

A comparative clinical evaluation of LED- versus laser-activated in-office tooth whitening

Submission date 24/01/2026	Recruitment status No longer recruiting	☐ Prospectively registered ☐ Protocol
Registration date 27/01/2026	Overall study status Completed	☐ Statistical analysis plan ☐ Results
Last Edited 27/01/2026	Condition category Oral Health	☐ Individual participant data ☒ Record updated in last year

Plain English summary of protocol

Background and study aims

This study compares two commonly used professional tooth whitening methods—one activated by LED light and one activated by a diode laser.

Who can participate?

Adult patients with tooth discoloration.

What does the study involve?

Participants were randomly assigned to one of the two treatments. Tooth color changes were measured objectively using a digital device before and after treatment to evaluate and compare the effectiveness of the two systems.

What are the possible benefits and risks of participating?

Benefits and risks not provided at time of registration

Where is the study run from?

Grigore T. Popa University of Medicine and Pharmacy, Romania.

When is the study starting and how long is it expected to run for?

October 2025 to December 2025

Who is funding the study?

Investigator initiated and funded

Who is the main contact?

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Contact information

Type(s)

Principal investigator, Public, Scientific

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Additional identifiers**Study information****Scientific Title**

Comparative clinical evaluation of LED- versus laser-activated in-office tooth whitening using digital spectrophotometry: a pilot randomized clinical trial

Study objectives

The objective of this study is to compare the clinical effectiveness of LED-activated and diode laser-activated in-office tooth whitening systems using objective digital spectrophotometric assessment of tooth color changes.

Ethics approval required

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Ethics approval(s)

Approved 28/09/2025, Scientific Research Ethics Committee of the UMF "Grigore T. Popa" Iași (Str. Universitatii Nr.16, Iasi, 700115, Romania; +40.232.211.818; eticacercetarii@umfiasi.ro), ref: 643

Primary study design

Interventional

Allocation

Randomized controlled trial

Masking

Blinded (masking used)

Control

Active

Assignment

Parallel

Purpose

Treatment

Study type(s)

Health condition(s) or problem(s) studied

Tooth discoloration; dental aesthetics

Interventions

Participants were randomly allocated to one of two intervention groups: laser-activated tooth whitening using a diode laser system and LED-activated tooth whitening using an LED light system. Both interventions were performed in a single clinical session under standardized conditions.

The expected total duration of the study visit for each participant was approximately 60–90 minutes, including baseline assessment, intervention, and immediate post-treatment evaluation. There was no additional follow-up period, as all outcomes were assessed immediately after completion of the whitening procedure.

Method of randomisation:

Participants were randomly allocated in a 1:1 ratio using a computer-generated random allocation sequence (Microsoft Excel). Allocation concealment was ensured using sealed, opaque envelopes, which were opened on the day of treatment.

Intervention Type

Device

Phase

Not Applicable

Drug/device/biological/vaccine name(s)

Biolase Epic diode laser (940nm), Philips Zoom WhiteSpeed LED whitening system

Primary outcome(s)

1. Tooth color (ΔE) (color difference (ΔE) is calculated from CIE $L^*a^*b^*$ coordinates) measured using a digital spectrophotometer (VITA Easyshade) at baseline (pre-treatment) and immediately after completion of the whitening procedure (post-treatment)

Key secondary outcome(s)

1. Adverse events measured using clinical observation and patient self-reporting of any adverse events at occurring during or immediately after the whitening procedure

2. Clinical perceptibility of whitening: The proportion of participants achieving a clinically perceptible color change, defined as $\Delta E > 3.3$, measured using a digital spectrophotometric measurements. at immediately after completion of the whitening procedure, compared with baseline.

Completion date

19/12/2025

Eligibility

Key inclusion criteria

1. Healthy adults aged 18–45 years
2. Extrinsic or mixed-type tooth discoloration (Vita shade A3 or darker)
3. Good oral hygiene

Healthy volunteers allowed

Yes

Age group

Adult

Lower age limit

18 Years

Upper age limit

45 Years

Sex

All

Total final enrolment

12

Key exclusion criteria

1. Pregnancy or breastfeeding
2. Severe dental hypersensitivity
3. Active carious, periodontal, or oral mucosal lesions
4. Systemic diseases or known allergies to bleaching agents

Date of first enrolment

01/10/2025

Date of final enrolment

19/12/2025

Locations**Countries of recruitment**

Romania

Sponsor information**Organisation**

Grigore T. Popa University of Medicine and Pharmacy

ROR

<https://ror.org/03hd30t45>

Funder(s)

Funder type

Funder Name

Investigator initiated and funded

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary

Not expected to be made available