



Title of Project : Development of Novel Treatment Strategies Targeting Cancer Stem Cells

Term of Project : FY2010-2014

Koichi Akashi
(Kyushu University, Graduate School of Medical Sciences,
Professor)

【Purpose of the Research Project】

Cancer is the major cause of death in advanced countries. Complete cure of cancer by drug is one of the most important themes for life innovation. It became progressively clear that cancer cells constitute a hierarchy like normal tissue, where cancer stem cells (CSC) is the origin of the whole cancer tissues. CSCs are resistant to conventional anti-cancer therapies, and cause relapse and metastasis by giving rise to new tumors. Thus, it is critical to develop novel therapeutic strategies eliminating CSCs. To this end, we will try to characterize CSCs, their niches, and their interaction that should play fundamental roles in maintenance of the CSC system. Our ultimate goal of this project is to establish a new paradigm of treatment strategies for cancers based on stem cell biology.

【Content of the Research Project】

(1) Isolation of CSCs

We will fractionate cancer cells from various types of hematopoietic, gastrointestinal, neuronal, mesenchymal cancer tissues. To test their stem cell activity, we will establish the next-generation immunodeficient mouse system that possess humanized Sirp α . Each fraction will be transplanted into this mouse line to rigorously evaluate its tumor-reconstitution activity.

(2) Isolation of CSC niche components

By visualizing CSCs, we will identify the niche components in vivo, and isolate the cells constitute microenvironment of CSCs.

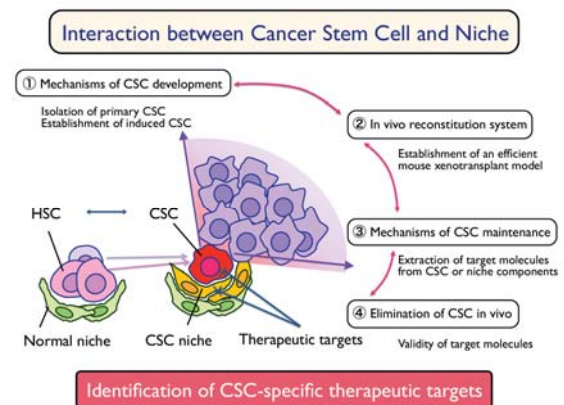
(3) Gene/protein profiling of CSCs and niche

Based on high-throughput small-scale profiling systems, we will identify the molecules that are specifically expressed in CSCs and their niches. To select therapeutic targets, these molecules are further validated by introducing new gene screening methods based on the system biology.

(4) Evaluation of therapeutic target molecules

By generating antibodies or low MW compounds against extracted target molecules,

we validate the anti-CSC activity in vivo.



【Expected Research Achievements】

We will isolate CSC populations as well as their niche components not only from hematological malignancies but also in solid tumor tissues. The information obtained from this investigation will be very useful to understand cancer stem cell biology. Moreover, these findings will be used to develop antibodies or other components to target cancer stem cells sparing normal stem cells. We hope development of such therapeutic strategies finally contribute to cure patients suffering from cancer in clinic.

【Key Words】

Cancer stem cells: Cancer stem cell (CSC) is a distinct cell population that is capable of self-renewal and production of cancer cells. The residual CSCs can provide a number of daughter cancer cells, resulting in relapse and metastasis.

Cancer stem cell niche: Cancer stem cell niche (CSC niche) is the microenvironment that is assumed to provide CSCs with various signals to maintain their stemness.

【Homepage Address】

<http://www.cancer-stem-cell.com/>