

Proceeding Paper

Protein-Protein Interaction between Glyoxalase II and Specific Redox Dependent Proteins through S-Glutathionylation Modification [†]

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Abstract: S-glutathionylation, the reversible formation of a mixed disulfide bridge between a specific cysteine and a glutathione molecule, can occur spontaneously or be catalyzed by enzymes. Glyoxalase II (GloII), using its natural substrate SLG can form specific protein-SSG mixed disulfide leading enzymatic regulation of S-glutathionylation.

Keywords: glutathione; glutathionylation; Glyoxalase II



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1. Introduction

Glyoxalase II (Glo2), the second enzyme of Glyoxalase system, is an antioxidant glutathione-dependent enzyme, that catalyzes the hydrolysis of S-D-lactoylglutathione (SLG) to form D-lactic acid and glutathione (GSH) [1]. GSH is the most important thiol-reducing agent inside the cell. Due to its chemical features, GSH plays a crucial role not only in the cellular redox state but also in various cellular processes including protein S-glutathionylation. S-glutathionylation a process that involves the reversible formation of a mix disulphide-bridge between specific cysteine residues, and GSH can be spontaneous or catalyzed by an enzyme. S-Glutathionylation is also involved in the protection of protein thiol groups from irreversible oxidation and plays key role in redox regulation by activation/inactivation of different enzymes.

2. Methods

Glo2 and SLG were incubated with different proteins that are known to be glutathionylated, such as malate dehydrogenase, actin or cytochrome c purified proteins [2].

3. Results

During the hydrolysis of SLG, in the active site of Glo2 there is unprotonated glutathione molecule (GS⁻) which can be transferred to protein target [3]. These in vitro studies demonstrate the high propensity of Glo2 to aggregate with other proteins through its catalytic site, leading to an enzymatic regulation of S-glutathionylation in proteins of different origin and cellular compartmentalization.

4. Conclusions

Identification of active involvement of Glo2 in glutathionylation of different proteins. In this perspective, Glo2 can play a new important regulatory role in S-glutathionylation, acquiring further significance in cellular post-translational modifications of protein.

Supplementary Materials: The following are available online at <https://www.mdpi.com/article/10.3390/CAHD2020-08615/s1>.

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