PROPHENOLOXIDASE SYSTEM (pro-PO) IN INVEREBRATES. MECHANISMS OF INNATE IMMUNE RESPONSE

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Summary

In many groups of invertebrates prophenoloxidase cascade (pro-PO), an element of humoral innate immune system, is the first line of defense in the fight against pathogens. Phenoloxidase (PO) is a part of a complex system of pattern recognition, made of proteinases and proteinase inhibitors, constituting the so-called prophenoloxidase-activating system. This innate immune reaction provides toxic quinone substances and other short-lived reaction intermediates, involved in formation of more long-lived products, such as melanin, that physically encapsulate pathogens. Furthermore, reaction intermediates in the melanin pathway participate in the wound healing process by the formation of covalent links in damaged tissues resulting in sclerotization (e.g. in insects). Recent evidence also strongly implies that the melanization cascade (the prophenoloxidase activating system) provides, or is intimately associated with, the appearance of factors stimulating cellular defense by aiding phagocytosis. In annelides, the pro-PO system is strictly involved in encapsulation and formation of "brown bodies", in which melanin and lipofuscin are synthesized. Therefore, it comes as no surprise that several studies have shown unequivocally the importance of the melanisation reaction for the outcome of several specific pathogen–host encounters, including bacterial infections.

Although much is known about the proPO system and its role in the immunity, still some details of its activation and the role of specific proteins and regulating factors in various groups of invertebrates remain to be elucidated.