Fungal luciferase: search, cloning and biochemical properties.

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Abstract

The study of the fungal bioluminescent system has come a long way from the first experiments of Robert Boyle in the 17th century to the elucidation of fungal luciferin structure several years ago. This discovery made the determination of a complete mechanism of fungal bioluminescence possible. It is quite obvious that luciferase is the key component of any bioluminescent system and its biochemical properties determine the potential for practical application of the described system. Gene encoding the fungal luciferase of *Neonothopanus nambi* was cloned recently in our laboratory. It was expressed in different expression systems and its properties were thoroughly investigated. To study the possibility of practical application of cloned luciferase we performed a series of experiments with it. The results of testing of fungal luciferase in traditional biomedical applications, for example as a reporter gene in different heterologous systems and in a whole-body imaging setup, were very promising. Using bioinformatics tools homologues of *N. nambi* luciferase were identified and cloned from certain other bioluminescent fungus species. All cloned homologues had a considerable percentage of sequence similarity and showed bioluminescent activity with fungal luciferin. Thus, all collected data, together with the discovery of fungal luciferin biosynthesis pathway, indicate excellent prospects for the future use of fungal luciferase in biomedical research. This work was supported by the Russian Science Foundation grant 17-14- 01169.

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