

论文
短蛸血细胞的形态结构、类型、细胞化学特性及其吞噬活性研究

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摘要:

血细胞作为免疫防御的第一道防线, 在软体动物的非特异性免疫系统中具有重要作用. 为了揭示头足类动物血细胞的形态结构、生物学性质及其免疫学功能, 实验利用活体染色、细胞化学和电镜技术等对短蛸血细胞的形态结构、类型、细胞化学性质及其弧菌吞噬活性进行了研究. 研究结果显示: 短蛸血细胞具有大透明细胞、小透明细胞、小颗粒细胞和大颗粒细胞4种类型. 大透明细胞约占血细胞总数22.6%, 平均直径为 $11.64 \pm 0.82 \mu\text{m}$, 胞质中没有或仅含有很少量的颗粒, 细胞表面光滑无伪足伸出; 小透明细胞约占血细胞总数的1.7%, 平均直径为 $8.88 \pm 0.88 \mu\text{m}$, 胞质中仅含有少量颗粒, 细胞核对台盼蓝呈阳性反应, 核质比较大; 小颗粒细胞约占血细胞总数的50.7%, 平均直径为 $12.82 \pm 1.54 \mu\text{m}$, 胞质中具有许多大小较为均一的嗜碱性小颗粒, 有些细胞内还含有小空泡, 不为中性红所着色, 疑为颗粒胞内容物所致, 细胞表面有较短伪足伸出; 大颗粒细胞约占血细胞总数的25.20%, 平均直径为 $13.66 \pm 1.50 \mu\text{m}$, 胞质中具有大小不匀的许多嗜碱性颗粒, 有些细胞内也含有不为中性红所着色的较大空泡, 细胞表面有许多长伪足伸出. 颗粒细胞中所含有的大量嗜碱性颗粒可能与蛋白质等分泌物的活跃合成有关. 大颗粒细胞还具有全质分泌的特性, 小透明细胞极可能是大颗粒细胞全质分泌后的一时性残余胞体. 弧菌吞噬实验结果表明, 两类透明细胞均没有弧菌吞噬活性, 两类颗粒细胞均具有弧菌吞噬活性, 暗示这两种颗粒细胞很可能是短蛸发挥细胞免疫功能的关键性细胞, 不仅与某些物质的活跃合成与分泌有关, 而且可能还直接参与了外来病原的吞噬及清除. 研究结果为揭示短蛸血细胞在非特异性免疫防御中的作用奠定了基础, 对于丰富软体动物免疫学也具有重要的科学价值.

关键词: 短蛸 血细胞 透明细胞 颗粒细胞 吞噬活性

Morphological structure, type, cytochemical and phagocytotic characteristics of haemocytes from *Octopus ocellatus* gray

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Abstract:

Haemocytes, as the frontier line of immune defence, play vital roles in the innate immune system of molluscs. In order to reveal characteristics of morphological structure, biological property and immunological function of cephalopod haemocytes, the morphological structure, type, cytochemical and phagocytotic characteristics of haemocytes from *Octopus ocellatus* gray were studied by vital staining, cytochemical and electron microscopic techniques. The findings show that *Octopus* haemocytes could be divided into four types, large hyalinocytes, hyalinocytes, with an average diameter of $11.64 \pm 0.82 \mu\text{m}$, smooth cell surface and no pseudopodium, have a few small cytoplasmic granules. The small hyalinocytes, with an average diameter of $8.88 \pm 0.88 \mu\text{m}$ and a high nucleocytoplasmic ratio, have only a few small cytoplasmic granules, whose nucleus is positively stained by trypan blue. The small granulocytes, with an average diameter of $12.82 \pm 1.54 \mu\text{m}$ and appearance of short pseudopodia, have a large number of small and homogeneous basophilic cytoplasmic granules. Some of the cells have small cytoplasmic vacuoles, which are unable to be stained by neutral red and can be derived from the desertion of the granule content. The large granulocytes, with an average diameter of $13.66 \pm 1.50 \mu\text{m}$ and appearance of many long pseudopodia, have a lot of different sized basophilic cytoplasmic granules. Some of the cells have both large and small cytoplasmic vacuoles, which can not be stained by neutral red. The abundant basophilic granules in granulocytes may be related with active synthesis and secretion of certain kinds of materials such as proteins. The large granulocytes show characteristics of holocrine, and the small hyalinocytes are a transient type of residual cell bodies of large granulocytes after the holocrine process finished. The results of vibrio phagocytosis assay indicated that two kinds of granulocytes have obvious phagocytotic ability while two kinds of hyalinocytes do not. It implies that two kinds of granulocytes are key haemocytes in *Octopus ocellatus* to carrying out cell immunity. Two kinds of granulocytes not only relate with active synthesis and secretion of certain kind of materials, but also participate directly in phagocytosis and elimination of foreign pathogens. The results lay a solid foundation for studying the functions of haemocytes in *Octopus* nonspecific immune defense, and also

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have great scientific value in the enrichment of molluscan immunology.

Keywords: Octopus ocellatus gray haemocyte hyalinocyte granulocyte phagocytosis

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