

Copper-Binding Peptides from Human Prion Protein and Newly Designed Peroxidative Biocatalysts

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A previous work suggested that peptides from the histidine-containing copper-binding motifs in human prion protein (PrP) function as peroxidase-like biocatalysts catalyzing the generation of superoxide anion radicals in the presence of neurotransmitters (aromatic monoamines) and phenolics such as tyrosine and tyrosyl residues on proteins. In this study, using various phenolic substrates, the phenol-dependent superoxide-generating activities of PrP-derived peptide sequences were compared. Among the peptides tested, the GGGTH pentapeptide was shown to be the most active catalyst for phenol-dependent reactions. Based on these results, we designed a series of oligoglycyl-histidines as novel peroxidative biocatalysts, and their catalytic performances including kinetics, heat tolerance, and freezing tolerance were analysed.

Key words: Artificial Enzyme, Peroxidase, PrP