

## 光学生物传感器用于快速检测卡介苗活菌数研究

作者: 刘晓红, 赵爱华, 罗金平, 田青, 王国治, 蔡新霞

单位: 中国科学院电子学研究所

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摘要:

基于三磷酸腺苷(ATP)光学反应原理,结合实验室自制的光学生物传感器,构建了一种快速检测卡介苗(BCG)活菌数的方法。选用加热裂解法提取BCG活ATP,对BCG疫苗进行了检测。结果表明,BCG活菌浓度与相对发光强度(RLU)线性相关,相关系数为0.9908( $P<0.01$ ),其ATP含量与文献报道的结果处于同一数量级(10-18 mol/CFU)。检测方法的相对标准偏差(RSD)为6.17%。检测样品仅需30  $\mu$ L,检测时间小于30 min。与国外商业化检测系统的测试结果线性相关,相关系数为0.9676( $P<0.01$ )。这种方法简便快速,在BCG疫苗及其他活菌疫苗质量控制方面具有广泛的应用前景。

关键词: 光学生物传感器, 活菌浓度, 生物荧光法, BCG

## Rapid Detection of the Viability of BCG Vaccine using optical biosensor

**Author's Name:**

**Institution:**

**Abstract:**

Based on the principle of ATP bioluminescence reaction, a rapid method was developed for detecting the viability of BCG vaccine which combined homemade optical biosensor. ATP extraction was performed in boiling Tris-EDTA buffer in the experiments. In this study, a high correlation between the viable count of BCG and Relative luminescence intensity (RLU) was obtained with correlation coefficient of 0.9908 ( $P<0.01$ ) according to the linearity of ATP standard, and a low Relative Standard Deviation (RSD) of 6.17%. The ATP content of BCG was 10-18 mol/CFU, consistent with the results in papers. The sample volume was 30  $\mu$ L and the whole test for a sample was completed within 30 min. There was also a high correlation between homemade optical biosensor and the commercial system with correlation coefficient of 0.9676 ( $P<0.01$ ). With the characters of easy operation and fast responses, this method can be applied widely in routine quality control to estimate viable count of BCG and other vaccines.

**Keywords:** Optical Biosensor, Viable Counts, Bioluminescence, BCG

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