Bioluminescence Imaging of γ-Glutamyltranspeptidase in Vivo

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γ-Glutamyltranspeptidase (GGT), an ectoenzyme with the activity of catalyzing cleavage of the γ-glutamyl bond of glutathione (GSH), plays a major role in cellular glutathione (GSH) homeostasis and cysteine salvage. Abnormal expression of GGT in living organisms is closely implicated in the development of several human tumors. Therefore, rapid and sensitive detection of GGT level in vivo and in clinical samples is of great importance. So far, precise "light up" GGT activity in vivo is still challenging for fluorescent modality due to signal interferes of background. Bioluminescence imaging, based on the firefly luciferase-catalyzed reaction for light production, can avoid the side-effects of fluorescence caused by the external excitation source, providing GGT detection in vivo with high signal-noise ratio and accuracy.

In this presentation, a bioluminogenic probe Glu-Luc was designed and synthesized by combining D-luciferin with γ-glutamyl group. γ-Glutamyl group cleavage is triggered by GGT, resulting in the release of D-luciferin, which shows bright bioluminescence emission in the present of luciferase and ATP. The probe exhibits very high selectivity and sensitivity toward GGT activity from in vitro to in vivo and in clinical samples, which offers a promising tool for investigations of the GGT-overexpressing related biological process including tumor diagnosis and prognosis.

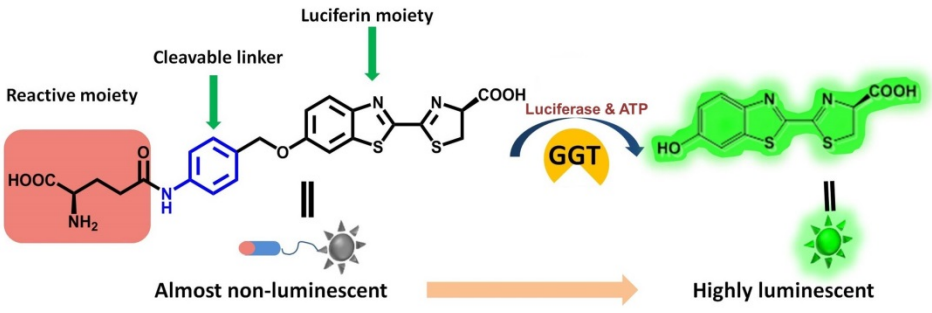

Figure 1. the structure of the GGT bioluminogenic probe and its detection mechanism

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