Fluorescent Probe for Labeling of Cancer Stem Cells

We are looking to out-license the technology for its commercialization.

Enables selective fluorescent labeling of cancer stem cells, without labeling normal stem cells

◆Background

Cancer stem cells present in cancer tissue survive treatment with chemotherapy or radiotherapy and cause cancer recurrence and metastasis after treatment due to their self-renewal and cancer-initiating abilities. Therefore, cancer stem cells have been visualized by fluorescence using molecular probes (e.g. Aldefluor™) that react with aldehyde dehydrogenase 1A1 (ALDH1A1), which is highly expressed in stem cells including normal stem cells. This method, however, has a problem of inability to distinguish between normal stem cells and cancer stem cells.

◆Description

Researchers at Kyoto University have developed a novel fluorescent probe (**CHO_βgal**) that selectively labels cancer stem cells by distinguishing them from normal stem cells.

➢ **Turn-on probe for identification of cancer stem cells**

CHO_βgal has a functional group as a substrate for ALDH1A1 as well as a functional group as a substrate for β-galactosidase, which is highly expressed in cancer cells. When these two functional groups are removed, **CHO_βgal** emits strong fluorescence in the near-infrared region (647-759 nm). Because no fluorescence is emitted until both groups are removed, cancer stem cells can be identified with a high signal-to-noise ratio (Fig. 1).

➢ **Cancer stem cell staining in cells and tissues without false-positive**

Because **CHO_βgal** does not respond to NSCs, cancer stem cell-specific visualization in both cells (Fig. 2) and tissue (Fig. 3) stainigs are possible.

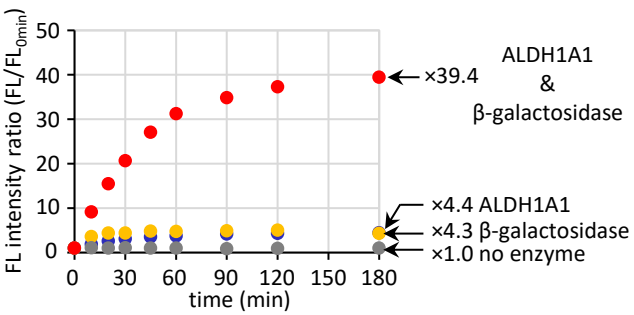

Fig. 1 Time-course of fluorescence intensity of CHO_βgal after reaction with enzymes

CHO_βgal emits strong fluorescence when reacting with both ALDH1A1 and β-galactosidase, but not when reacting with either one alone.

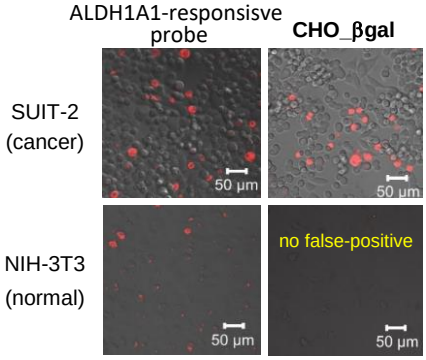

Fig 2 CLSM images of cancer and normal cells stained by our previous probe and CHO_βgal

False-positive signals from NSCs are suppressed in **CHO_βgal** staining.

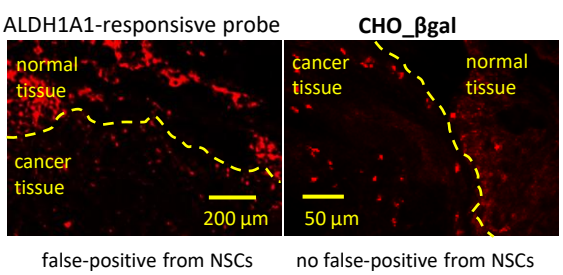

Fig. 3 Boundary region between cancer and normal tissues stained by our previous probe and CHO_βgal

In the case of our previous ALDH1A1-responsive probe, false positive signals are observed in both normal and cancer tissues. No fasle-positive signals from NSCs in **CHO_βgal** staining.

◆Development Status

- Cytotoxicity evaluated
- Cancer stem cells were successfully detected with the new probe in unfixed lungs of mouse models of lung cancer metastasis.
- Staining of tissue sections
  Confirmation of cancer stem cell detection by staining frozen sections, regardless of the presence or absence of normal tissue

◆Applications

- Research reagents
- In-vitro diagnostics
- In-vivo diagnostics

◆Intellectual Property

Patent pending
(PCT application in preparation)

◆Offer

- Patent license
- Option for patent license

◆Contact

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