

Crystal Structure of Chicken Interleukin 1 Beta

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Interleukin-1 (IL-1) is an important factor in the inflammatory response and it involves in the various cellular activities including cell proliferation, differentiation and apoptosis. The IL-1 family contains two agonists (IL-1 α and IL-1 β) and a specific antagonist (IL-1 receptor antagonist, IL-1Ra). Also, IL-1 α and IL-1 β can be synthesized in the different cell lines such as monocytes, macrophages, neutrophils and hepatocytes. In circulation system, the major component of IL-1 is IL-1 β . IL-1 has been proved to act as a potential vaccine adjuvant to active T cell and enhance antibody production. However, only the structures of human and murine IL-1s have been solved. Therefore, the crystal structure of chicken IL-1 β would be determined to provide insight into this atomic structure for its medical application. In this study, the cDNA of chicken IL-1 β was first cloned into pET28a vector and then expressed in *E. coli* BL21. The high resolution diffraction data of chicken IL-1 β was collected from the BL13B1 beamline in NSRRC. The resolution of our crystal was up to 1.79 angstrom and the space group was P2₁2₁2₁. The crystal structure was determined by molecular replacement (MR) method. The overall structure of chicken IL-1 β is composed of 12 β -strands and one α -helix to form a barrel-shaped conformation. The electron density map in residues 36-41 & 55-64 is unable to be apparently observed, implying these regions have the high flexibility. According to the previous report, these two regions are critical for IL-1 receptor association. Therefore, the high flexibility in these regions is required to alter the local conformation and trigger the protein-protein interaction. Besides, the existence of an internal hydrophobic cavity in IL-1 β is important for the protein stability. These residues around the cavity are highly conserved in human or murine. However, several conserved residues were not found in the cavity of chicken IL-1 and its residue packing pattern is also unique. Our studies also reveal that chicken IL-1 has the novel biophysical properties, which is not observed in other IL-1s.

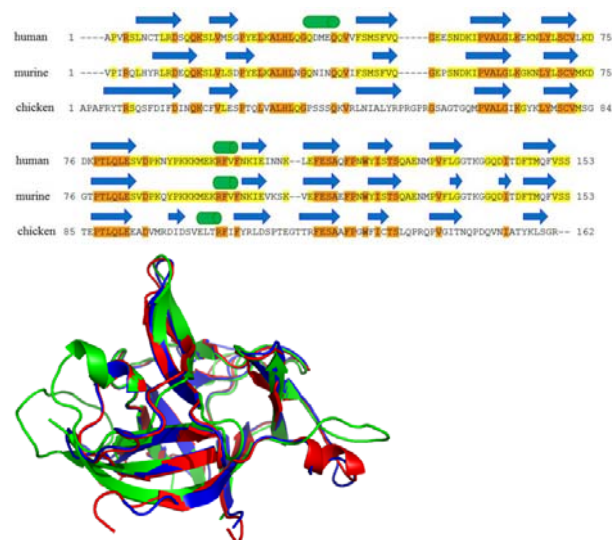


Fig. 1: IL-1 shows high sequences and structures homology. (A) The sequence of chicken IL-1 was aligned with human and murine IL-1 that structure had been solved. Blue arrows are the β -strand and green cylinders are α -helix. (B) Superimposition of human IL-1 (red), murine IL-1 (blue) and chicken IL-1 (green).

References

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