

Zinc as a biomarker can be used to diagnose the early stage prostate cancer, while ZIP1 protein, a zinc transporter is significantly down-regulated in prostate cancer cells. This behavior leads to the apparent alteration of the enrichment ability for zinc between early prostate cancer tissues and healthy tissues. This difference inspires us to develop a novel  $Zn^{2+}$  sensor that applies to the clinic diagnosis of early prostate cancer. We designed a tetrapeptide sensor H<sub>2</sub>L (Dansyl-Gly-Pro-Trp-Gly-NH<sub>2</sub>) according to the photo-induced electron transfer principle (PET), and it performed adequately in  $Zn^{2+}$  imaging of prostate cell lines. Based on the assessment of  $Zn^{2+}$  enrichment ability, there was distinctly lower  $Zn^{2+}$  concentration in prostate cancer cell lines than healthy prostate epithelial cells. Furthermore, H<sub>2</sub>L displayed high sensitivity with a detection limit as low as 49.5 nM, and high specificity for  $Zn^{2+}$  detection. Also the low toxicity and the superior cell permeability of H<sub>2</sub>L made the imaging of  $Zn^{2+}$  ions detection safe and rapid.