

Periodate mediated protein-polysaccharide bioconjugation by reassignment of tyrosine codon

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Recently, great efforts have been devoted to expanding the genetic code for the in vivo biological incorporation of non-canonical amino acids into proteins. This methodology will be useful to manipulate the protein with non natural amino acids that possess unique side chains, which could be used for probing protein function and structure.. Here, we report the global incorporation of 3, 4-dihydroxy L-phenylalanine (L-DOPA) into green fluorescent protein (GFPdopa) which altered the spectral and functional properties of the protein. The successful incorporation L-DOPA further facilitates the selective chemical cross-linking of protein-polysaccharide interaction in vitro. GFPdopa protein were oxidized upon sodium periodate (NaIO₄) which lead to the formation an orthoquinone intermediate that is subsequently attacked by nucleophilic side chains of amine group interacting polysaccharide. In general, we have developed an efficient bioconjugants by selective covalent cross linking using genetically encoded unnatural amino acid. Our current approach could be a valuable and efficient addition tool to the protein engineering field as well as for developing of protein-polysaccharide based therapeutics for mankind.