

## Yeast Transformant-Based Glucose Biosensor for Implantable Application

Masaki Yamaguchi\*, Atsunori Nakano<sup>1</sup> and Tadayoshi Taniyama<sup>2</sup>

Faculty of Engineering, Iwate University, 4-3-5 Ueda, Morioka 020-8551, Japan  
<sup>1</sup>Graduate School of Science and Engineering for Research, University of Toyama,  
3190 Gofuku, Toyama 930-8555, Japan

<sup>2</sup>Laboratory of Bacterial Infection and Immunity, Department of Immunology,  
National Institute of Infectious Diseases, 1-23-1 Toyama, Shinjuku-ku, Tokyo 162-8640, Japan

(Received February 8, 2008; accepted May 8, 2008)

**Key words:** biosensor, glucose oxidase, transformant, *A. niger*, *P. pastoris*, totally implantable type

A novel transformant-based glucose biosensor is proposed using glucose oxidase (GOD) as the molecular recognition material in order to solve the problem of deactivation of the enzyme with time. In this paper, the feasibility of this approach for a glucose biosensor is demonstrated as a preliminary study. *A. niger* is used as a source of the GOD gene. The yeast strain *P. pastoris* X-33 is used as the host for plasmid construction, cloning, and enzyme expression. The yeast transformant-based glucose biosensor consists of a ring filter, disc housings, and a flat electrode (30 mm diameter, 8.5 mm thick). A reaction chamber with an inner volume of 300  $\mu$ l is constructed by sandwiching a ring filter made of porous sintered metal between two disc housings. Both the GOD protein and its transformant are enclosed in the reaction chamber. Our results indicated that (i) the GOD gene transformant, which is capable of not only secretory expression but also constitutive expression, was obtained, and (ii) deactivated GOD, with time, can be replaced with newly produced recombinant GOD from the GOD gene transformant.

\*Corresponding author: e-mail: masakiy@iwate-u.ac.jp