Mechanism of proteins to obtain functions from small structural changes now explained

The Oligomeric Protein Crystallography Team (Team Leader: Dr. Naoki Kunishima,) , the Advanced Protein Crystallography Research Group, the RIKEN Harima Institute, successfully introduce a new method of demonstrating the minute structural changes of proteins to show a novel type of enzyme response mechanism by using the results of enzyme crystallography. This mechanism is expected to contribute to the drug discovery.

Many proteins bring about structural changes using an external stimulus, and the structural changes, in turn, allow proteins to demonstrate functions specific to each of proteins. The structural changes observed in crystallography and other methods are not necessarily large in scale, and therefore only proteins that cause obvious structural changes have been the subject of research.

The research group established a new structural evaluation method that enables the relationship between minute structural changes and the functions of proteins to be examined. In this method, structural changes are first divided into two elements: rigid body change and localized change. Then, the minute structural changes of proteins are precisely examined and comparisons are made to obtain data.

The research group succeeded in determining the structure of the acyl-CoA thioesterase PaaI protein, an enzyme known to be associated with the degradation of biodegradable plastics, and visualizing and proving the existence of the half-of-the-sites reactivity phenomenon for the first time. The phenomenon was shown to be brought about by minute oligomeric structural change, which is referred to as an asymmetric induced-fit mechanism, thus demonstrating the phenomenon’s biological significance.
for the first time ever.

The research results were published in the September 9 issue of "Journal of Molecular Biology".

For more information, please contact:

RIKEN Public Relations Office
Email: koho@riken.jp