INSPIRING METHODS FOR CHRONIC PERIODONTITIS TREATMENT WITH THE 'GEISTLICH BIO-OSS' PREPARATION

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Abstract

Background: One of dentistry's biggest challenges is still the regeneration of periodontal tissues. Full structural healing is frequently not achieved by traditional treatments. In order to improve reparative processes, this study investigates a novel strategy that combines cellular technology—specifically, cultivated allogeneic fibroblasts—with osteoplastic materials (Geistlich Bio-Oss).

Goal: Using a comparative histological analysis in an experimental model of periodontitis, assess the effectiveness of cultivated allogeneic fibroblasts in the regeneration of periodontal tissue.

Supplies and Procedures: Wistar rat gingival biopsy samples were used to isolate allogeneic fibroblasts, which were then cultivated in Medium 199. Trypan blue staining was used to evaluate the vitality of the cells in a primary monolayer culture. Intact Control, Untreated Control, Metrogyl-Denta (Group I), Regenerin (Group II), and Cultured Fibroblasts (Group III) were the five groups of 50 rats used to imitate periodontitis. On the seventh day of the trial, histological analysis was carried out. Findings: There was substantial tissue damage and diffuse purulent periodontitis in the untreated group. Focused inflammation was lessened but remained persistent in Group I (Metrogyl-Denta). A shift to serous inflammation was seen in Group II (Regenerin). Group III (Cultured Fibroblasts), which exhibited strong mitotic activity, localized fibroblast proliferation around vasculature, and aggressive fibrillogenesis resulting in the quick development of

new connective tissue, showed the greatest reparative impact. In summary, the use of cultivated allogeneic fibroblasts performs noticeably better than conventional antibacterial and regenerative pharmaceutical agents. This technique speeds up the periodontium's structural regeneration and promotes active collagen formation, offering a scientific basis for combining cell treatment with bone-substitute materials like Geistlich Bio-Oss in clinical settings.

Keywords: tissue regeneration, allofibroblasts, periodontitis, histological study, and Geistlich Bio-Oss.

Overview of the Experimental Investigation of Periodontal Tissue Using Cultured Allogeneic Fibroblasts: Histological ResultsThe discipline of transplantology is now being advanced by the clinical application of cells generated in vitro.

Review of the literature: This approach avoids certain problems commonly associated with allotransplantation. After extended in vitro cultivation, cellular antigenic determinants decrease, leading to minimal or no immunological conflict. Furthermore, in vitro-grown fibroblasts do not cause cancer [6]. Increasing the efficacy of therapeutic measures and searching for alternative treatments are still crucial because periodontal disease is one of the most prevalent dental conditions. Thus, there is a lot of interest in using cell cultures, especially fibroblasts, to regenerate damaged tissues [1, 4].Previous studies have suggested that allogeneic fibroblasts may be used to treat periodontitis in conjunction with various carriers and cellular preparations [2, 3, 5, 12]. These cells have been grafted onto biopolymer films, dura mater, and osteoplastic materials [7–11, 13]. Comparing the histological evaluation of regeneration activities following fibroblast application to other cellular preparations has not yet been thoroughly investigated.ObjectiveThe goals of this work were to extract allogeneic fibroblasts from gingival biopsy samples and do a comparative histological analysis of periodontal tissue regeneration using cultured fibroblasts in an experimental context.

Supplies and Methods A technique for extracting allofibroblasts from gingival biopsies was created. Under aseptic conditions and local infiltration anesthetic, a 2 x 2 mm piece of mucous membrane was extracted from the hard palate, retromolar space, or oral vestibule. After being stored at a cold temperature in a sterile tube containing Hank's balanced salt solution and antibiotics, the biopsy was brought to the laboratory in three days.The cell technology lab used a 0.15% trypsin solution to do tissue deaggregation. Trypsinization continued for several cycles until tissue depletion using a magnetic stirrer. At a density of 500,000–600,000 cells ml, the cell suspension was seeded into Medium 199 after being centrifuged, filtered, and resuspended in a nutritional medium for counting. 10% fetal bovine serum was added as a supplement. Cultivation began at 37, with a medium change occurring every 48 hours. Phase-contrast microscopy was used to observe each day.Typical fibroblast-like cells were selected. For additional subculturing, a formed monolayer was used. To count the cells, the monolayer was treated with a 0.25 trypsin-Versene mixture and then incubated at 37 for 10 to 15 minutes. Cell viability was assessed in a Goryaev chamber using 0.1% trypan blue staining. An insulin syringe was then used to inject the cellular material 1 mm into the gingiva close to the tooth neck. Findings from the study The volume of the suspension ranged from 0.3 to 0.4. The administration's effectiveness was confirmed by the tissue tension and perifocal blanching of the mucosa.The following treatments were administered to 50 white Wistar rats that were divided into three experimental groups and two control groups: Group I: Metrogyl-Denta

Group II: Regenerin Allogeneic Culture

Group III: FibroblastsTo mimic periodontitis, periodontal tissues were mechanically damaged.

Histological examinations were performed on all groups, including the intact control group, on the seventh day of the experiment.Results and Discussion Primary fibroblast culture growth occurred in three stages: attachment and spreading (Phase 1), exponential division (Phase 2), and monolayer formation (Phase 3).Stratified squamous epithelium and

dense fibrous connective tissue with thick collagen bundles comprised the periodontium of Control Group 1 (Intact).Group 2 Control (No Periodontal Therapy): By day seven, significant anomalies in the underlying connective tissue and mucosa were observed. A neutrophil-dominated invasion comprising a mixture of macrophages and lymphocytes led to diffuse purulent periodontitis.The experiment's first group (Metrogyl-Denta): On day seven, generalized moderate edema and vascular anomalies (congestion, stasis) were found. The epithelium was partially necrotic. In contrast to the group that did not receive treatment, deep tissue damage persisted even if the medicine limited the inflammatory process to a targeted form.The experiment's second group (Regenerin): Morphological changes were associated with serous periodontitis. Tiny inflammatory infiltrates, primarily composed of lymphocytes, were observed in the connective tissue.The experiment's third group, the cultured fibroblasts, showed a robust anti-inflammatory effect along with increased basal cell proliferation and mitotic activity around the defect's borders. It has been demonstrated that fibroblasts actively produce collagen by proliferating focally around arteries in the stroma. This led to increased fibrillogenesis and the formation of new connective tissue.

In conclusion:, a technique for growing and morphologically evaluating monolayer cultures of allofibroblasts was developed in conjunction with an experimental model of periodontitis. Comparative data confirmed that: Untreated damage leads to diffuse purulent periodontitis with substantial destruction.Metrogyl-Denta results in localized purulent inflammation and surface imperfections.Regenerin promotes a transition to serous periodontitis and has stronger anti-inflammatory properties than Metrogyl-Denta.Cultured fibroblasts exhibit the most remarkable reparative effects, as seen by their rapid creation of new connective tissue and enhanced fibrillogenesis.

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