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Title: Morphological and metabolic shifts of *Yarrowia lipolytica* induced by alteration of the dissolved oxygen concentration in the growth environment

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Abstract: *Yarrowia lipolytica*, an ascomycete with biotechnological potential, is able to form either yeast cells or hyphae and pseudohyphae in response to environmental conditions. This study shows that the morphology of *Y. lipolytica*, cultivated in batch cultures on hydrophilic (glucose and glycerol) and hydrophobic (olive oil) media, was not affected by the nature of the carbon source, nor by the nature or the concentration of the nitrogen source. By contrast, dissolved oxygen concentration (DOC) should be considered as the major factor affecting yeast morphology. Specifically, when growth occurred at low or zero DOC the mycelial and/or pseudomycelial forms predominated over the yeast form independently of the carbon and nitrogen sources used. Experimental data obtained from a continuous culture of *Y. lipolytica* on glycerol, being used as carbon and energy source, demonstrated that the mycelium-to-yeast form transition occurs when DOC increases from 0.1 to 1.5 mg l(-1). DOC also affected the yeast physiology, as the activity of enzymes implicated in lipid biosynthesis (i.e. ATP-citrate lyase, malic enzyme) was upregulated at high DOC whereas the activity of enzymes implicated in glycerol assimilation (such as glycerol dehydrogenase and kinase) remained fundamentally unaffected in the cell-free extract.

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