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Cloning and molecular characterization of 2-glycerol 3-phosphate acyltrasferase homologue genes in the green microalga *Chlamydomonas reinhardtii*

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Microalgae are attractive as an alternative source of triacylglycerides (TAGs) to produce biodiesel, mainly due to their easy culture, fast growth, high biomass productivities, as well as their capacity to accumulate high quantities of TAGs, especially under nutrient stress. However, it is necessary to develop strains with higher TAG productivities under optimum culture conditions. Therefore, it is necessary to study the microalgal lipid pathway, which has been suggested to be similar to the pathway of higher plants. The first step of this pathway is catalyzed by the enzyme Glycerol-3-phosphate Acyltrasferase (GPAT). Three isoforms of this enzyme corresponding to different organelles have been identified in higher plants: an isoform located in the endoplasmic reticulum related to the production of TAGs, and the isoforms located in the chloroplast and mitochondria that have been linked to the production of membrane lipids. In previous studies, over-expression of the first two isoforms resulted in the increase of TAG levels in plant seeds. In this study we reported cloning and molecular characterization of two GPAT homologue genes (CrGPAT1 and CrGPAT2) in the model microalga Chlamydomonas reinhardtii. Based on the in silico analysis we propose that CrGPAT1 corresponds to the endoplasmic reticulum isoform, while CrGPAT2 correspond to the chloroplast isoform. The 3' termini was fully mapped for both genes, and its analysis suggested possible post-transcriptional regulation of CrGPAT2. The expression of CrGPAT1 appears to be up-regulated whilst CrGPAT2 appears to be down-regulated during nitrogen deficiency. The role of these genes in TAG accumulation is currently being investigated.

Biography

Maria Eugenia Duarte-Coello completed an undergraduate degree in Biochemistry Engineering at the Instituto Tecnologico de Merida (Mexico) at the age of 23 years, and she is currently carrying a Master of Science in Biotechnology (fourth semester) at the Scientific Research Center of Yucatan (CICY, Centro de Investigación Científica de Yucatan, Mexico).

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