Issue Number 5 June 2009

BioResource now !

Our monthly newsletter features a variety of information, highlighting current domestic and international issues concerning bioresources.

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Research and Bioresources No.2

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Tohru Masui, Department of Biomedical Resources, National Institute of Biomedical Innovation

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Secrets in Anti-constipation Measures

Announcements (Details are available at http://www.nbrp.jp/)

- A poster exhibition on "NBRP *Drosophila*" and promotional activity of NBRP will be presented at the 9th Japanese *Drosophila* Research Conference (JDRC9).
  Date: July 6 (Mon.)–8 (Wed.), 2009.
  Place: YAMAHA Resort TSUMAGOI

The Japanese Association for Laboratory Animal Science launched a serial article on NBRP animal resources in "*Experimental Animals*"—the in-house journal—beginning from the second issue of Vol. 58.

Research and Resources No.2

Bioresources in the Ministry of Health, Labour and Welfare

—Supporting research in "Medicine as Human Biology"

Tohru MASUI, Manager, Dept. of Biomedical Resources, National Institute of Biomedical Innovation

The concept of carrying out research on humans as a model of a biological organism has been proposed for a long time. However, humans are considered too venerable to be treated as a model organism. For example, dissection of humans, prohibited for a long time in Western Europe, was permitted in the 15th century following authorization by the Pope. Dissection of humans had however been conducted in prominent medical schools in Italy prior to this authorization. In Japan, it is well known that human anatomy depicted in the Wakan Sansai Zue (Illustrated Japanese-Chinese Encyclopedia) is an ideological diagram imported from China. In addition, the fear of confronting death is significantly high in humans, leading people to revere animism and regard people who examine or coffin dead bodies as having unusual talents. In other words, people regard human death with a feeling of awe. Unusual talents can however lead to discrimination, one of the main motifs described repeatedly in Okuribito, a recent popular movie in Japan. In addition, recent controversies regarding organ transplantation laws may also be related to the venerability of human beings.

The operations of the Ministry of Health, Labour and Welfare (MHLW) concern human health and involve various investigations on the processes from birth to death in humans. Medical activities form a large part of the financial budget and attract significant attention. However, the budget for medical research on human biology (medical and biological research) is relatively insignificant. For example, the activities of MHLW are inconspicuous in the Department of Biomedical Resources, to which I belong.

In the last fiscal year, I was interviewed by two researchers from Europe and the USA, who were investigating medical administration in Japan. It was difficult for these researchers to understand the activities of the MHLW, especially in the field of medical and biological research and bioresources. The reason for this was that, in both the UK and the USA, medical and biological research is under the jurisdiction of the state department, which is equivalent to the MHLW. In comparison, these fields of research are under separate administrations in Japan. As medicine and medical and biological research have become inter-related in present times, both Europe and the USA have adopted a stance that the state department controlling medical care should also govern medical and biological research.

In contrast, Japan still takes a strong stance that medicine and medical and biological research should be treated separately and that strict discrimination of the two disciplines will maintain their originality. This view also appears to be supported by the general public and medical doctors.

I personally consider this idea to be fundamentally unsound and contend that both medical and biological research should be carried out in conjunction with general medical care of humans. Currently, there are many diverse choices for medical treatment. This reflects the uncertainties and experimental aspects included in medical treatments, although the health of the patients and dedication to provide the best medical care are given priority. In addition, no progress will be made in current medical practices without considering that the treatment of a patient provides a crucial opportunity for obtaining data that could be useful for treatment of the next patient. In other words, whether successful or not, medical care of a particular patient should be used as a reference when treating the next patient. This practice has been used by individual doctors for a long time. In the future, data standardization will facilitate the development of databases, which will be available as large-scale medical information. This will involve extensive groups of doctors and may presumably lead to "personalized medicine," where medical care is designed for each individual. However, it would be appropriate to think that "realization of personalized medicine" is to make good use of the medical care provided to a patient and then transfer this knowledge to treat the next patient.

In this regard, various bioresource projects are conducted in the MHLW, and therefore a conventional relationship between medicine and research needs to be reconsidered in order to further expand and improve these projects. Some of the projects in which we are involved are introduced briefly below.

The national centers affiliated with the MHLW include six institutions: National Cardiovascular Center, National Hospital for Geriatric Medicine, International Medical Center of Japan, National Center of Neurology and Psychiatry (NCNP), National Center for Child Health and Development, and National Cancer Center (NCC). Each of these institutions are involved in specific medical fields such as cardiovascular disease, aging-related disorders and diseases, infectious diseases, psychiatric and neural diseases, medical issues related to childhood health, and cancer, respectively. These institutions collect samples and information in accordance with their specialties for medical treatment and research. Some of the sample collections have global acclaim. Although a part of the collections can be provided to other institutions, most collections are used only for collaborative research within the institutions.

For example, the muscle bank at the NCNP is a collection of samples related to muscle disorders. The bank was established in the 1970s and has collected more than 10,000 samples, which are also requested by overseas institutions. In addition, the NCNP also manages a brain bank, which is a network-based bank incorporated within the medical policy network. In addition, from this fiscal year, the NCC will officially initiate the consolidation of a cancer-related bioresource bank.

Health

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These institutions will be transformed into independent administrative institutions next year. Therefore, bioresources will play a strategically important role in collaborating with other institutions.

In addition, the National Hospital Organization plans to activate the use of bioresources via the medical policy network.

I belong to the National Institute of Biomedical Innovation (NIBIO)[1] that conducts many bioresource projects, not necessarily on samples derived from humans. A brief description of the entire structure of our institution is provided below.

Tsukuba Primate Research Center[2] and Research Center for Medicinal Plant Resources[3] are located in Tsukuba, while Cell Bank[4], Gene Bank[5], and Laboratory Animal Resource Bank[6] are located in Osaka. The Research Center for Medicinal Plant Resources holds the sole large-scale collection of medicinal plants in the country and conducts unique activities that involve managing cultivation areas located in different climate zones, from Tanegashima to Hokkaido. The Tsukuba Primate Research Center was established to acquire monkeys for virus examination and includes a facility where infection testing can be conducted. The center is therefore important in view of current international precautions against infectious diseases. In addition, the NIBIO aims to establish databases of bioresources for disease-related research. I am in charge of this research and conduct investigative research in this area (i.e. medical bioresource project).

[1] : http://www.nibio.go.jp/english/
[2] : http://tprc.nibio.go.jp/eng/index_e.html
[3] : http://wwwts9.nibio.go.jp/ (Japanese only)
[4] : http://cellbank.nibio.go.jp/
[5] : http://genebank.nibio.go.jp/index_e.html
[6] : http://animal.nibio.go.jp/index.html.en

In this fiscal year, we are also planning to establish a resource bank for research on incurable diseases. The first half of the project aims to distribute biological resources, while the latter half aims to facilitate efficient use of the resources related to rare diseases by centralizing the samples. Both projects focus on human-derived research resources and are important for the administration of the MHLW.

Many projects at the MHLW involve bioresources and a full description of these projects will be presented in the future. However, it is important that human-derived bioresources are used in conjunction with links that provide the clinical history of each individual from whom the resources were obtained. Currently, there are only guidelines concerning the use of genomic information for administrating bioresource banks. In these guidelines, it is assumed that research is conducted on anonymous samples, which are not linked to subjects (depositors or patients) and their medical information. However, recent research often uses numerous samples, and it is assumed that disease classification occasionally changes according to the research achievements.

Indeed, in the field of hematological diseases, treatment methods as well as disease classifications in some cases have changed during the last 10 years. In this manner, medical care and research have joint functions that may currently affect individual health. It is an important change that these fields are considered inseparable.

As described previously, the difference between biological resources derived from humans and other species is ambiguous in some sense. Moreover, as stated in the guidelines, it is necessary to maintain the dignity and secure the basic rights of humans. However, uncertainties remain regarding the activities of future scientific research. In this regard, conducting research according to planned preliminarily research protocols will not adequately utilize human-derived bioresources. Therefore, there is a need to improve the institutional structures.

I have introduced human-derived bioresources at the MHLW. The world acts on the basis that humans are of paramount value. However, I have a background in zoological science and thus have no concerns when considering humans as a biological species. I am extremely pleased to see that the National BioResource Project (NBRP) introduces numerous biological organisms and also recognizes the value of species. This is especially relevant to me as this was a topic that interested and excited me during my school days. We look forward to further advancements in NBRP activities, which reflect the importance of mutual dependence between the numerous members worldwide.

Website of NIBIO

Erudite Lecture Series by Dr. Benno: No. 6

Secrets in Anti-constipation Measures

We recommended that women who could defecate only once every two weeks to eat at least 300 g of yogurt every day. As a result, constipation resolved within a week in most of the women. The ingestion of yogurt not only improved bowel movements but also caused marked changes in the composition of enteric bacteria. Hazardous bacteria such as Clostridium were decreased, while beneficial bacteria such as Bifidobacterium were increased.

Peristaltic activity that induces defecation occurs only once or twice a day. However, if an individual does not defecate at the urge of defecation, the rectum will gradually stop signaling and the urge will be lost. In addition, sufficient water content of the feces is necessary for normal defecation. The water content of healthy feces, which can be released without strain, is 80%, whereas that of hard feces is 60% or lower. If feces, which usually pass through the colon in a day or two, stay inside the colon for many days, it will become hardened as a result of the absorption of water content.

Yogurt however provides lactobacilli and bifidobacteria, and these bacteria producing acetate and lactate, which in turn, activate peristaltic motion and thus improve laxation.

Constipation is a serious problem, in both young and elderly people. In particular, constipation may occur regularly in bed-bound and demented elderly people due to weakening of the internal organs with age. Constipation develops in association with anorexia, resulting in slow bowel movements and in turn leads to a vicious cycle of constipation. Thus, an active intake of yogurt, lactobacillus beverages, and other high-fiber foods are recommended for these at-risk patients.

In a nursing home in Saitama Prefecture, laxatives are inevitably used in demented elderly people who cannot defecate by themselves due to constipation. However, people administered laxatives may defecate more than 10 times a day and suffer from diarrhea. Therefore, 250 g of yogurt was provided per day concomitantly with laxative for 20 days. As a result, the number of times the patients defecated decreased in 6 of 10 patients and were decreased by one-half in 2 of these 6 patients. Moreover, diarrhea was alleviated in all the patients, despite the feces not being as hard as normal motions. Constipation in elderly people, especially bed-bound or demented people, causes pain and discomfort, and therefore laxatives are often used. However, increasing the intake of lactobacillus and bifidobacteria will increase the quality of life and alleviate the burden on these people, as well as their caretakers.

This is a serious issue in our country with an increasing aging society. We are now in an era when yogurt and lactobacillus should be fully utilized to enhance our quality of life.

Coming up in the next issue !
The next month's issue will be
"Achievements in Wheat Research."

Editor's Note This month, a very complex ethical issue was taken up after the publication of our newsletters. The article written by Dr. Masui is based on his own experience as a patient, and he has now adopted a serious stance on this extremely important and complex issue. We do not wish to consider this matter taboo, but rather would like to contemplate an appropriate frameworks and system for the future. (Y.Y.)

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