Feature

Innovative methods for cancer treatment: World's first cancer stem cell model from iPS cells

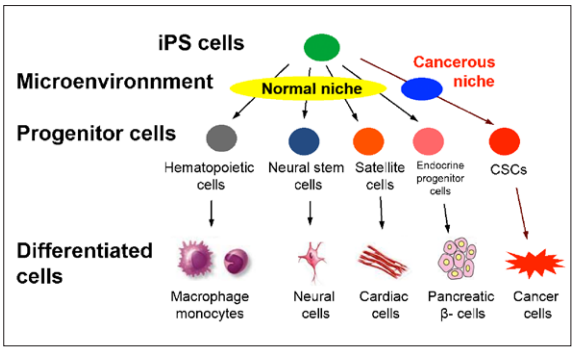
Professor Masaharu Seno, Lab of Nano-Biotechnology at the Department of Biotechnology, Graduate School of Natural Science and Technology, Okayama University,

Cancer has been the top cause of death in Japan since 1981 with an estimated 300 people out of 100,000 dying of the disease annually.

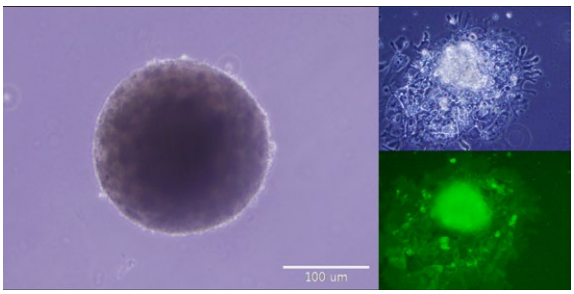
Professor Masaharu Seno, head of the Lab of Nano-Biotechnology at the Department of Biotechnology, Graduate School of Natural Science and Technology, Okayama University, is focused on finding new methods to treat the disease. "My research is focused on the development of innovative methods for cancer treatment," says Seno. "Specifically, my group is using induced pluripotent stem cells (iPSCs) to develop cancer stem cells (CSCs). Recently, we reported that cancer stem cells produced from mouse iPS cells, that then differentiate, are actually necessary for the maintenance of the cancer cells themselves. Understanding the mechanism governing the development of cancer is a major advance for the treatment of cancer. "

Professor Seno points out that his group's success lies in producing cancer stem cells from iPS cells, which when transplanted into nude mouse, retains the stem cell like properties overcoming the ethical issues."CSCs from iPSCs and from mice also provides an abundant supply of many different kinds of cancer cells for experiments," adds Professor Seno. "We are planning to produce a library of CSCs for customized cancer treatment."

Professor Masaharu Seno



iPS cells and microenvironment



CSCs from Human iPSC. A, a spheroid of CSCs in nonadhesive culture. B, CSCs in adhesive culture. C, staining of undifferentiated cells in panel B.

In the future Professor Seno is planning to collaborate with industrial partners to develop CSC libraries in the form of a consortium to manage cell libraries. The ready availability of CSCs would enable the establishment of novel systems to evaluate agents for cancer therapy "including those which were previously dropped by pharmaceutical companies".

The research on cancer is an extension of Professor Seno's expertise in the design of "functional physiologically and biologically active molecules for medicine and public health". Other projects include the development of highly efficient, in vivo drug delivery systems (DDS) using nano-capsules of proteins or lipids to reduce side effects associated with conventional approaches; novel procedure for profiling tissues and cells for DDS; and design of novel mutant proteins of betacellulin (BTC) for the tissue regeneration therapy of pancreatic islets in diabetes therapy.

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