

Triacylglycerol Lipases of Yeast: More than just Hydrolases

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In the yeast, mobilization of triacylglycerols (TAG) is facilitated by *TGL3*, *TGL4* and *TGL5* gene products. Domains and motifs search analyses indicated that Tgl3p and Tgl5p TAG hydrolases possess a GX SXG lipase motif but also a H-(X)₄-D acyltransferase motif. Interestingly, experiments using [¹⁴C]acetate as a precursor for complex glycerophospholipids revealed that *tg13Δ* mutant had a lower steady-state level of these membrane lipids. Also the total phospholipids quantification data gave an insight that deletion of *TGL3* and *TGL5* altered the cellular phospholipid content. To understand a possible link between TAG lipolysis and phospholipid metabolism in detail, we performed an overexpression studies with Tgl3p and Tgl5p which clearly demonstrated that these two enzymes enhanced the level of phospholipids. In addition, the purified Tgl3p and Tgl5p did not only exhibit TAG lipase activity but also catalyzed acyl-CoA dependent acylation of lyso-phosphatidylethanolamine and lyso-phosphatidic acid (LPA), respectively. Further we found that these two TAG lipases are important for the efficient sporulation of yeast cells. The site-directed mutagenesis studies clearly indicated that the acyltransferase motif of Tgl3p is important for the yeast cell spore formation than as a TAG hydrolase. In this study we hypothesized that these TAG lipases may be involved in prospore membrane formation. In summary, our results indicate that these TAG lipases play a dual role and thereby contribute to both anabolic and catabolic processes in yeast lipid metabolism.