Role of Acyl Transferases in Lipid Accumulation and Lipid Profile in the Oleaginous yeast *Yarrowia lipolytica.*

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The main storage lipids in eukaryotic cells are triacylglycerols (TAG) and steryl esters (SE). In yeasts, these lipids accumulate within special organelles known as lipid bodies (LB). In the lipid accumulation oriented metabolism of the oleaginous yeast *Yarrowia lipolytica*, TAG represent the vast majority of storage lipids, whereas SE are found only in minor quantities. We identified an additional acyltransferase in *Y. lipolytica* encoded by the *ARE2* gene, which along with *DGA1*, *LRO1* and *ARE1* are the only genes coding for proteins contributing to TAG synthesis. The relative contribution of each enzyme depends on growth phase, with Dga1p being the most significant contributor in overall TAG synthesis. The proteins encoded by the *ARE* genes are the main TAG synthesizing enzymes during exponential growth. The *DGA1*, *ARE1* and *ARE2* genes encode acyl-CoA dependent acyltransferases with overlapping functions. In addition, *ARE1* and *ARE2* genes are the only genes involved in SE synthesis, demonstrating a synergic contribution in sterol esterification. A yeast lacking all four genes, although lacking lipid bodies, is viable and has no growth defects, even in late stationary phase, probably due to the ability of *Y*. *lipolytica* to accumulate free fatty acids (FFA). Interestingly, strains lacking the *ARE2* gene contain large lipid bodies, demonstrating a direct role of storage lipid proteins in LB formation. Fatty acid composition of TAG and FFA fractions in strains with modified acyltransferase genotype will be also presented.