

# EXPLORING COPPER SULFIDE PENETRATION IN MANDIBULAR ANTERIOR TEETH

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**OBJECTIVE:** Providing valuable insights into intricate root canal treatments and assessing the effectiveness of electrophoresis when combined with Cupral<sup>®</sup> and a finely dispersed Ca(OH)<sub>2</sub> paste. Additionally, we aimed to examine the copper sulfide penetration process in intact mandibular anterior teeth during electrophoresis and offer insights into its distribution patterns and effects within dental tissues through macroscopic and histological analysis.

## MATERIALS AND METHODS

We included 20 single-root lower teeth, all extracted for prosthetic reasons

Patients' ages ranged from 40 to 65 years

The study had two phases: macroscopic and histological examinations

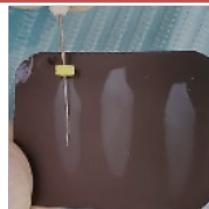
The first group, consisting of eight single-root teeth, used Cupral<sup>®</sup>, a compound based on copper and calcium hydroxide

Cupral<sup>®</sup> was made up of several components, including finely spread calcium hydroxide, calcium sulfate, copper hydroxide, copper sulfate, distilled water and methylcellulose

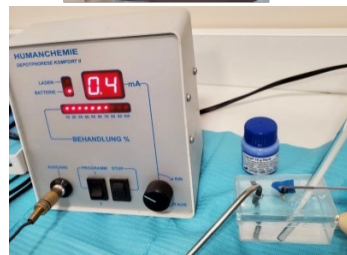
We applied it using electrophoresis in two sessions, with a 7-day interval between each session

The second group, consisting of eight single-root teeth, used a mixture created by combining one portion of Cupral<sup>®</sup> with nine portions of finely dispersed calcium hydroxide compound in a 1:9 proportion

The third group was the comparison group and had four more single-root teeth that were left untreated



1. Scouting of each tooth was performed using a manual 10.02 K-file



2. Tooth with open endodontic chamber immersed in plastic container filled with 0.9% saline solution (up to cervical level)

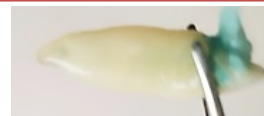
3. Using the KOMFORT II device to apply current, the electrophoretic current intensity was varied at a rate of up to 5 mA/min for each canal

## RESULTS

**Macroscopically, in the first group,** a blue-turquoise coloration of the crown and root was observed; aesthetically unacceptable



**In the second group,** no staining of this intensity was observed

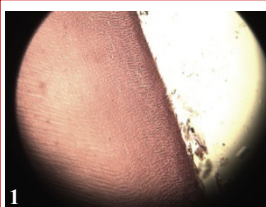


### 1° GROUP

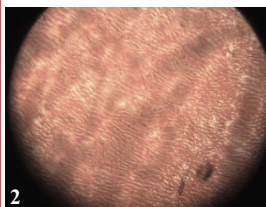
Application of **Hematoxylin-Eosin** stain to the slides; and examined them under a **Nikon E200** optical microscope at a **magnification of 400x**

### 2° GROUP

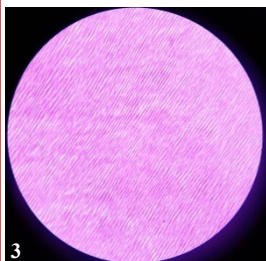
**Hematoxylin-Eosin** stain for the slides; examined using **Nikon E200** at a **400x magnification**



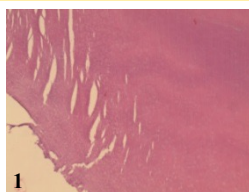
1. Infiltration of copper sulfide within predentin and dentinal canals



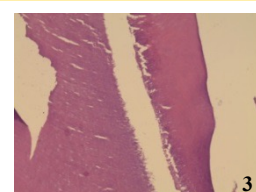
2. Copper sulfide appears as a substance of small brown granules with varying degrees of intensity



3. The intertubular dentinal matrix is not colored (therefore free of copper salts) due to the presence of inorganic substances



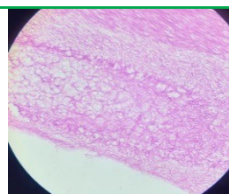
1. Areas of predentin slightly impregnated with copper sulfide are observed  
2. It is interesting to observe the non-uniform dispersion of copper particles infiltrating the dentinal canals



3. It is possible to observe areas where copper salts are completely absent

### 3° GROUP

**Hematoxylin-Eosin** stain for the slides; examined using **Nikon E200** at a **400x magnification**



➤ A normal dentin structure is observed in the dentinal walls of the root canal

**CONCLUSIONS:** Observing histologically how copper sulfide permeates the root canal system, can pave the way for innovative techniques and materials that enhance the success of endodontic treatments and reduce their failure rate.