71 Cloning, genomic structure and chromosomal localization of the gene, mouse RTS and RECQL5β

Tatsuya OHHATA[1],2, Ryoko ARAKI[1], Ryutaro FUKUMURA[1], Asato KUROIWA[3], Yoichi MATSUDA[3], Kouichi TATSUMI[1], Masumi ABE[1], 1,[2]Transcriptome profiling group NIRS [2]Grad. Sch. Sci. Tech. Chiba Univ. [3]CAST Hokkaido Univ.

The RecQ helicase family with the conserved helicase domain in the open reading frame has been identified in many species. In human, five members of RecQ helicase family, RECQL, WRN, BLM, RTS (RECQL4) and RECQL5 have been identified. RECQL4 was determined as a responsible gene for Rothmund-Thomson syndrome exhibiting abnormalities in the skin and skeleton, juvenile cataracts, premature aging and a predisposition to neoplasia. RECQL5 has three alternative splicing form, α, β, and γ. Interestingly, only the RECQL5β is a molecule more than 100 kDa exhibiting tissue specific expression like WRN, BLM, and RTS. In this study, we isolated the RTS and RECQL5β from mouse and determined their DNA sequences, exon/intron genome structures and the chromosome loci. Our study facilitates functional studies through the reverse genetic approach and will contribute to understanding the role of the RecQ helicase family gene products.

72 Measurement of XANES at High Spatial Resolution in Biological Specimens and Its Application to Image Chemical Bonds

Atsushi ITO[1], Hiroyuki MATSUDA[1], Yuichi KUWANA[1], Mitsuaki OJIMA[2], Yoshinori KITAJIMA[3], Kunio SHINOHARA[4], [1]Dept. Applied Sci. Sch. Engineering Tokai Univ. [2]Dept. Health Sci. Sch. Pharmaceutical Sci. Nagasaki Univ. [3]Phton Factory Inst. of Materials Structure Sci. [4]Rad. Res. Inst. Faculty Med. Univ. of Tokyo

Absorption peaks in XANES (X-ray Absorption Near Edge Structure) have been widely recognized to be attributable to the absorption in specific chemical bonds. We have developed computer programs, by which 1) XANES of small areas in biological specimens are calculated from a set of images by X-ray contact microscopy taken at wavelengths around the absorption edge of an element, and 2) distributions of chemical bonds are obtained from these XANES spectra. We applied this method to the distributions of SH and SS compounds using XANES at the S-K absorption edge and DNA distribution using XANES at the P-K absorption edge. XANES of small areas in a mammalian CHO cell and human skin exhibited specific peaks corresponding to SH and SS compounds, and phosphorus-containing compounds (probably mainly composed of DNA). From these XANES spectra, distributions of these compounds were obtained at the resolution of about 0.5 μm.

73 X-ray Absorption Near Edge Structure of DNA Bases

Kentaro FUJII[1], Ken AKAMATSU[2], Akinari YOKOYA[1], Yasuji MURAMATSU[1], [1]SPring-8 Japan Atomic Energy Res. Inst. [2]Japan Sci. Tech. Corp.

Selecting a photochemical reaction site at specific base in a DNA molecule is important to understand the molecular mechanism of base damages by direct effect. We have investigated base selective excitation of DNA by inner shell photo-excitation. An inner shell orbital is highly localized, and the difference in binding energies of core electrons is large enough not only to allow the selective excitation of specific element, but also to open away to select a specific functional group. In this study, we observed the X-ray absorption near edge structure (XANES) spectra of DNA bases using the monochromatic soft X-rays (400 –560 eV) from synchrotron radiation (JAERI soft X-ray beamline, BL23SU in SPring-8). The obtained spectra were theoretically analyzed by the discrete variational density functional formalism (DV-Xα) method. Some of the results will be described at the session with emphasis on novel experiments for studies of DNA damages.