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Molecular cloning and characterization of a diacylglycerol acyltransferase homologue gene in the green microalga *Chlorella saccharophila*

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The environmental and health problems caused by the excessive use of fossil fuels and the constant rise on their prices have created the necessity to find new sources of alternative energy. Microalgae have shown great potential as a solution, not only because they contribute to the capture of environmental CO_2 but they are also efficient generators of biomass and highly energetic molecules, such as triacylglycerides (TAGs). These lipidic molecules are used as raw material for the production of biodiesel. There are several enzymes involved in the biochemical route of TAG's synthesis, among them Diacylglycerol acyltransferase (DGAT) is committed to perform the last step in this metabolic route. The purpose of the present study is the molecular characterization of DGAT genes and to determine its role in the synthesis of TAGs in *Chlorella saccharophila*, a green microalga native of the state of Yucatan in Mexico. This microalga is capable of reaching high biomass and TAG productivities, with an adequate fatty acid profile for biodiesel production. Using a set of degenerate primers, one putative DGAT gene was isolated and named as CsDGAT. From the bioinformatic analysis we propose this gene belongs to the type 2 of DGAT sequences. Both 5' and 3' termini were fully mapped, and its analysis suggested possible post-transcriptional regulation of this gene. Furthermore, we found that the expression of CsDGAT was up-regulated during nitrogen starvation. The next step in this project is to over-express CsDGAT in *C. saccharophila* and to evaluate the TAG levels in the transgenic lines.

Biography

Luis Ernesto Osuna-Rosales completed an undergraduate degree in Genomic Biotechnology at the Autonomous University of Nuevo Leon (Mexico) at the age of 22, and he is currently enrolled in a Master of Science degree program in Biotechnology at the Scientific Research Center of Yucatan (CICY, Centro de Investigacion Cientifica de Yucatan, in Spanish). His current area of research involves alternate fuels based on living organisms, metabolic engineering to improve yields of highly energetic biomolecules and microalgal biotechnology.

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