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Bioluminescence as tool to environmental contamination detection



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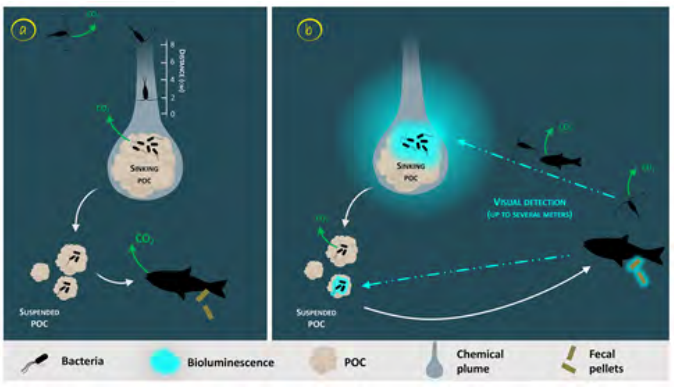
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Abstract

Recombinant bioluminescent bacteria are frequently directed towards use as environmental biosensors because it has high sensitivity, selectivity, costless, easy to use and function as rapid measurement to detect heavy metals. The bioluminescence of DF4/PUTK2 assay is based on using the bio-reporter Acinetobacter DF4/PUTK2 carrying luciferase genes luxCDABE which emit light constitutively. This can be measured in time intervals by luminometer to determine the behavior of bio-reporter against lead. The light emitted in the lead treated samples was equal or increased than the control. Therefore, the bio-reporter DF4/PUTK2 was subjected to intensive studies to elucidate its behavior with lead and if it was possible to be employed as a lead light-on assay in water in reverse order. Time exposure (5 to 990 min), lead concentration (0 to 30000 ppm), and lead salts (acetate-chloride and nitrate) were included in this study. The bio-reporter DF4/PUTK2 was more sensitive to lead concentrations range (19.25 to 15000 ppm). However, at high concentrations of lead, the light was being decreased due to cell death and/or metabolic burden simultaneously. It was possible to detect the presence of lead in water samples through light-induction in specific concentrations which add another advantage to the bio-reporter DF4/PUTK2.

Importance of Research

The bioluminescence reaction is now routinely used for gene assays, the detection of protein–protein interactions, high-throughput screening (HTS) in drug discovery, hygiene control, analysis of pollution in ecosystems and in vivo imaging in small mammals. Throughout history, humans have been fascinated by the living light produced by luminescent organisms. Today, the glimmering power of bioluminescence has been harnessed for lifesaving uses in medicine, from lighting up structures inside the brain to illuminating the progression of cancer cells.



Research Lab

The City of Scientific Research and Technological Applications (SRTA-City) is the newest addition of research institutes in Egypt that was directed to the development and renovation of industry. A decision to develop a science park in the Alexandria region was reached in 1993 in order to acquire and improve scientific technologies in different areas of human life. The SRTA-City occupies 250 acres in the industrial area located at New Borg El Arab City, west of Alexandria. This region also inhabits about 40% of the Egyptian industry. The science park comprises 12 research centers to be developed at different intervals. The first stage of SRTA-City was inaugurated on the 13th of August, 2000 and included Genetic Engineering and Biotechnology Research Institute (GEBRI), Informatics Research Institute (IRI), Advanced Technology and New Materials Research Institute (ATNMRI) and Arid Lands Cultivation Research Institute (ALCRI). The Genetic Engineering and Biotechnology Research Institute - Sadat City University is committed to preparing a graduate who is able to compete and innovate locally and regionally and to excel in scientific and applied research for community service and environmental development.

Biography

Abdul Rhman H Muhammad has completed his master degree from Cairo University and work as research assistant ship at at Environmental Biotechnology Department, Genetic Engineering and Biotechnology Research Institute (GEBRI), Scientific Research and Technological Applications City (SRTA-City). He has published paper in biocatalysis and agricultural biotechnology journal junder titile Studying the behavior of the light-off bioreporter DF4/PUTK2 as a light-on assay against lead, He received the Next Generation Scholars Scholarship, which is granted to outstanding students and top university graduates to study for a master's degree.

About the University

Giza, a district across the Nile from Cairo, is home to Egypt's main university, the University of Cairo. It was founded on 21st December 1908, but its main campus with faculties was not established until 1929. The University of Cairo has served as a venue for medical studies for several students each year. Egyptian universities consider it the "mother of universities" due to its historical significance as one of the oldest in the country. Cairo university faculty of medicine thrives on the mission of preparing world-class physicians who help the community and take over the world. The university strives to bring out the best in its students through structured learning and good research facilities. Students are taught interactive learning techniques so they will be able to overcome obstacles in the future. About 155,000 students are currently enrolled in the University's 20 faculties and 3 institutions. The students admitted can be sure that they will be accommodated at reputed hospitals and have a secure life. The university works continuously for the betterment of the community at large. The teaching staff undergoes ongoing training programs to ensure that they stay on top of the latest technology and can impart knowledge to students as efficiently as possible.



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