

Genetically Encodable Click Reactions(GEN-Click) for Spatially Restricted Protein and Metabolite Labeling

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Chemical reactions for in situ modification of biomolecules within living cells continue to be developed. Among the re-actions available, bio-orthogonal reactions such as click chemistry using copper(I) and Staudinger ligation are now widely used for specific biomolecule tracking in live systems. However, currently available live cell copper(I) catalyzed azide/alkyne cycloaddition (CuAAC) reactions are not designed for spatially-resolved manner. Therefore, we developed a "GEN-Click" system that can target the CuAAC reaction catalysts proximal to the protein of interest (POI) that could be genetically expressed in a live cell. The genetically controlled, spatially restricted metal-catalyzed biorthogonal reaction can be used for proximity biotin-labeling of various azido-bearing biomolecules (e.g. protein, phospholipid, oligosaccharides) in living cell systems. Using GEN-Click, we could successfully detect the metabolite-transferring events at the cell-cell contact sites.

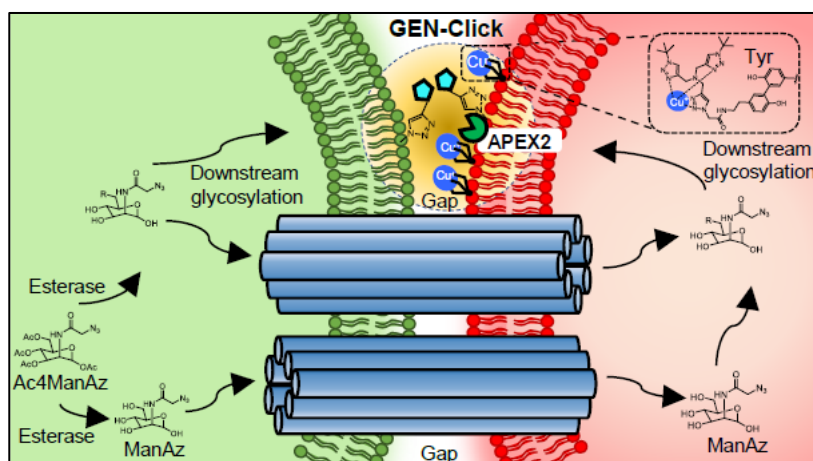


Figure 1. Schematic representation of metabolite transfer through Gap-Junction and cell surface labeling proximal to APEX2 expressing region using GEN-Click.