Tissue optical clearing in the ultraviolet for clinical use in dentistry to optimize the treatment of chronic recurrent aphthous stomatitis

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The most difficult problems in diagnostics and therapy of biological tissues: *significant scattering and partial absorption of radiation*

**Optical clearing method helps to reduce the scattering of biological tissues**

**Optical clearing agents**

- **Hyperosmotic agents:**
  - Glucose
  - Sorbitol
  - Glycerol
  - Polyethylene glycol
  - Propylene glycol
  - Dimethyl sulfoxide

- **Isosmotic solutions:**
  - X-ray contrast agent iohexol
  - etc.
TEMPORAL TOTAL TRANSMISSION SPECTRA OF THE GINGIVAL TISSUE

87.5% glycerol
The efficiency of optical clearing of the gum mucosa tissue under the influence of optical clearing agents is maximal in the ultraviolet region.
CLINICAL PHOTOTHERAPY DEVICE

Ultraviolet and Visible Spectrum
CLINICAL APPLICATION OF THE DEVELOPED METHOD OF PHOTOTHERAPY CHRONIC RECESSIVE APHTOSIS STOMATITIS AND THE METHOD OF OPTICAL CLEARING WITH 87.5% GLYCEROL

Before treatment

Phototherapy using the optical clearing method

Treatment result
CONCLUSION

The “dynamic” transparency windows with a high efficiency in the UV are created in the human gingival mucosa during immersion optical clearing with 87.5% glycerol.

87.5% glycerol creates three new optical windows (200-250 nm; 250-300; and 300-400) with transmission efficiency peaks at 210 nm, 260 nm and 350 nm, that is 2500%, 1200 % and 860%, respectively.

These results are essential to improve efficiency treatment of dental diseases (in particular chronic recurrent aphthous stomatitis), as well as for methods of optical monitoring of morphological changes in the tissues of the oral cavity.
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