

The effect of storage conditions on the viability of periodontal ligament cells in rat tooth

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I. Objectives

Viable periodontal ligament cell is critical for periodontal healing of replanted and transplanted teeth. So the purpose of this study was to evaluate the MTT assay as a tool of periodontal ligament cell viability and to evaluate the viability of the periodontal ligament cells when stored in several different storage conditions such as Hanks balanced salt solution(HBSS), Dulbeccos modified eagle medium(dMEM), Viaspan and Likorol using MTT assay.

II. Material and Methods

A total of 140 teeth of 35 Sprague-Dawley white female rats of 4-weeks old with a body weight of about 100 grams (Daehan Biolink, Korea) were used. To facilitate the extraction, same pretreatment as the preliminary experiment was done.

The maxillary left and right, first and second molars were extracted as atraumatically as possible under the anesthesia with ketamine(0.1mL/100gm, Bukwang Phamarcological Co., Korea). 10 teeth each were immersed in 2 ml of HBSS(Gibco-BRL, Life technologies, Grand Island, NY, USA), Dulbeccos Modified Eagle Medium (DMEM, Gibco-BRL, Life technologies, Grand Island, NY, USA) with 1% penicillin and streptomycin, Viaspan^R (Dupont Pharma, Willmington, DE, USA), Likorol^R (Laboratories Chauvin OPSIA, France) for 1hour, 24hours and 1week at 4°C. 10 teeth each that were warm-dried for an hour served as negative control and 10 teeth each that immersed in MTT solution immediately after extraction served as positive control.

After the designated incubation period in the storage media, the teeth were placed in the 96-well plate and MTT assay was done. The mean optical density value were calculated and the weight of each tooth was measured.

The data were statistically analyzed using a one-way ANOVA. A level of p0.05 was accepted as statistically significant. A student-Newman-Keuls method was used to determine differences among the groups.

III. Results

In the means and SD of the ratios of MTT measurements and weight of corresponding teeth at 1 hour and 24 hours, there were no differences among the experimental groups of HBSS, DMEM, Viaspan (Fig. 1, 2). Likorol showed lower MTT measurement at 1 hr experimental period compared with HBSS, dMEM and Viaspan (p<0.05)(Fig. 4). At one week experimental period, Viaspan group showed significantly higher measurement compared with the other groups (p<0.05)

IV. Conclusions

Considering all the requirements of storage medium and the data from our study, Viaspan is the best storage media for preserving the periodontial ligament cell of extracted rat teeth in our laboratory environment.