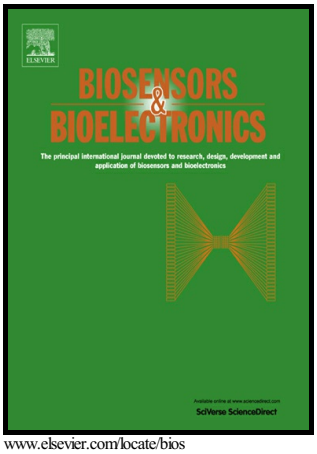
A fluorescence biosensor for VEGF detection based on DNA assembly structure switching and isothermal amplification

Junlong Li, Kexin Sun, Zhongping Chen, Jifei Shi, Dandan Zhou, Guoming Xie



www.elsevier.com/locate/bios

PII: S0956-5663(16)30963-0
DOI: http://dx.doi.org/10.1016/j.bios.2016.09.078
Reference: BIOS9190

To appear in: *Biosensors and Bioelectronic*

Received date: 2 August 2016
Revised date: 19 September 2016
Accepted date: 22 September 2016

Cite this article as: Junlong Li, Kexin Sun, Zhongping Chen, Jifei Shi, Dandan Zhou and Guoming Xie, A fluorescence biosensor for VEGF detection based on DNA assembly structure switching and isothermal amplification, *Biosensors and Bioelectronic,* http://dx.doi.org/10.1016/j.bios.2016.09.078

Title: A fluorescence biosensor for VEGF detection based on DNA assembly structure switching and isothermal amplification

Junlong Li[a], Kexin Sun[a], Zhongping Chen[b], Jifei Shi[c], Dandan Zhou[d], Guoming Xie[a*]

[a]Key Laboratory of Laboratory Medical Diagnostics, Ministry of Education, Department of Laboratory Medicine, Chongqing Medical University, Chongqing 400016, PR China

[b]Department of Clinical Laboratory, Chongqing Municipal Jiulongpo District the First People's Hospital, Chongqing 400050, PR China

[c]Institute of Medical Technology, Baotou Medical College, Baotou 014060, PR China

[d]Clinical Laboratory, The First Affiliated Hospital, Chongqing Medical University, Chongqing 400016, PR China

guomingxie@cqmu.edu.cn

xiegm059@foxmail.com

[*]Correspondence author: Key Laboratory of Laboratory Medical Diagnostics of Education, Ministry of Education, Department of Laboratory Medicine, Chongqing Medical University, No. 1 Yi Xue Yuan Road, Chongqing 400016, PR China, Tel.: +86 23 68485240; fax: +86 23 68485240

Abstract

Vascular endothelial growth factor (VEGF) is an important biomarker in cancer angiogenesis. Here, we develop a aptasensor method for VEGF detection based on DNA assembly structure switching and isothermal amplification. The design employs a DNA assembly made of a isothermal amplification template, a aptamer, a primer and a protector chain. The DNA assembly is unable to undergo isothermal amplification in the absence of target. The presence of the target, however, triggers a structure switching event that causes hybridization of primer with template to facilitate isothermal amplification. Whereafter, toehold-mediated DNA strand displacement reaction between the generated (single-stranded DNA) ssDNA and fluorescent/quencher labeled probe are performed. Then, the increase in fluorescence provides an analytical signal. This strategy opens up a sensitive, selective and simple sensing platform for detection of VEGF. The system was also implemented to analyze the VEGF in human serum samples with satisfactory results.

Keywords: Vascular endothelial growth factor (VEGF); Aptamer; Fluorescence biosensor; Isothermal amplification

1. Introduction