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An overview of earthworm functional enzymes: digestive and fibrinolytic enzymes

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Abstract

Earthworms are well-known soil decomposers. Charles Darwin, one of the most acclaimed scientists, studied earthworms, leading to the compilation of the "Earthworm book." Today, it is widely acknowledged that earthworms play a crucial role in forming nutrient-rich soil. Because earthworms are polyphagous animals and the cast contains a large amount of nutrients, the application of earthworms in composting has been researched extensively. Earthworms have also been studied for their therapeutic effects against human diseases. In the 16th century, Shizhen Li, who was China's greatest naturalist, used dried earthworm powder as an antipyretic and diuretic treatment. Frédéricq, at the end of the 19th century, discovered a protease from earthworm fluid that could dissolve fibrin. Mihara *et el.* isolated and characterized a fibrinolytic enzyme called "lumbrokinase" from the earthworm, *Lumbricus rubellus*. This research led to the wide recognition that earthworms have potent and useful fibrinolytic enzymes. Fibrinolytic enzymes from earthworms have potential applications as active pharmaceutical ingredients against thrombotic diseases such as myocardial and cerebral infarction, which are difficult to treat. Thus, many researchers are attempting to elucidate detailed functions of the fibrinolytic enzymes from earthworms. Today, dried earthworm powder is sold as a dietary supplement in Asian countries. This presentation discusses earthworm functional enzymes, primarily focusing on digestive and fibrinolytic enzymes. Then, a novel method to produce earthworm-based dietary supplements is introduced. Finally, results showing the therapeutic effects of oral administration of earthworm powder in humans and animals are described.

Keywords

Digestive enzyme, Earthworm, Fibrinolytic enzyme, Fibrinolysis, Thrombosis