

# Lipid Particles as a Storage Compartment for Squalene in the Yeast *Saccharomyces cerevisiae*

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Squalene belongs to the group of isoprenoids and is a precursor for the synthesis of sterols, steroids and ubiquinons such as coenzyme Q10. It has become popular for biotechnological purposes but its isolation from natural sources, e.g. shark liver oil, is rather expensive and questionable from the ecological viewpoint. Therefore, alternative sources to isolate this compound were suggested among them the yeast *Saccharomyces cerevisiae*. It has been shown that the amount of squalene in yeast can be increased by varying the culture conditions or by genetic manipulation. As an example, in strains deleted of *HEM1* squalene accumulates and is stored mainly in lipid particles/droplets. Most interestingly, a heme-deficient *dga1Δlro1Δare1Δare2Δ* quadruple mutant (*Qhem1Δ*) which is devoid of the classical storage lipids, triacylglycerols (TAG) and steryl esters (SE), accumulates substantial amounts of squalene in cellular membranes, especially in microsomes and the plasma membrane. The fact that *Qhem1Δ* does not form lipid particles suggests that biogenesis of these storage particles cannot be initiated by squalene which is synthesized in the ER similar to TAG and SE. This result also indicates that squalene accumulation, at least under the conditions tested, is not lipotoxic. Our experiments demonstrate that squalene incorporated into organelle membranes does not compromise cellular function. In summary, subcellular distribution of squalene can be regarded as an example of highly flexible lipid storage in yeast.

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