

论著

烟曲霉 *pbs2* 基因在热应激与胞壁应激的双重应激中的作用

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摘要: 目的 研究烟曲霉对细胞壁合成干扰物质及棘白菌素类药物的敏感性、烟曲霉在受热应激后HOG通路成分的表达变化探讨 *pbs2* 基因在热应激和胞壁应激的双重应激中的作用。方法 烟曲霉野生株AF293和 *pbs2* 突变株在含钙荧光白(Calcofluor white,CFW),刚果红(Congo red,CR)和十二烷基硫酸钠(Sodium dodecylsulfate,SDS)的葡萄糖酵母浸液琼脂(Yeast Agar Glucose,YAG)上生长,观察其对上述3种细胞壁合成干扰物质的敏感性。微量液基稀释法检测烟曲霉对米卡芬净和卡泊芬净的敏感性。实时荧光定量PCR法分析AF293受到热刺激前后菌体 *pbs2* 和 *hog1* 的RNA含量变化。结果 50℃培养时 *pbs2* 突变株对胞壁合成干扰物质的敏感性较野生株AF293增强,600μg/mL CFW,400μg/mL CR及100μg/mL SDS完全抑制 *pbs2* 突变株生长,不能完全抑制AF293的生长;在37℃培养时,AF293和 *pbs2* 突变株敏感性没有差异。50℃培养时,卡泊芬净和米卡芬净对AF293和 *pbs2* 突变株的最低有效浓度(Minimum effective concentration,MEC)均为0.25μg/mL,但 *pbs2* 突变株在药物浓度为0.5μg/mL作用时生长完全受抑制,而野生株仍生长;在35℃和42℃培养时,AF293和 *pbs2* 突变株对两种药物的敏感性没有差异,MEC均为0.5μg/mL。50℃热应激后,AF293的 *pbs2* 和 *hog1* 的RNA表达量分别下降至37℃时的3%和13%; *pbs2* 突变株的 *hog1* 降至应激前的35%。结论 烟曲霉受热应激和胞壁应激的双重应激时, *pbs2* 基因参与细胞适应反应,发挥保护作用。

关键词: *pbs2* 烟曲霉 热应激 胞壁刺激

The role of *pbs2* gene in the heat stress and cell wall stress of *Aspergillus fumigatus*

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Abstract: Objective To verify the role of *pbs2* gene in the heat stress and cell wall stress of *Aspergillus fumigatus*. Methods The sensitivities of AF293 and *pbs2* mutant growing on the YAG medium with different concentrations of Calcofluor white, Congo red and Sodium dodecyl sulfate (SDS) to the cell wall interfering compounds and to the echinocandins were observed. The expressions of *pbs2* and *hog1* gene of AF293 and the *pbs2* mutant upon heat stress were detected by Real-time PCR. Results AF293 and the *pbs2* mutant showed no difference in sensitivity to cell wall interfering compounds at 37℃, but the sensitivity of *pbs2* mutant increased at 50℃. Calcofluor white (600 μg/mL), Congo red (400 μg/mL) or SDS (100 μg/mL) totally inhibited the growth of *pbs2* mutant but had no effects on AF293. Compared to AF293, the *pbs2* mutant showed increased sensitivity to echinocandins at 50℃, but no difference at 35℃ or 42℃. The MEC of caspofungin and micafungin to AF293 and the *pbs2* mutant were 0.5 μg/mL at 35℃ and 42℃, 0.25 μg/mL at 50℃, respectively. Echinocandins (0.5 μg/mL) could completely inhibited the growth of *pbs2* mutant but not AF293 at 50℃. Upon heat stress at 50℃, the *pbs2* and *hog1* RNA expression of AF293 decreased to 3% and 13%, respectively, while the *hog1* expression of the *pbs2* mutant decreased to 35%. Conclusions The *pbs2* gene plays a protective role in *A. fumigatus* adapting to the heat stress and cell wall stress.

Keywords: *Aspergillus fumigatus* *pbs2* heat stress

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