CANCER STEM CELLS

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Glioblastoma Brain Cancer

• Highly malignant
  • Median survival for adults treated with radiation therapy is about 14.6 months
  • Fewer than 3% of patients are still alive 5 years after diagnosis
• Thought to be on account of presence of cancer stem cells (CSCs)
Background and Context

- Cancer stem cells in glioblastoma brain tumors
  - Heterogeneous mixture of stem cells and differentiated tumor cells
- Current therapies and their effectiveness
  - CSCs vs. differentiated cells
3D scaffolds

• How can researchers create a sustainable and developable model to study CSCs?

• 3D scaffold vs. in vitro
  • Effectiveness in animal testing—in vitro implantations have been unsuccessful where as cells cultured in 3D scaffolds have had more success
  • Both chemical properties of scaffold and 3D nature more accurately simulate the growth environment of CSCs in animals

• Biodegradable, easily manufactured
My Purpose

- Different types of scaffolds—C-HA, CA (chitosan alginate)
  - Which ones are most effective and consistent in creating CSCs to be researched?
- Testing using various protein indicators of CSCs through Western blot technique
Results—CD44

CD44/B-actin

CD44/B-actin

Cell Cultures

2D U87 D4 LMW EtOH D4 0.05 EtOH D8 0.05 EtOH D4 0.1 EtOH D8 0.1 EtOH D4 0.2 EtOH D8 0.2 EtOH

Cell Cultures

U87 2D D4 0.05 EtOH D8 0.05 EtOH U87 C-HA D4 U87 C-HA D7
Results—CD44 (continued)

CD44/B-actin 7/10/14

![Graph showing CD44/B-actin levels in different cell cultures.]

- U87 2D
- D4 LMW
- D8 LMW
- D4 0.05
- D8 0.05
- D4 0.1
- D8 0.1
- D4 0.2
- D8 0.2

Cell Cultures

0 0.5 1 1.5 2 2.5 3 3.5

CD44/B-actin
C-HA and 2D scaffolds

- Protein indicators used:
  - Nestin and GFAP
  - Id1
  - CD44
  - SOX2
  - GAPDH (control)
  - B-actin (control)
C-HA and 2D scaffold results (cont.)
C-HA and 2D scaffold results

2D scaffold vs. C-HA for CSC indicators
Conclusions

• C-HA vs. CA scaffold
  • Consistency of results of C-HA scaffold

• 3D scaffolds as models

• Where do we go from here?
  • Once the 3D scaffold can be perfected, other researchers around the world can easily receive the scaffolds and begin to grow their own tumors to study CSCs such that a new and more advanced therapy can be formulated to better attack glioblastoma brain cancer.