



HAL
open science

Soluble type 3 diacylglycerol acyltransferases (DGAT3) interact with membrane lipids

Anne-Marie Crutz-Le Coq, Ophélie Kot, Sihem Hentati-Mansouri, Franjo Jagic, Christelle Louis-Mondesir, Pierre Briozzo, Thierry Chardot

► **To cite this version:**

Anne-Marie Crutz-Le Coq, Ophélie Kot, Sihem Hentati-Mansouri, Franjo Jagic, Christelle Louis-Mondesir, et al.. Soluble type 3 diacylglycerol acyltransferases (DGAT3) interact with membrane lipids. LIPIDS: from membrane dynamics to signaling (17th GERLI lipidomics meeting), Nov 2022, Saint-Jean-Cap-Ferrat, France. . hal-04489023

HAL Id: hal-04489023

<https://hal.inrae.fr/hal-04489023v1>

Submitted on 4 Mar 2024

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.

Soluble type 3 diacylglycerol acyltransferases (DGAT3) interact with membrane lipids

Crutz - Le Coq, AM* ; Kot, O ; Hentati-Mansouri, S ; Jagic, F ; Louis-Mondesir, C ; Briozzo, P ; Chardot, T.

Université Paris-Saclay, INRAE, AgroParisTech, Institut Jean-Pierre Bourgin (IJPB), RD 10, 78000 Versailles, France

* anne-marie.le-coq@inrae.fr

Diacylglycerol acyltransferases (DGATs) of type 1 and type 2 are well-known ER membrane enzymes playing a major role in TAG synthesis in Eukaryotes. A third type of protein, DGAT3, has been purified from the cytosolic fraction of peanut (*Arachis hypogea*) cotyledon in 2006 (Saha et al.).

Since then, the DGAT3 gene family appears to be widely and exclusively distributed among plants and (micro)algae (Turchetto-zolet 2016). Deduced amino acid sequences share a lack of predicted transmembrane domains ('soluble' proteins) and the presence of a conserved thioredoxin-ferredoxin-like domain, which may carry Fe-S cluster. Indeed, DGAT3 of *Arabidopsis thaliana* has been identified as a 2Fe-2S protein when expressed in *E. coli* (Ayme et al. 2018).

Although the capacity of diverse DGAT3s to synthesize TAG *in vitro* (Saha et al. 2006, Ayme et al. 2018) or *in vivo* has been observed, their physiological role remains unclear (or diverse), as well as their subcellular location. DGAT3 has been proposed to be involved in lipid remodeling in germinating *A. thaliana* (Hernandez et al. 2012) or to take part in a chloroplastic TAG synthesis pathway in *Chlamydomonas reinhardtii*.

In order to investigate activities, substrate specificities or potential lipid ligand, we developed an *in vitro* approach based on recombinant his-tagged proteins purified from *E. coli*. Using protein-lipid overlay assays and/or microscale thermophoresis, we observed that two distantly related land plant DGAT3 (from *A. thaliana* and *Amborella trichopoda*) bind to a subset of membrane lipids including phosphatidic acid and PI4P.

We thank E. Hornung and I. Feussner (Göttingen Univ., Germany) for the gift of expression plasmid for *A. thaliana* DGAT3.

Saha et al., 2006. *Plant Physiology* 141: 1533-43.

Turchetto-Zolet et al., 2016. *Genetics and Molecular Biology* 39: 524-38.

Ayme et al., 2018. *Scientific Reports* 8: 17254.

Hernandez et al. 2012. *Plant Physiol* 160: 215-25.