BIOSAMPLE RESEARCH CENTER

Departmental Overview

Procedures for storing biosamples and managing biosample information at ABCC and RERF had been mostly dependent on individual research departments until recent years. To preserve these precious biosamples, which include blood (serum, plasma, and cells), urine, pathological specimens, blood smears, and teeth, in good condition over the long term, and to promote utilization of such biosamples, it was crucial to centralize their management and create a database for biosample information. In 2013, the Biosample Research Center (formerly Biosample Center) was established to undertake this work. With the goal of clarifying radiation effects on disease risks and on medical conditions among A-bomb survivors and their children, the Center is centralizing biosample management, and arranging appropriate storage for quality control in order to ensure effective utilization of these invaluable materials, donated by A-bomb survivors, their spouses, and children. To achieve these objectives, biosamples and their information previously collected by various departments are being moved to the Center, and most of the biosamples currently collected are processed and stored by the Center since 2015, with newly standardized preparation methods. The Center will implement LIMS (laboratory information management system) for biorepository to RERF for the management of all the workflows and the inventory and quality information of newly collected and preserved biosamples.

Because the 51 deep freezers currently installed in Hiroshima Laboratory for storage of biosamples had been filled to capacity, securing space for the biosamples became a task of the highest priority. In 2015, to solve the space issue, we introduced a robotic deep-freezer biorepository system (Brooks BioStore II) in Hiroshima to accommodate and effectively manage future samples, in addition to 674,000 existing biosample tubes compatible with the system.

Development of the Research Resource Center (RRC) as well as the Biosample Research Center is the top priority of RERF to facilitate internal and external collaborative research. To take full advantage of the invaluable biosamples, RRC will link the inventory and quality information of biosamples with epidemiological and clinical information to construct an RERF integrated database, with which internal and external researchers can search for biosamples necessary for their research on their own. Therefore, the Biosample Research Center must construct and constantly update a biosample database, and provide it to RRC whenever needed. In order to construct such a biosample database, the Biosample Research Center must utilize LIMS that can record and manage all of the workflows and the biosample inventory and quality information.

Quality evaluation of both aged preserved and newly collected biosamples is important to ensure the accuracy of data obtained by any analytical method. There are, however, no single indices or measurement methods for quality control that can be applied to various biosamples with different storage conditions and to various analytical methods. Therefore, protocols and methods of quality control will be established in consultation with an advisory committee.

FY2018 Achievements

Dr. Tanabe from Tohoku University was appointed to the director of the Biosample Research Center in July 2018 after Dr. Imaizumi had assumed the position of acting director until then. Dr. Kajimura was appointed to an assistant technical director of the Center in April 2018. The name of the Center was changed from "Biosample Center" to "Biosample Research Center."

Inventory Management and Storage of Biosamples

- Completed the inventory of about 885,000 blood and urine sample tubes among 963,000 tubes stored in -80˚C freezers or in liquid nitrogen tanks in Hiroshima (to 92% completion) by Oct. 31 2018.
- Completed the transfer of about 212,000 tubes of the archived biosample tubes into a robotic freezer among 674,000 tubes that are compatible with the freezer in Hiroshima (to 31% completion) by Oct. 31 2018.
- Completed the inventory of about 390,000 blood and urine sample tubes among 496,000 tubes stored in -80˚C freezers or in liquid nitrogen in Nagasaki (to 79% completion) by Oct. 31 2018.
- Newly stored 75,009 tubes of blood samples (Hiroshima 49,758, Nagasaki 25,251) and 15,487 tubes of urine samples (Hiroshima 10,471, Nagasaki 5,016) from Nov. 1 2017 to Oct. 31 2018.
- Extracted DNA from 4,664 preserved blood clots provided by 2,642 AHS participants by Oct. 31 2018, and evaluated the quality of the DNA by electrophoresis with an Agilent TapeStation.
- Updated the monitoring systems of freezers and liquid nitrogen tanks to maintain safety and security of stored biosamples in Hiroshima and Nagasaki.
- Determined approximate specifications for LIMS (laboratory information management system) to be implemented in RERF for the management of sample-processing workflows and the inventory and quality information of biosamples.

Preparation for Usage of Biosamples

- Selected candidates for members of an advisory committee for the operation of the Biosample Research Center and the quality control of biosamples, and invited them as speakers for workshops on "Biosample quality control" and "Data integration for utilization of biosamples" to exchange information and ideas.
- Drafted protocols for quality evaluation of preserved blood plasma, serum, and cells (including blood clot) as well as DNA/RNA extracted from the blood cells with the assay methods endorsed by ISBER (International Society for Biological and Environmental Repositories).
- Initiated collection of biosample quality information from RERF researchers who have used preserved blood samples for completed or ongoing research projects by using a specific questionnaire.

- Prepared detailed regulations and procedures on sample usage and sample use request forms to be reviewed by the Committee on Biological Samples.
- Reported recent progress of the Biosample Research Center at Local Liaison Council meetings to obtain understanding and support from the local community.