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Sensing of oxygen in microtiter plates: a novel tool for screening drugs against pathogenic yeasts

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Abstract:

Abstract Most antibiotics were discovered via their inhibition of growth of target organisms. However, yeasts in particular have the capability to adapt metabolic pathways to the availability of nutrients e.g. yeasts can easily switch between respiratory and fermentative pathways in response to oxygen concentration, or can even use both simultaneously. Thus, we cultivated S. *cerevisiae* BY4741 and C. *albicans* 1386 in microtiter plates with integrated oxygen sensors to characterize the availability of oxygen for the organisms and to detect influences of fungicides on the oxygen consumption rates. The relevance of the respiratory pathway was indicated by the almost total consumption of oxygen during the first 1–3 h of the cultivation in the microtiter plates, when an increase in turbidity could hardly be seen. Moreover, the sensitivity of S. *cerevisiae* to inhibitors of the respiratory chain, such as myxothiazol, could be detected via a reduced oxygen consumption rate, whereas no inhibition of growth was observed. Thus, not only was the sensitivity of the test organism for the test compound detectable, but the affected pathway was also highlighted. Other compounds, such as pyrrolnitrin and ambruticin VS-3, inhibited growth of C. *albicans* 1386 and of S. *cerevisiae* (only pyrrolnitrin), which was additionally observed as reduced oxygen consumption rates. Thus, the determination of oxygen in microtiter plates via fluorescent dyes is a versatile supplement to standard growth inhibition tests.

Key-words: Myxothiazol, ambruticin VS-3, pyrrolnitirn, *candida albicans* 1386, *Saccharomyces cerevisiae*, oxygen consumption, fluorescent oxygen-sensitive dye