wall in the extraction efficiency
- The data presented here might lead to further investigations on microalgae cell wall during stress conditions and solvent extraction
- The data provides information to the scientific community on the effect of coupled solvents on the microalgae cells structure in the frame of the extraction of lipids from microalgae

1. Data

Three experiments using confocal microscopy imaging on 7 days-stressed *Chlamydomonas reinhardtii* are reported. Fig. 1 shows the cytoplasm containing lipid droplets and the cell wall structure, while the microalgae are under nitrogen starvation, which induces lipid accumulation. Figs. 2 and 3 describes the structural changes on lipid droplets on such stressed cells, when using solvents for lipid



Fig. 1. *Chlamydomonas reinhardtii* observed under confocal microscopy during lipid accumulation. Cells evolve during stress conditions in terms of their cell wall. Different profiles could be observed: cells in division, cells with one thin layer of cell wall, cells with one very thick layer of cell wall, 2 to 3 layers of cell wall, and more than 3 layers, up to 7 layers. Lipid droplets were stained with Bodipy 505/515 (green), the cell wall with Concanavalin A (orange). Scale bar : 5 μm.

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