



LIFE SCIENCE

SPring-8 operates several beamlines for Life Science experiments. Researchers from universities, private companies and government laboratories around the world use these facilities, and many studies not only of crystallographic, but also of biological significance, have been reported.

To date, a wide range of crystals of biological macromolecules have been analyzed at SPring-8, and their structures have been revealed. For example, the crystal structure of the xenobiotic exporter protein AcrB from *Escherichia coli*, also known as a multidrug efflux transporter, has been determined by the multiple isomorphous replacement method at BL44XU. This structure allows us to understand the molecular mechanism of efflux transportation of xenobiotics by modeling the complex structure with an outer membrane channel protein, TolC. In addition, the crystal structures of sarcoplasmic reticulum Ca²⁺-ATPase (calcium pump) have been determined at a 2.6-Å resolution for the Ca²⁺-bound form and at a 3.1-Å resolution for the Ca²⁺-unbound form at BL41XU and BL44XU.

The structures of the various states of biological macromolecules are important for understanding the detailed molecular mechanisms of biological machinery. At BL45XU, the crystal structure of DNA-dependent RNA polymerase holoenzyme from *Thermus thermophilus* has been determined at a 2.6-Å resolution, and since RNA polymerase is the key enzyme of the transcription process, knowledge of the structure of the RNA polymerase holoenzyme has led to detailed elucidation of the molecular mechanism of transcription.

The crystal structure of the homologous-pairing domain of the human RAD52 protein for DNA repair (Rad52₁₋₂₁₂) has been determined at a 2.85-Å resolution. At BL45XU, an X-ray diffraction pattern has also been recorded from a single myofibril of muscle by generating microbeams using a pair of pinholes. This is the first example of X-ray diffraction recording from micrometer-sized hydrated, functional protein assemblies in a cell. The microfibril angle (MFA) in wood has been determined for various branch portions in Sugi, *Crypromeria japonica*, by small angle X-ray scattering (SAXS) at BL40B2. Meanwhile, at BL28B2, coronary microangiographic imaging has been carried out in isolated perfused rat heart to evaluate vascular responses.

Masaru Tanokura