Influence of Root Canal Disinfectants on Growth Factor Release from Dentin

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**Aim**
- To develop a protocol for growth factor release from human dentin, to quantify the amount of 3 different growth factors, and to visualize their exposure on the dentin surface.
- To test whether different irrigation solutions and intra-canal medication influence the amount of growth factor released from dentin.

**Materials & Methods**
- Dentin disks of equal diameter and thickness were prepared from human extracted molars.
- **TGF-b1 Release**
  - Each disk was immersed in 100 mL test solution for 5, 10, or 20 min:
    - **Group A**: 10% EDTA, pH 6
    - **Group B**: 10% EDTA, pH 7
    - **Group C**: Citrate buffer, pH 5
    - **Group D**: Citric acid, pH 2
    - **Group E**: 17%EDTA, pH 7
    - **Group F**: Citric acid phosphate buffer, pH 7
  - All samples were subjected to growth factor quantification using ELISA test system for TGF-b1
- **FGF-2 and VEGF Release**
  - According to the results of the above exp, the release of the growth factors FGF-2 and VEGF, from dentin disks, was examined by treating disks with EDTA, 10% at pH 7 for 5, 10, and 20 min.
  - The amount of growth factor was determined by using ELISA test systems
- **TGF-b1 Release after the Use of Irrigation Solutions or intra-canal medication**
  - Irrigation solution used were:
    - **Group 1**: 2% CHX (5 or 10 min)
    - **Group 2**: 5.25% NaOCl (5 or 10 min)
    - **Group 3**: corticoid- antibiotic paste: Ledermix (48 hrs.)
    - **Group 4**: triple antibiotic paste (48 hrs.)
    - **Group 5**: 1%CHX gel (48 hrs.)
    - **Group 6**: Oil-based Ca(OH)2 (48 hrs.)
    - **Group 7**: water-based Ca(OH)2 (48 hrs.)
  - Subsequently, the disks were treated with EDTA for 5, 10, or 20 min, and the release of TGF-b1 into the EDTA solution was quantified via ELISA.
  - Results were compared with the release of TGF-b1 following 10% EDTA at pH 7.

**Results**
- Conditioning with 10% EDTA at pH 7 rendered the highest amounts of TGF-b1 release.
- FGF 2 and VEGF were detected after EDTA conditioning at low conc.
- Irrigation with CHX before EDTA increased TGF-b1 release while NaOCl had the opposite effect.
- All tested intra-canal dressings interfered with TGF-b1 release except water-based Ca(OH)2.

**Conclusion**
- Chances of success for procedures aiming at maintaining tooth vitality might increase after EDTA conditioning to release bioactive molecules from dentin.
- The use of CHX appears unproblematic, whereas NaOCl reduces subsequent growth factor release and might thus be restricted to the first visit.
- Ca(OH)2 as intra-canal dressing appears preferable in terms of subsequent growth factor release.
- High conc. of NaOCl and antibiotic paste decrease survival of stem cells.

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