

LIFE SCIENCE :



"Yamatsutsuji" - Japanese mountain azalea



"Sakura" - Japanese cherry

MEDICAL BIOLOGY

Two experimental methods are discussed in the articles of this section. One is X-ray imaging and the other X-ray diffraction. The experimental data obtained by these methods are quite different, X-ray imaging provides images in real space, whereas X-ray diffraction provides patterns in reciprocal space. However, what is common between these two methods is that both can be used to study biological specimens under native conditions. This enables us to study a function of a biological object. Even though the sizes of the objects are different by three orders of magnitude, the experiments described in these five articles were all carried out for the same purpose: to study physiological functions.

The article by Sasaki describes the most important result obtained by the new diffraction technique that enables us to observe motion of a single protein molecule. This technique was successfully used to observe motion of a potassium channel, which is biologically quite important. Similarly, Pearson and his colleagues studied a function of myosin, which is the motor protein that produces force in cardiac muscle. Both the potassium channel and cardiac muscle are indispensable in our life. X-ray diffraction was also used by Inoue and his colleagues to study the structure of hair cuticle, which is the top layer of human hair. The cuticle plays a major role in controlling penetration of chemicals into hair. Benzyl alcohol, which is used at all hair salons, seems to open a pathway of penetration in the cuticle for dyes.

The other two articles, biological functions are studied at a structural level about 1000 times larger by X-ray imaging. Kondoh studied blood vessels in the mouse brain by angiography. The images clearly demonstrated a change in the diameter of 100-200 μm blood vessels. Hooper and his colleagues studied penetration of air into the lungs using refraction-enhanced imaging. The results are significant in the management of breathing of a baby born preterm.

All these articles demonstrate that SPring-8 is now an established tool to study biological functions at different structural levels.

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