

### Highly sensitive and simple detection of intracellular caspase-3 based on metal-enhanced fluorescence (MEF) by bifunctional Au nanoparticle

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Caspase-3 is one of the most representative biomarkers related to cancer and neurodegenerative diseases. It exhibits proteolytic activity for the specific peptide sequence, Asp-Glu-Val-Asp (DEVD), which it recognizes and degrades specifically. In this study, we developed a site-specific proteolytic-reaction-based biosensor for the detection of caspase-3 by using metal-enhanced-fluorescence (MEF)-induced bifunctional Au nanoparticle (AuNP). This AuNP complex does not initially emit in the spectral region associated with the fluorophore because of the quenching effect of the AuNPs. Once caspase-3 recognized and cut the peptide between AuNPs and FITC, it separated from the AuNPs and emitted strong fluorescence. Using this detection method, we successfully detected caspase-3 with very high sensitivity, as low as 10 pg/mL. It is a rapid, simple, one-step method applied to proteolytic biomarkers of several diseases for early and straightforward detection. Acknowledgment: This research was supported by the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (No.2019R1A2C3002300 and No.2018R1A6A3A11051465).