

A highly specific ratiometric two-photon fluorescent probe to detect dipeptidyl peptidase IV in plasma and living systems

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With the support by the National Natural Science Foundation of China and National Basic Research Program of China, the group led by Prof. Ge Guangbo (葛广波) and Prof. Yang Ling (杨凌) from the Laboratory of Pharmaceutical Resource Discovery, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, reported a highly specific ratiometric two-photon fluorescent probe to detect dipeptidyl peptidase IV in plasma and living systems, which was published in *Biosensors and Bioelectronics* (2017, 90: 283–289).

Dipeptidyl peptidase IV (DPP-IV, CD26) is a multifunctional serine protease enzyme which has attracted great attention in the fields of drug discovery, cancer biology, immunology and endocrinology. A novel ratiometric two-photon fluorescent probe GP-BAN has been developed and well characterized for highly selective detection of DPP-IV in complex biological systems including plasma, living cells and tissue slices. In this study, a novel probe termed GP-BAN has been designed on the basis of the catalytic properties and substrate preference of DPP-IV. GP-BAN displays excellent selectivity toward DPP-IV over other human hydrolases including FAP, DPP-VIII and DPP-IX. GP-BAN can be efficiently hydrolyzed by DPP-IV and release BAN which brings significant changes in both color and fluorescence emission spectra, allowing the naked-eye visible and fluorescence analysis. Furthermore, both GP-BAN and BAN exhibit excellent two-photon properties, which can be excited with near-infrared light to avoid interference of the biological matrix and photodamage to living samples. Further biological applications demonstrate that GP-BAN can be used to measure DPP-IV in complex biological samples such as plasma and tissue preparations, as well as to monitor endogenous DPP-IV in living systems with high ratiometric imaging resolution and deep-tissue imaging depth. All these findings suggest that GP-BAN can serve as a highly specific fluorescent probe to image DPP-IV in complex biological systems and to explore the biological functions and medicinal roles of endogenous DPP-IV in living systems.

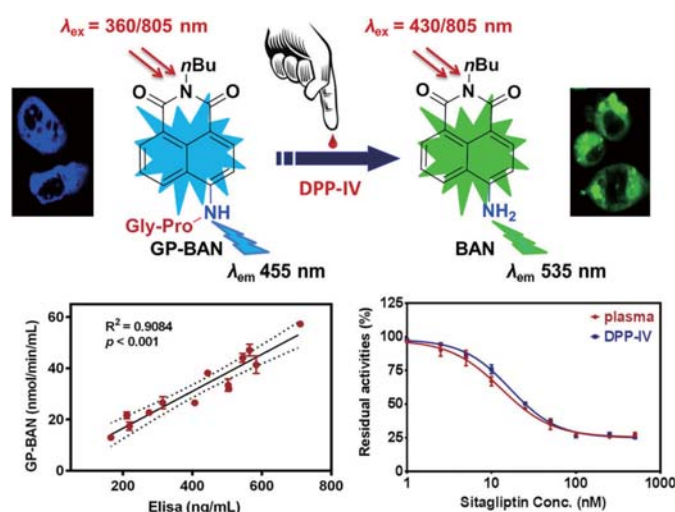


Figure Proposed response mechanism of the GP-BAN/BAN system for DPP-IV detection and its biomedical applications (quantification of DPP-IV in diluted human plasma and rapid screening of DPP-IV inhibitors by this probe).