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MDR-transporters: intracellular localization and function during sporulation of Saccharomyces cerevisiae

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Yeast cells modulate the expression of multidrug resistance (MDR) transporters in response to environmental changes. In our study, we investigate the potential role and localization of MDR transporters in spores, which represent the resting phase of the yeast life cycle. It remains unclear whether spores contain MDR transporters from the ABC or MFS superfamilies. ABC transporters from the PDR family may undergo unhelpful ATP hydrolysis, which may negatively affect spore survival. Conversely, some MDR transporters may promote spore development or aid germination under xenobiotic exposure.
We compared the sporulation efficiency of strains with inactivated (Δpdr1Δpdr3) or overactive (PDR1-3) MDR systems to the wild-type. Intriguingly, both strains showed a stable sporulation percentage, albeit with reduced spores per ascus. Using GFP fusions, we investigated the localization of several mein MDR transporters during meiotic division in S. cerevisiae. We did not detect the presence of Pdr5, Pdr15, Pdr11, Snq2, or Tpo1 proteins in spore and ascus membranes. However, the MFS transporter with broad substrate specificity Flr1-GFP was found to accumulate in spore membranes. To better understand the role of Flr1 in spore development, we compared sporulation efficiency in wild-type, Δflr1/Δflr1, and PTEF-FLR1/PTEF-FLR1 (overexpressor) strains. Our findings suggest that both PDR1/PDR3 and FLR1 play a complementary role in the response to chemical stresses, such as the azole antimycotic fluconazole, in spores.
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