Data in Brief 5 (2015) 429–433

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Data of a fluorescent imaging-based analysis of anti-cancer drug effects on three-dimensional cultures of breast cancer cells

Junji Itou *[,1], Sunao Tanaka [1], Wenzhao Li [1], Yoshiaki Matsumoto, Fumiaki Sato, Masakazu Toi

Department of Breast Surgery, Graduate School of Medicine, Kyoto University, 54 Shogoin-Kawahara-cho, Sakyo-ku, Kyoto 606-8507, Japan

ARTICLE INFO

Article history:
Received 20 August 2015
Accepted 24 September 2015
Available online 8 October 2015

Keywords:
Anti-cancer drug
Breast cancer
Live imaging
Photoconvertible fluorescent protein
Pulse labeling
Three-dimensional culture

ABSTRACT

Three-dimensional (3D) cell culture is a powerful tool to study cell growth under 3D condition. To perform a simple test for anti-cancer drugs in 3D culture, visualization of non-proliferated cells is required. We propose a fluorescent imaging-based assay to analyze cancer cell proliferation in 3D culture. We used a pulse-labeling technique with a photoconvertible fluorescent protein Kaede to identify non-proliferated cells. This assay allows us to observe change in cell proliferation in 3D culture by simple imaging. Using this assay, we obtained the data of the effects of anti-cancer drugs, 5-fluorouracil and PD0332991 in a breast cancer cell line, MCF-7.

Specifications table

Subject area	Biology
More specific subject area	Cell biology, drug development
Type of data	Image, graph, figure

* Corresponding author.
E-mail address: junji-itou@umin.ac.jp (J. Itou).
[1] These authors contributed equally to this manuscript.

http://dx.doi.org/10.1016/j.dib.2015.09.037

How data was acquired	Microscope
Data format	Analyzed
Experimental factors	Breast cancer cells were cultured in three-dimensional condition.
Experimental features	Cells were pulse-labeled with Kaede-red fluorescent protein, and analyzed whether cells were proliferated. The effects of anti-cancer drugs were tested.
Data source location	Kyoto, Japan
Data accessibility	Data is in this article. The detailed procedure is in the supplementary material.

1. Value of the data

- Pulse-labeling with fluorescent protein is useful technique to analyze cell proliferation in three-dimensional culture.
- Non-proliferated cells are easily identified by pulse-labeling in three-dimensional culture.
- Our fluorescent imaging-based analysis can evaluate anti-cancer drug effects on cell proliferation.

2. Data, experimental design, materials and methods

In the process of drug development, animal studies are required to evaluate candidates obtained from two-dimensional (2D) cell culture. However, experiments with animals are costly and labor-intensive, and should be reduced to protect animals. Therefore, a useful pre-animal study model is in demand. Three-dimensional (3D) culture is considered to have more similar characteristics to the in vivo environment than to 2D culture, and is a favorable technique to fill the gap between 2D cultures and animal studies.

The desired function of most anti-cancer drugs is proliferative inhibition. In 3D culture, change in cancer growth is analyzed by observation of the size and the morphology of a colony, and it is difficult to judge whether alterations are due to changes in cell proliferation and/or survival. To overcome this problem, simple proliferation assay is needed.

We demonstrate a fluorescent imaging-based assay to analyze anti-cancer drug effects on 3D growth. We utilized a fluorescent protein Kaede for pulse-labeling. The fluorescent color of Kaede can be irreversibly changed from green to red (Kaede-red) by irradiation with short wavelength light [1]. We used a luminal breast cancer cell line, MCF-7, and performed pulse-labeling with Kaede-red for visualization of non-proliferated cells. Cells were treated with anti-cancer drugs, and subsequent changes in cell proliferation were analyzed.

2.1. Material and methods

A detailed procedure for the fluorescent imaging-based assay is described in the supplementary material.

Establishment and maintenance of Kaede-expressing MCF-7 cells were described previously [2]. For 3D culture, cells were suspended in 5% phenol red-free Matrigel (Corning, 356237, Bedford, MA, USA) and plated in a Matrigel-coated well of a clear-bottom 96-well plate (BD Falcon, 353219, Franklin Lakes, NJ, USA). Anti-cancer drugs we used were 5-fluorouracil (Wako, 064-01403, Osaka, Japan) and PD0332991 (Selleck Chemicals, S1116, Houston, TX, USA).