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Specific chemiluminescent protocol for dual-site recognition of *Streptococcus mutans* utilizing strong affinity between teicoplanin and Gram-positive bacteria

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Abstract

A novel dual-site recognition protocol was developed for chemiluminescent (CL) detection of *Streptococcus mutans* (*S. mutans*) based on a designed antibiotic-affinity strategy. Teicoplanin, a broad-spectrum antibiotic against Gram-positive bacteria, was adopted to functionalize magnetic particles and recognize *S. mutans* utilizing the strong affinity between this agent and D-Alanyl-D-Alanine peptide moieties in the bacterial cell wall. To achieve ideal specificity for *S. mutans* detection, rat immunoglobulin G2a (rat IgG2a) tagged with horseradish peroxidase (HRP) was used as the second recognition agent and signal tracer since Fab region of rat IgG2a could bind with *streptococcal* protein G highly expressed in the cell wall of *S. mutans*. Thus HRP-tagged sandwich complex of teicoplanin/*S. mutans*/rat IgG2a was formed on the magnetic particles, followed by a CL quantification of *S. mutans* based on a HRP-catalyzed luminol-H_2O_2-*p*-iodophenol CL reaction. This dual-site recognition protocol showed a linear range of 1.0×10^2 - 1.0×10^6 CFU mL^{-1} and a detection limit of 33 CFU