

NeuroCult™

Reagents for Brain Tumor Stem Cell Research

Brain Tumor Stem Cells and the Neurosphere Assay

Multipotent neural stem-like cells or brain tumor stem cells (BTSCs), also known as cancer stem cells (CSCs), have recently been identified and isolated from different grades (low and high) and types of brain cancers, including gliomas, medulloblastomas, astrocytomas, and ependymomas.¹ Similar to neural stem cells, these brain tumor stem cells exhibit self-renewal, high proliferative capacity and multi-lineage differentiation potential in vitro.

The Neurosphere Assay is based on serum-free culture conditions containing specific mitogens that selectively allow neural stem cells (or BTSCs) and their progeny to proliferate and self-renew while maintaining their multi-lineage potential. Originally used to isolate, identify and expand neural stem cells, the Neurosphere Assay has recently been applied to the study of BTSCs. Importantly, the Neurosphere Assay may be a clinically relevant functional read-out for the study of BTSCs, with emerging evidence suggesting that renewable neurosphere formation is a significant predictor of increased risk of patient death and rapid tumor progression in cultured human glioma samples.^{2,3}

NeuroCult™ media and dissociation reagents have been used to:

DISSOCIATE TISSUE

- Dissociate human glioblastoma and oligodendroglioma samples⁴

CULTURE

- Culture human glioblastoma-derived⁵⁻⁸ and oligodendroglioma-derived⁹ tumorspheres
- Culture cells obtained from mouse models of medulloblastoma¹⁰ and glioma¹¹ as tumorspheres

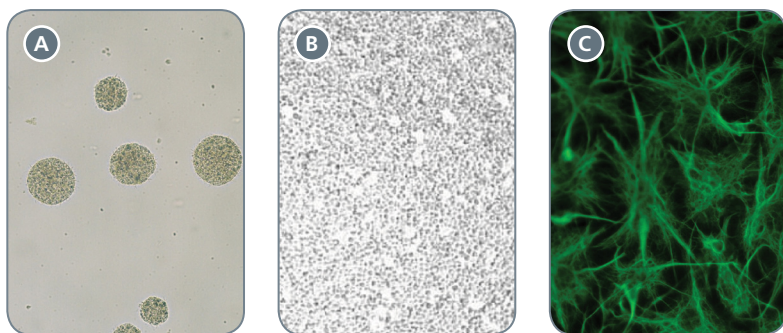
DIFFERENTIATE

- Differentiate brain tumor stem cells into neurons, astrocytes and oligodendrocytes¹⁰⁻¹¹

PASSAGE

- Passage/dissociate tumorspheres¹²

FIGURE 1. Representative images of cells cultured in NeuroCult™ products



A. Human neurospheres cultured with the NeuroCult™ Proliferation Kit (Human; Catalog #05751).

B. Mouse neurospheres dissociated to a single cell suspension using the NeuroCult™ Chemical Dissociation Kit (Catalog #05707).

C. Astrocytes (identified using an anti-GFAP antibody) generated by differentiating neural stem and progenitor cells with the NeuroCult™ NS-A Differentiation Kit (Human; Catalog #05752).

Ordering Information

STEMCELL Technologies offers standardized NeuroCult™ media for performing the Neurosphere Assay with human, mouse and rat neural stem cells. Components for all media and supplements are rigorously prescreened to ensure that you are using consistently high quality reagents for every experiment.

Products to Assess Self-Renewal and Proliferation Potential

PRODUCT	APPLICATION	CATALOG #
NeuroCult™ NS-A Proliferation Kit (Human)*	Human Proliferation Medium	05751
NeuroCult™-XF Proliferation Medium*	Xeno-Free Human Proliferation Medium	05761
NeuroCult™ Proliferation Kit (Mouse)*	Mouse Proliferation Medium	05702
NeuroCult™ NS-A Proliferation Kit (Rat)*	Rat Proliferation Medium	05771
NeuroCult™ Neural Colony-Forming Cell (NCFC) Assay Kit (Mouse)*	Colony Assay to Quantify Cells with High Proliferative Potential	05740
NeuroCult™ Neural Colony-Forming Cell (NCFC) Assay Kit (Rat)*		05742

*Requires supplementation with rh EGF (Catalog #02633). When culturing cells obtained from human, rat or adult mouse samples, rh bFGF (Catalog #02634) and Heparin (Catalog #07980) are also required.

Products to Assess Multi-Lineage Differentiation Potential

PRODUCT	APPLICATION	CATALOG #
NeuroCult™ NS-A Differentiation Kit (Human)	Human Differentiation Medium	05752
NeuroCult™ Differentiation Kit (Mouse)	Mouse Differentiation Medium	05704
NeuroCult™ Differentiation Kit (Rat)	Rat Differentiation Medium	05772

Products to Create Single Cell Suspensions

PRODUCT	APPLICATION	CATALOG #
NeuroCult™ Enzymatic Dissociation Kit for Adult CNS Tissue (Mouse and Rat)	Enzymatic Dissociation of CNS Tissue	05715
NeuroCult™ Chemical Dissociation Kit (Mouse)	Chemical Dissociation of Neurospheres	05707

Support Products

PRODUCT	QUANTITY	CATALOG #
rh EGF	200 µg	02633
rh bFGF	25 µg	02634
Heparin (0.2% heparin sodium salt in PBS)	2 mL	07980
ALDEFLUOR™	40 tests/kit	01700

References

- Vescovi, AL *et al.*, Nat Rev Cancer 6: 425-436, 2006
- Laks, DR *et al.*, Stem Cells 25: 980-987, 2009
- Panosyan, EH *et al.*, Pediatr Blood Cancer, 2010 (epub ahead of print)
- Platet, N *et al.*, Cancer Lett 258: 286-290, 2007
- Piccirillo, SG *et al.*, Nature 444: 761-765, 2006
- Gallia, GL *et al.*, Mol Cancer Ther 8: 386-393, 2009
- McGillicuddy, LT *et al.*, Cancer Cell 16: 44-54, 2009
- Zheng, H *et al.*, Cancer Cell 17: 497-509, 2010
- Jenkins, RB *et al.*, Cancer Res 66: 9852-9861, 2006
- Yang, ZJ *et al.*, Cancer Cell 14: 135-145, 2008
- Harris, MA *et al.*, Cancer Res 68: 10051-10059, 2008
- Wakimoto, H *et al.*, Cancer Res 69: 3472-3481, 2009
- Rasper, M *et al.*, Neuro Oncol, 2010 (epub ahead of print)
- Bar, EE *et al.*, Stem Cells 25: 2524-2533, 2007
- Quemener, V *et al.*, Neuro Oncol 9: 115-123, 1990

Did you know?

ALDEFLUOR™, a non-immunological tool for detecting aldehyde dehydrogenase-bright (ALDH^{br}) cells, has been used for isolation of glioblastoma brain tumor stem cells¹³⁻¹⁵. Learn more about ALDEFLUOR™ at www.aldefluor.com.