CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
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Project Number
S1218

Project Title
The Comparative Effectiveness of CPAs DMSO, OCT, and Glycerol on Viability of Cells Extracted from Frozen Intact Teeth

Abstract

Objectives/Goals
The purpose of this experiment was to search for a cryopreservation solution that would allow for maintenance of dental pulp tissue vitality without the necessity of first removing the pulp tissues from the intact teeth prior to freezing.

Methods/Materials
8 human wisdom teeth were collected at the time of their extraction and placed in Hanks Balanced Salt Solution. Within 24 hours, 3 of the teeth were cut open and their pulp tissues were removed. These pulp tissues and the remaining 5 teeth were then placed into the following cryopreservation solutions: DMSO (control solution), DMSO/OCT, and DMSO/Glycerol (experimental solutions). The samples were then frozen in a -80 degree freezer. After 5 1/2 weeks, the samples were removed from the freezer and thawed. The cells were digested in collagenase type 1, suspended in PBS, and stained with Trypan Blue. Once stained, the cell suspensions were placed on a hemocytometer where the total number of cells and the total number of viable cells were counted in order to determine percent cell viability of the cells in each solution.

Results
The results showed that for all solutions, the samples of cells taken from pulp tissue frozen within intact teeth had lower percent viability than the samples of pulp removed from teeth prior to freezing. The results also showed that between the two experimental cryopreservation solutions that were used to freeze intact teeth, (DMSO/OCT and DMSO/Glycerol) the cells placed into the DMSO/OCT solution had a higher percent viability than the cells frozen in the DMSO/Glycerol solution.

Conclusions/Discussion
The results supported the hypothesis that, when intact teeth are cryopreserved, the pulp tissue with the highest cell viability will be from the tooth that was preserved in DMSO/OCT. By discovering the optimal solution for maintaining cell viability when freezing intact teeth the dental pulp stem cells located within the dental pulp tissue of the teeth can more easily be stored for future use in cell therapies.

Summary Statement
The search for a cryopreservation solution that can maintain the highest number of viable cells of the dental pulp tissue located within intact teeth.

Help Received
Oral surgeons extracted teeth and tested safety of blood from patients; used lab equipment at school lab under the supervision of Ariel Haas (teacher); mother (pediatric dentist) helped by opening the teeth, unsung dental hand piece