

## Functional Characterization of Archaeon *Halobacterium salinarum* Thioredoxin

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*H. salinarum*, an extremely halophilic archaeon, grows in the environment containing more than 25% NaCl. The enzymes and proteins from this archaeon have thus been adapted to be active and stable in the hyper-salt and hyper-oxidation stress conditions. One of these enzymes is thioredoxin that is a family of redox proteins, a small, heat stable and redox-active ubiquitous protein that participates in various intracellular redox reactions. Therefore, they are important factors in regulation of oxidative stress by the interaction with target proteins. However, antioxidant activity of Archaeon Thioredoxin (ArcTRX) remains unknown. In this study, we evaluated the antioxidant activity by *in vivo* H<sub>2</sub>O<sub>2</sub> tolerance bioassay using complementary mutant *E. coli* system and *in vitro* MCO (Metal-Catalyzed oxidation) assay with pUC18 DNA. In addition, we also examined the antioxidant effect of ArcTRX on skin damage by reactive oxygen species (ROS) with treatment of ArcTRX to human keratinocyte cell line HaCaT. We also compared overexpressed ArcTRX with interacting-proteins in *E. coli* systems using the 2-DE proteomic approach. Thus, we characterized unique archaeon thioredoxin from *H. salinarum* (ArcTRX), it might be an effective scavenger for oxidative stress and modulate overall proteins.