The National Institute of Radiological Sciences (NIRS) is Japan’s leading medical research institution dedicated to comprehensive research on radiation and human health. NIRS has carried out various scientific activities related to radiological sciences over the half-century since its foundation in 1957. This annual report summarizes our accomplishments and research outcomes in fiscal year 2013 (April 2013—March 2014).

NIRS continues its scientific research and development, according to the third mid-term plan (2011—2016), to promote medical applications of radiological sciences and to protect people from radiation injury. The work for restoration after the severe nuclear power plant accident in 2011 keeps NIRS staff busy. Training experts and professionals in radiological procedures and radiation protection is an important mission of NIRS in responding to the requests of society. Studies on the health effects of low dose radiation are the most important topics. NIRS has worked as an IAEA Collaborating Centre (IAEA-CC) since 2006. We completed the second term of IAEA-CC activities (2010—2013) in three scientific fields, including biological effects of low dose radiation, molecular imaging and carbon ion radiotherapy. This work has now been extended to the third term for another four years until 2017.

The efforts to integrate various scientific fields, from basic physics, chemistry, biology, engineering, and computer science to clinical medicine, have brought fruitful outcomes in a wide range of radiological sciences. The most successful outcome of these efforts is represented by realization of carbon ion radiotherapy. Clinical studies with more than 8000 patients during the past 20 years have clearly demonstrated the outstanding capability of this treatment for patients having locally advanced cancer. A new scanning system with pencil beam irradiation has further improved the treatment by providing a better dose distribution and shorter treatment period. Now, these results are being transferred to clinical practice in newly established facilities throughout Japan. Remarkable progress has been made in molecular imaging research which also requires the joint efforts of multidisciplinary experts. A new molecular imaging probe developed for detection of abnormal ‘tau’ protein in the brain of patients with cognitive disorders has attracted the world-wide attention of scientists and neurologists working in brain science.

Cancer, cognitive disorders and health effects of radiation exposure are the major health concerns of society nowadays. NIRS continues its efforts to deal with these problems, and to establish a solid base promoting comprehensive scientific research in a wide range of radiological sciences, as ‘Visible NIRS’, ‘NIRS in the World’ and ‘NIRS in History’.

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