Study shows steps to isolate stem cells from brain tumors

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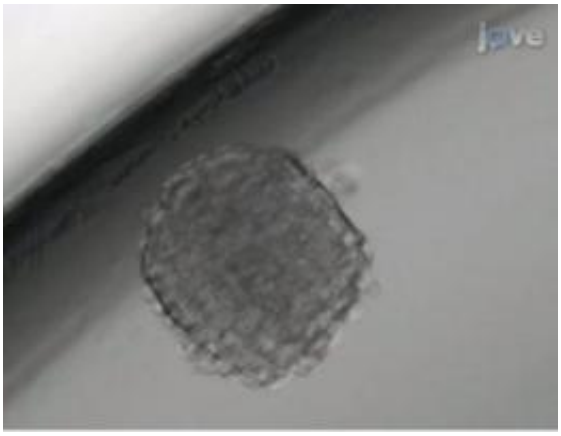

Here is a representative neurosphere cultured from brain tumor initiating cells. Credit: *Journal of Visualized Experiments*

A new video protocol in *Journal of Visualized Experiments* (*JoVE*) details an assay to identify brain tumor initiating stem cells from primary brain tumors. Through flow cytometry, scientists separate stem cells from the rest of the tumor, allowing quick and efficient analysis of target cells. This approach has been effectively used to identify similar stem cells in leukemia patients.

"Overall, these tumors are extremely rare, with only around one in 100,000 people being diagnosed with a primary brain cancer," Dr. Sheila Singh, co-author and neurosurgeon from McMaster University, explains. "However, these tumors are the second most common malignancy in the

pediatric population, and are behind only leukemia as the cancer with the highest mortality rate."

This publication is significant because it allows scientists to identify, purify, and study brain tumor initiating cells rapidly and without sample loss. Because these stem cells allow scientists to grow films in a petri dish, they serve as an effective model of a tumor expanding in the brain of a patient. Though not all tumors are actively driven by a stem cell, they do drive the most aggressively expanding tumors that lead to a negative prognosis. Typically, the median survival for patients with these types of tumors is fifteen-months, and they are almost uniformly fatal. Currently there is no prospect for a cure.

"Since 2003, we've been perfecting the technique to isolate stem cells from brain tumors," Dr. Singh explains. Stem cells have three key properties: self-renewal, multilineage differentiation, and longevity. Studying stem cells allow scientists to develop therapies that not only target the progenitor cells, but also many of the daughter cells. This is crucial because stem cells are often hard to eradicate without adverse effects to the rest of the body. Once daughter cells are identified, this procedure can be used to target and isolate these cells as well. Singh continues, "By describing the entire hierarchy of tumor progenitor cells, we can describe, characterize and target any point in the lineage. These techniques are going to help us characterize and isolate these cells to learn more about their molecular underpinnings and how to target them."

Given the small amount of tissue available to scientists like Dr. Singh, analytic procedures must be incredibly efficient and precise so as not to waste the precious material. Since Dr. Singh first identified brain tumor initiating cells, she has "recognized the difficulties in working with these tissues." Singh's lab "has focused on optimizing these procedures, which are limited by small cell numbers, to increase the data output." As such, *JoVE*'s unique video-text hybrid serves as an effective means to transmit

the procedures to Dr. Singh's colleagues and other cancer researchers. *JoVE* is the world's first peer-reviewed science video journal indexed in PubMed and MEDLINE.

More information: Singh et. al. www.jove.com/video/4111

Provided by The Journal of Visualized Experiments