Isolation of Tumor Mesenchymal Stem-like Cells from High-grade Gliomas According to the Weight of Fresh Specimens

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Introduction

It is known that tumor mesenchymal stem-like cells (tMSLCs) can be isolated from high-grade gliomas and also play a role in glioma progression. Moreover, it has been reported that the success of tMSLCs isolation is a critical indicator of the overall survival of World Health Organization grade IV glioma patients. Despite these reports, attempts to isolate tMSLCs from surgical specimen are not always successful. Given that weights of surgical specimens from high-grade gliomas vary, we presumed that weightier surgical specimens would be better for tMSLC isolation.

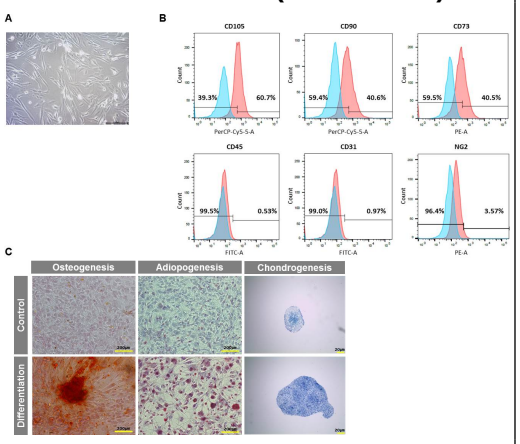
Methods

To test this, we assessed 51 fresh, high-grade glioma specimens and divided them into two groups according to success or failure of tMSLCs isolation.

Results

We found no significant difference in the weights of specimens in the two groups. We further found no significant differences between the two groups in terms of patient age, sex, pathological diagnosis, tumor type, or molecular markers. We did, however, determine that the estimated optimal weight of samples for tMSLC isolation was 180 mg.

Figure 1. Exemplification of tMLSC characterization (tMSLC15-88)

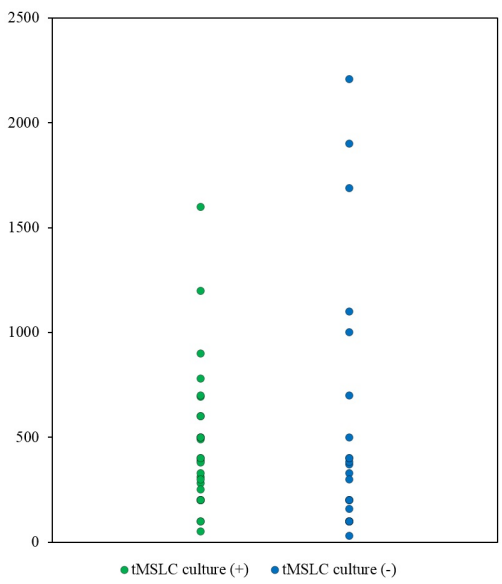


(A) Spindle-shaped morphology of tMSLC was detected by phase-contrast microscopy (x100). (B) MSC Surface antigen markers (CD105, CD90, CD73, CD45, CD31, and NG2) were detected by flow cytometry. (C) Differentiation of tMSLCs into osteogenic cells, adipogenic cells, and chondrogenic cells were evalutated by Alizarin Red, Oil Red O, and toluidine blue staining, respectively

Conclusions

Collectively, our findings indicate that, contrary to our expectations, the efficiency of tMSLCs isolation was not related to the weight of surgical specimens.

Figure 2. Weight distributions of fresh specimens in isolation-positive and isolation-negative groups.



A comparison of the mean value in each group (469.9 ± 341.9 mg vs. 546.7 ± 618.9 mg) revealed no statistically significant difference in the weights of surgical specimens between the two groups (P = 0.577, independent two-sample t-test)

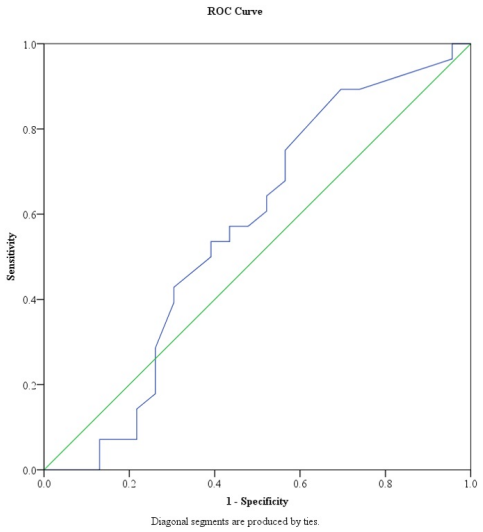
Learning Objectives

1. The weight of the specimen and the eficiency of tMSLCs isolation are not relevant.

2. Contrary to common belief, the weight of the specimen is negative correlation with the efficienc of tMSLCs isolation.

3. As known as, isolation of tMSLCs is related with negative prognosis.

Figure 3. Receiver-operating characteristic (ROC) curve for the isolation of tMSLCs



The value of area under curve (AUC) 0.599 indicates a poor capacity for discrimination, showing that specimen weight is unrelated to the success of tMSLC isolation.