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In vitro migration dynamics of gingival mesenchymal stem cells through micro perforated membranes

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Background: Migration through micro-perforated membranes might help in managing the periodontal defect isolation from surrounding regenerative elements problem caused by guided tissue regeneration occlusive membrane. Macro-perforated membrane affect the membrane mechanical properties and abolish its barrier effect against gingival epithelium and extracellular matrix components.

Materials & Methods: Gingival mesenchymal stem cells were seeded on the upper chambers of collagen-coated polytetrafluoroethylene trans-wells with readymade pore diameters of 0.4, 3 and poly carbonic acid trans-wells with readymade pore diameters of 8 microns. Bovine serum was added to culturing media in the lower chambers versus plain media in control groups. Migrated cells were counted, proliferation evaluated using MTT assay. Scanning electron microscopic images of the lower surface of perforated trans-well membranes

were obtained.

Results: Gingival mesenchymal stem cells migrated more significantly in FBS chemotaxis groups compared to the control groups. 8 microns perforated membrane groups showed statistically significant more cell migration compared to 3 and 0.4 microns groups, scanning electron microscope images confirmed cells migration through the perforations.

Conclusions: This study results demonstrated that micro membrane perforations of 0.4, 3 and 8 microns are suitable pore diameters for gingival mesenchymal stem cells migration to chemotactic media, and are occlusive for cell migration in negative control, without affecting membrane mechanical or occlusive properties, which can be used to develop GTR membrane with selective cell migration ability.

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