overcome by Elbashir et al who found that RNAi in mammalian cells can be achieved by chemically synthesized short interfering RNA(siRNA) that are 21nt in length, short enough to evade the host interferon response. Therefore, now this technique can be broadly used for analysis of mammalian gene functions. Furthermore, DNA vector-based approach has been also developed. We will report a practical and theoretical update on our and others approaches to silencing mammalian genes, and discuss the possible application of this new technology.

W-2-3 RNA interference of non homologous end joining related genes: an application to radiobiology

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RNAi is a process to knock down the expression of a specific gene by injecting double stranded RNA and first described in C. Elegance and other organisms. Recently, the application of this technique was extended to mammalian systems by introducing short interfering RNA (siRNA) which consists of double stranded 21 nucleotide RNA with two nucleotide 3′overhangs. In order to apply RNAi to radiation biology, we have succeeded in silencing a NHEJ related DNA-PKcs gene in normal human fibroblasts. As a result, normal cells were changed to radiosensitive cells by reducing the degree of DNA double strand break (DSB) repair (Peng et al 2002). We also have tired to knock down another NHEJ related gene, Ligase IV by using Hemagglutinating virus of Japan envelop (HVJ-E) and a partial success was obtained by increasing the radiosensitivty of normal cells. These results indicate that a strategy of transiently silencing a DSB repair gene may be useful in radiation therapy.

W-2-4 Biochemical and structural analyses of the human DSB repair protein, Rad52

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The Rad52 protein plays important roles in the homologous recombinational repair (HRR) of double strand breaks of chromosomal DNA. In this study, we found that the human Rad52 protein catalyzed homologous pairing, which is an essential step for the HRR pathway. The N-terminal domain of Rad52 was identified as the homologous-pairing domain by a protease mapping experiment, and we determined the crystal structure of this homologous-pairing domain at 2.85 angstrom resolution, which revealed that the eleven monomers tightly associate into a ring. Surface potential analysis revealed that the positively charged groove encircles the Rad52 ring and contains well-conserved amino acid residues. Among the residues, those essential for ssDNA and dsDNA binding were actually identified by a mutational analysis. Thus, Rad52 is likely to bind DNA outside the undecameric ring. Furthermore, the structure of an ssDNA bound to Rad52 was determined by NMR spectroscopy, and was found to be extended about 1.5 times relative to the B-form DNA, which is similar to that bound to the bacterial homologous-pairing protein, RecA.

W-2-5 Biologically uncommon D-amino acids in proteins from aged human tissues

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The homochirality of biological amino acids (L-amino acids) or the RNA or DNA backbone ribose (D-sugars) might be established before the origin of life. It has been considered that D-amino acids and L-sugars were eliminated on the primitive earth. Therefore, the presence and function of D-amino acids in living organism have not been studied. However, we have previously shown that Asp-151 and Asp-58 residues invert to the D-beta-isomers at a high degree in alpha A-crystallin from the human eye lens during aging. These modification can cause major changes in structure, since different side chain orientations can induce an abnormal peptide backbone. Similar reactions were also reported in beta-amyloid protein of Alzheimer disease. We suggests that UV irradiation is also closely related to the formation of D-beta-Asp in the protein of lens and skin from elderly person. We propose why racemization/isomerization occurs at specific sites in proteins.

New Dose Calculation System of A-bomb Dosimetry 2002 (DS02)

W-3-1 The process for the construction of DS02

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There has been observed the difference between measured neutron activation data and DS86 calculation. The measured data were lower than DS86 at the short range and higher more than 800 m ground range. The collaboration between US and Japan WGs began in 1994 and finished in 2003. The new AMS technique has been developed to measure neutron activation of Cl-36 and Ni-63. At the end of the 2001 we decided to perform intercomparison study between Eu-152 and Cl-36 measurements to solve the discrepancy between the measurement and DS86. The 9 exposed samples were selected for intercomparison of the Eu-152 and Cl-36 measurements. Eu-152 was measured by the Komura's group of Kanazawa University. Cl-36 was measured at three laboratories: Nagashima's group at University of Tsukuba, Straume's group University of Utah and Ruehm's group at Technical University of Munich. As the result of the intercomparison study, the Eu-152 and Cl-36 data each other agreed well within

1.2 km and also the data agreed with DS02.

W-3-2 (1)Measurement of Eu-152 and Co-60

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Residual activity data of 60Co and 152Eu were not enough to evaluate the dosimetry system DS86 in around 1987. Additional data of 152Eu, 60Co, 36Cl, 63Ni were accumulated both in Hiroshima and Nagasaki. The results of 152Eu in Hiroshima revealed that the measured data were 30–40% lower than the activation calculation based on the DS86 neutrons. The data beyond 1300 m ground range were not clarified because of detection limit o the gamma-ray measurement. The results of 60Co showed similar discrepancy as 152Eu. In the new dosimetry system DS02 (tentative name), the coordinate of the hypocenter, the height of burst, the yield of the bomb were reevaluated. As a result, residual activity data and calculations show good agreement up to about 1300 m at Hiroshima and Nagasaki.

W-3-3 Intercomparison of Eu-152

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Discrepancy between measured Eu-152 activity and theoretical calculation has long been discussed. Various ideas were examined to solve the problem on the bases that observed values are correct, however, agreeable answer has not been obtained. The Hiroshima and Nagasaki samples measured previously were re-measured by using extremely low background Ge detectors in Ogoya Underground Laboratory. As a results, Eu-152 could not be detected in the samples collected from more than 1000 m from hypo-center for Hiroshima and more than 600 m for Nagasaki. New Eu-152 measurements were conducted for kg-size Hiroshima samples and compared with Cl-36 measurement by AMS method. Eu samples separated and enriched by the JCAC were measured at Ogoya during March to August in 2002 by large volume well type Ge. As a result, Eu-152 activities in 10 samples collected at 146 m to 1400 m from hypocenter agreed well with theoretical calculation based on the DS86.

W-3-4 Intercomparision measurements of Cl-36

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As a part of reassessment study of A-bomb radiation dosimetry in Hiroshima and Nagasaki, the magnitudes of Cl-36 created in A-bombed granites through a (n,g) reaction have been measured by a means of a tandem accelerator mass spectrometry (AMS). In order to guarantee the reliability of result, three laboratories, Tsukuba, LLNL and Munchen, were involved into this study and measured the samples prepared from the same granites. Though each laboratory uses own developed AMS techniques, the agreement of result is sufficient and the results strongly support a new dosimetry system DS02. It will be reported the details of the Cl-36 AMS and will be discussed about the results.

W-3-5 ^{63}Ni Measurement by Liquid Scintillation Method

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Measuring of ^{63}Ni ($t_{1/2}$ = 100.1 y) produced by fast neutron induced reaction of ^{63}Cu(n,p)^{63}Ni enables us to evaluate the fast neutron fluence even at present. In order to determine the amount of ^{63}Ni produced in an exposed copper sample, we employed liquid scintillation method for the measurement of beta-rays from ^{63}Ni. The copper samples analyzed in this work were two rain gutters collected from Hiroshima University (slant range: 1502 m). The nickel in the copper sample was chemically extracted by electrolysis, solvent extraction and ion exchange methods. The chemical yield was determined to be 60–70% by ICP-AES. As a result, the ^{63}Ni produced in a copper sample exposed by Hiroshima Atomic Bomb was clearly detected by liquid scintillation method for the first time.

W-3-6 DS02 Evaluation of Sample-specific Calculated Doses for Thermoluminescent Dosimetry Measurements

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Dosimetry system DS86 included detailed calculations of gamma ray dose in individual samples (bricks and tiles) from Hiroshima and Nagasaki that had been measured by thermoluminescence (TL). Measurers took samples from superficial surfaces with a direct line of sight to the bomb, to get doses close to the kerma received by an infinitesimal sample suspended one meter above flat ground ("free-in-air (FIA) kerma"), but the actual in situ/FIA ratio varies. DS86 calculated in situ doses by