Patient-derived “sarcoma” models; current status of NCC-sarcoma model series

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Sarcomas are unique mesencyhmal malignancies. Sarcomas consist of more than 50 histological subtypes, which exhibit different molecular features and clinical behaviors, and occur almost everywhere in human body. Although such complexity and diversity, sarcomas are rare; they account for less than 1% of all malignancies. Because of these characteristics, the development of novel therapy for sarcomas is challenging, and the effective anti-cancer drugs are limited in sarcomas. A lack of adequate cancer models is one of the major reasons why the clinical study and even basic research is difficult to conduct in sarcomas. Our systematic review revealed that only 136 cell lines are available from the public cell banks, and the most of available cell lines are derived from a few histological subtypes. Patient-derived xenografts are also difficult to obtain from any public domains. To address the issue of patient-derived sarcoma models, we started to establish cell lines and xenografts of sarcomas in 2014. Since then, we challenged tumor tissues of 300 sarcoma cases. We have presently established 40 each of cell line and xenograft. All established cell lines were published, and delivered upon a request by researchers. The model establishment cannot be achieved by any single institutes, because of sample availability and model accessibility. With this notion, we work with many researchers, doctors and companies outside our institute. We join to the international consortium to establish and utilize the cancer cell lines. Moreover, to promote the use of sarcoma PDX, we launched a collaboration study with Charles River Laboratories. We will make all our sarcoma PDX models available in the contract research worldwide. To expand the sarcoma model repertory, we launched a new collaborative study with the Tochigi Cancer Center, where many patients with sarcomas are treated and provide their tumor tissues for the medical research.

Using the established sarcoma models, we are currently investigating the correlation between the results of NCC Oncopanel assay and the response to molecular target drugs. The utility and limitation of oncopanel assay have been discussed in the clinical setting, and we aim to clarify the significance of actionable gene mutations in sarcomas in terms of prediction of clinical outcome.

All these result and research resources will be shared in the community of researchers in the near future. Sarcomas are typical rare cancers, and their problems such as scare availability of experimental models are common among the other rare cancers. Based on our experience, we hope to improve the research circumstances of rare cancer research.

[Awards]

2010 Kodama Memorial Award, Title: Electrophoresis Approach for Biomarker Development Towards Personalized Medicine, Japanese Electrophoresis Society
2009 Tamiya Memorial Award, Title: Cancer Biomarker Development by Proteomic Approach, Foundation for Promotion of Cancer Research
2007 26th Young Incitement Award, Title: Lung Cancer Proteomics towards Personalized Medicine – Biomarker Development to Predict Response of Recurrent Lung Adenocarcinoma to Gefitinib Treatment, Japanese Cancer Association
2004 Young Investigator Award, Title: Proteomics of Lymphoid Neoplasms – Proteome-mining for 2D Gel, Human Proteome Organization

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