

Characterization of the GntR Family Transcriptional Regulator Rv0792c: A Potential Drug Target for *Mycobacterium tuberculosis*

Authors : Thanusha D. Abeywickrama, Inoka C. Perera, Genji Kurisu

Abstract : Tuberculosis, considered being as the ninth leading cause of death worldwide, cause from a single infectious agent *M. tuberculosis* and the drug resistance nature of this bacterium is a continuing threat to the world. Therefore TB preventing treatment is expanding, where this study designed to analyze the regulatory mechanism of GntR transcriptional regulator gene Rv0792c, which lie between several genes codes for some hypothetical proteins, a monooxygenase and an oxidoreductase. The gene encoding Rv0792c was cloned into pET28a and expressed protein was purified to near homogeneity by Nickel affinity chromatography. It was previously reported that the protein binds within the intergenic region (BS region) between Rv0792c gene and monooxygenase (Rv0793). This resulted in binding of three protein molecules with the BS region suggesting tight control of monooxygenase as well as its own gene. Since monooxygenase plays a key role in metabolism, this gene may have a global regulatory role. The natural ligand for this regulator is still under investigation. In relation to the Rv0792 protein structure, a Circular Dichroism (CD) spectrum was carried out to determine its secondary structure elements. Percentage-wise, 17.4% Helix, 21.8% Antiparallel, 5.1% Parallel, 12.3% turn and 43.5% other were revealed from CD spectrum data under room temperature. Differential Scanning Calorimetry (DSC) was conducted to assess the thermal stability of Rv0792, which the melting temperature of protein is 57.2 ± 0.6 °C. The graph of heat capacity (C_p) versus temperature for the best fit was obtained for non-two-state model, which concludes the folding of Rv0792 protein occurs through stable intermediates. Peak area (ΔH_{Cal}) and Peak shape (ΔH_{Vant}) was calculated from the graph and $\Delta H_{Cal} / \Delta H_{Vant}$ was close to 0.5, suggesting dimeric nature of the protein.

Keywords : CD spectrum, DSC analysis, GntR transcriptional regulator, protein structure

Conference Title : ICBBBS 2018 : International Conference on Biotechnology, Bioinformatics and Structural Biology

Conference Location : Kuala Lumpur, Malaysia

Conference Dates : February 12-13, 2018