

## 亚洲玉米螟幼虫应对大肠杆菌注射的血淋巴免疫应激反应

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Immunological and stress response of the hemolymph of *Ostrinia furnacalis* Guenée (Lepidoptera: Pyralidae) larvae to the injection of *Escherichia coli*

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### 摘要

为研究大肠杆菌 *Escherichia coli* 侵染引发亚洲玉米螟 *Ostrinia furnacalis* Guenée 幼虫免疫应激反应的机理, 本实验测定了分别注射生理盐水以及  $3 \times 10^3$ ,  $3 \times 10^4$ ,  $3 \times 10^5$  和  $3 \times 10^6$  个细胞/mL 大肠杆菌后亚洲玉米螟 5 龄幼虫血淋巴中血细胞总数 (THC)、颗粒细胞和浆血细胞数量, 血清中酚氧化酶 (PO)、谷胱甘肽过氧化物酶 (GSH-px)、谷胱甘肽还原酶 (GR) 和谷胱甘肽-S-转移酶 (GST) 的活性, 通过流式细胞仪分析了血细胞活性氧自由基 (ROS) 水平的动态变化。结果表明: 与对照组相比, 注射  $3 \times 10^5$  和  $3 \times 10^6$  个细胞/mL 大肠杆菌细胞后 12 h, 可引起亚洲玉米螟 5 龄幼虫 THC 及浆血细胞、颗粒细胞数量明显上升 ( $P < 0.01$ ), 同时应激产生大量 ROS。  $3 \times 10^4$ ,  $3 \times 10^5$  和  $3 \times 10^6$  个细胞/mL 大肠杆菌 3 个不同浓度处理组均引起幼虫体内 PO 活性显著升高 ( $P < 0.01$ ), 诱导幼虫血清中 GSH-px, GST 及 GR 的活性上升 ( $P < 0.01$ )。这些结果表明, 亚洲玉米螟幼虫受到大肠杆菌侵染后, 其血淋巴细胞免疫和体液免疫能力受到显著影响, 可诱导血清中 GSH-px, GST 和 GR 活性升高以清除过多的 ROS, 防止其毒害。

### 关键词:

### Abstract:

In order to explore the mechanism of immunological and stress response of *Ostrinia furnacalis* Guenée larvae invaded by *Escherichia coli*, the numbers of total hemocytes, granular hemocytes and plasmatocytes in the 5th instar larvae of *O. furnacalis* injected with physiological saline,  $3 \times 10^3$ ,  $3 \times 10^4$ ,  $3 \times 10^5$  and  $3 \times 10^6$  cells/mL *E. coli*, respectively, were counted, and the activities of phenoloxidase (PO), glutathione peroxidase (GSH-px), glutathione-S-transferase (GST) and glutathione reductase (GR) were determined. The content of reactive oxygen species (ROS) of the hemocytes was also analyzed by flow cytometry (FACS). The results showed that the numbers of total hemocytes, granular hemocytes and plasmatocytes in the 5th instar larvae of *O. furnacalis* increased significantly in 12 h post injection with  $3 \times 10^5$  cells/mL and  $3 \times 10^6$  cells/mL *E. coli* ( $P < 0.01$ ), compared with the control group. The content of ROS in hemocytes also increased at the same time. Injections with  $3 \times 10^4$ ,  $3 \times 10^5$  and  $3 \times 10^6$  cells/mL *E. coli* triggered the enhancement of PO activity, and also induced the increase of the activities of GSH-px, GST, and GR in the serum. The results suggest that the abilities of cellular and humoral immunity of *O. furnacalis* larvae are significantly affected by the injection of *E. coli*, and the activities of GSH-px, GST and GR are also induced to scavenge the excessive ROS to prevent from the toxic effect of ROS.

### Key words:

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