

## BACKGROUND

The purpose of this pilot study is to determine the effectiveness of the Microlux fiber optic transilluminator for detecting interproximal caries in dental patients with fixed orthodontic appliances in place.

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## INTRODUCTION

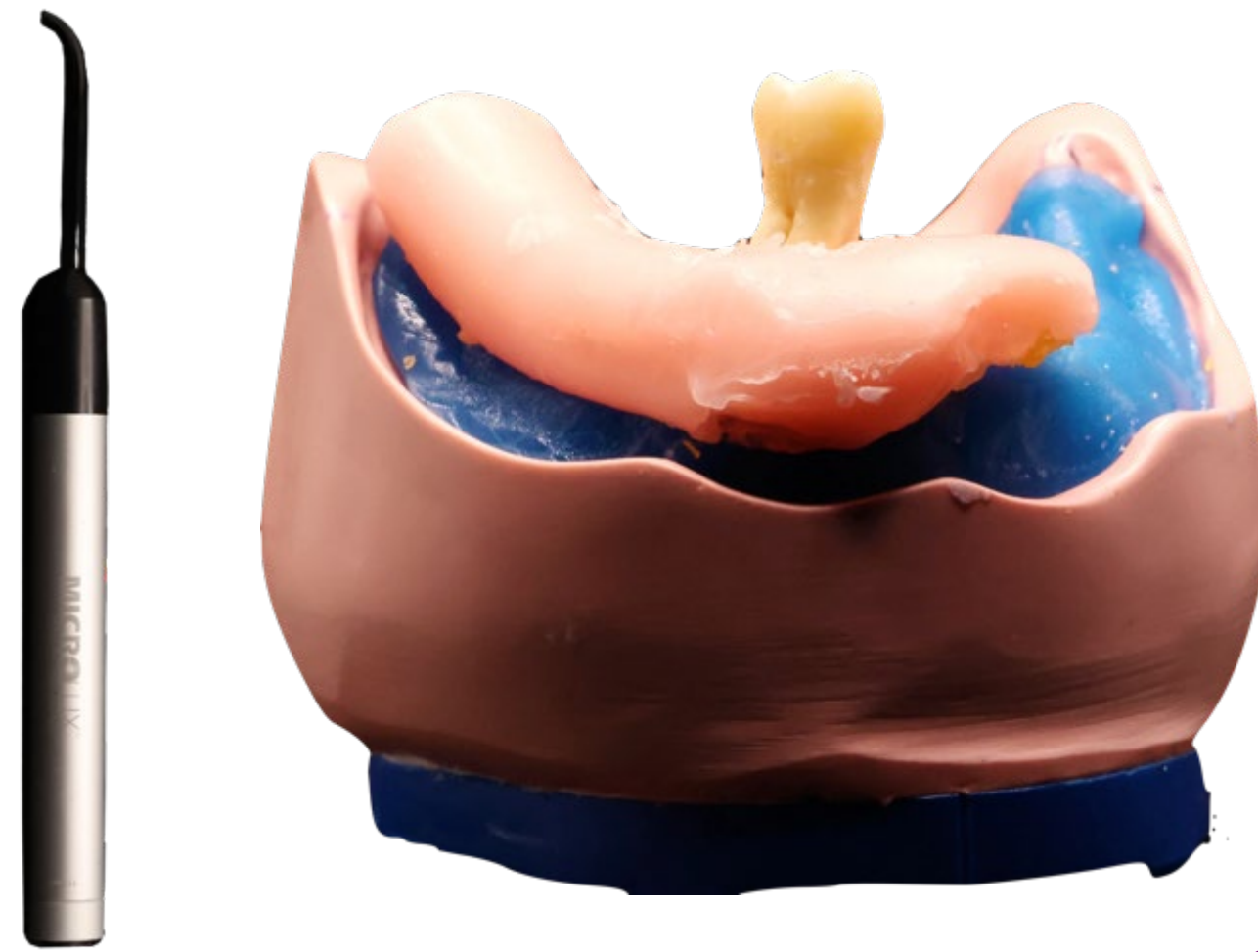
We aim to establish the usefulness of the transillumination technique when the standard therapy of diagnostic radiography is not possible without removal of appliances.

### Potential Benefits:

- Minimally invasive
- Cost effective
- Efficient
- Minimizes patients' risk of radiation exposure

## MATERIALS

- Edentulous mandibular model
- MEGATRAY blue light-curing custom tray material
- Baseplate wax
- Extracted teeth
- Microlux transilluminator
- Stainless steel band



## METHODS

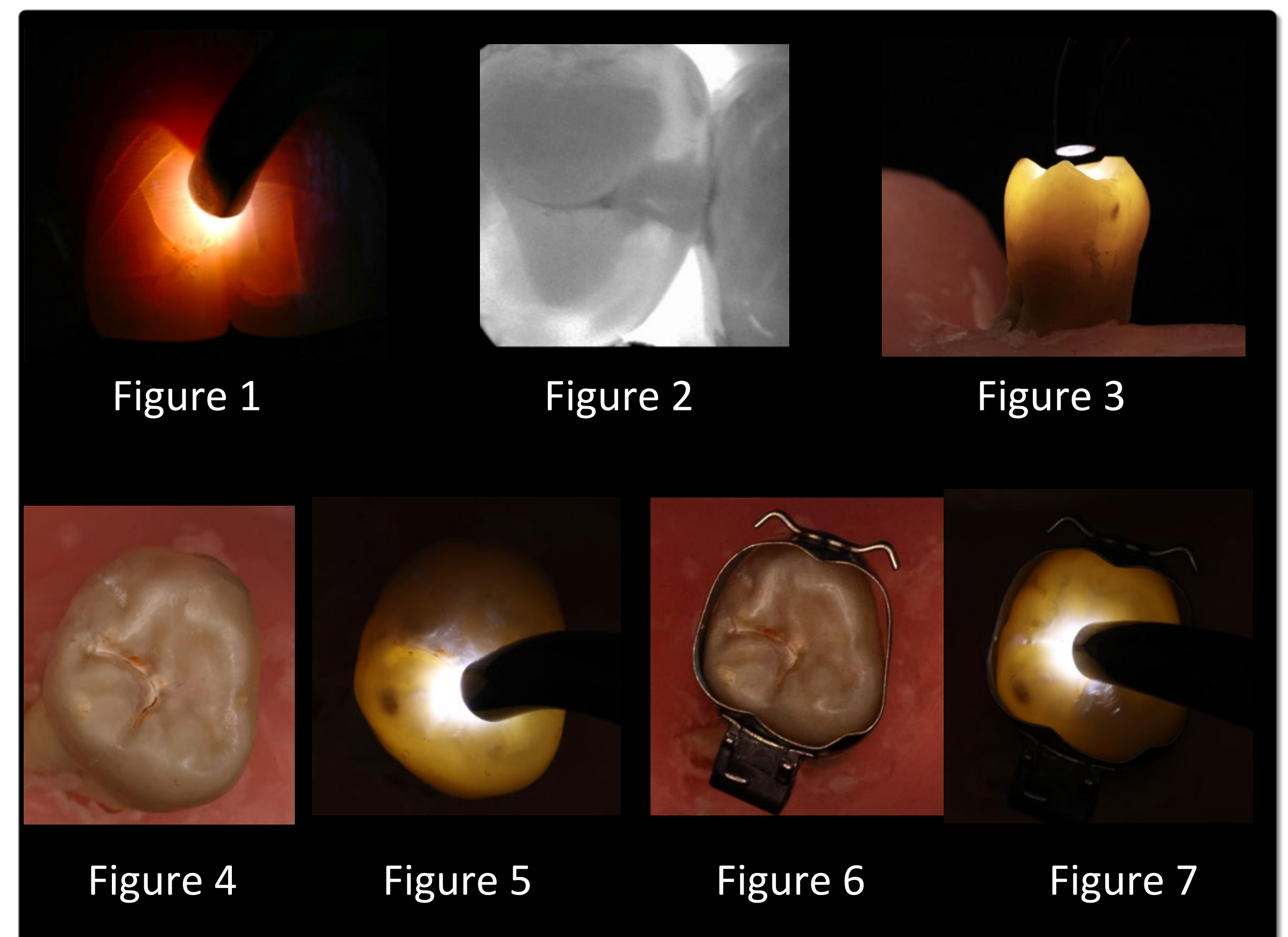
Three examiners who do not confer will independently use transillumination to detect interproximal lesions under stainless-steel bands on extracted teeth.

Lesions are pre-diagnosed by an independent researcher with a visual/tactile examination. This will be compared against the findings made by the three examiners.

## RESULTS

Our technique successfully detected previously invisible shadows in dental units, indicating its clinical relevance. However, our findings led us to reject the null hypothesis, as two out of three examiners showed statistically significant differences in their diagnoses. This suggests that the number of transilluminated diagnosed teeth does not accurately reflect the true diseased status of the teeth. Our study faced limitations, including a small sample size of carious teeth and an imbalance between carious and non-carious control teeth. We recommend repeating the experiment with a larger sample size and a balanced distribution of carious and non-carious teeth.

## IMAGERY



- Fig 1:** Transillumination of fractured teeth (A Moule & N Cohenca 2016)  
**Fig 2:** Transillumination of interproximal carious lesion (Jan Kühnisch *et al* 2015)  
**Fig 3:** Lateral view of extracted tooth being transilluminated  
**Fig 4:** Occlusal surface of extracted tooth  
**Fig 5:** Transillumination of extracted tooth, can appreciate discoloration in DB cusp  
**Fig 6:** Banding of extracted tooth  
**Fig 7:** Transillumination of occlusal surface of extracted tooth with fixed orthodontic appliance in place, can appreciate discoloration in DB cusp

## CONCLUSION

Our study suggests that periodic transillumination evaluation of teeth with fixed orthodontic appliances is recommended for patients undergoing orthodontic therapy. Although fiber optic transillumination alone may not adequately penetrate below the contact point of posterior teeth with orthodontic bands, it is important to acknowledge the limitations of our trial due to the small sample size. Further investigations with larger sample sizes are necessary to assess the efficacy of the fiber optic transilluminator in such cases. Additionally, exploring the diagnostic potential of the intraoral scanner system with transillumination in teeth with fixed orthodontic appliances, as highlighted by studies like Michou *et al.*, can significantly advance caries detection and monitoring in clinical practice. The integration of near-infrared imaging (NIRI) technology into intraoral scanners offers a promising avenue for caries detection, enhancing comprehensive patient care and promoting collaboration between orthodontists and general dentists. Further research is needed to evaluate the potential benefits and feasibility of implementing NIRI technology as a viable alternative to fiber optic transilluminators.

## FUTURE STUDIES

The utilization of near infrared imaging (NIRI) technology in an intraoral scanner, as demonstrated by Sobral *et al.*, presents a potential solution for caries detection in teeth with fixed orthodontic appliances. Their study protocol compares the diagnostic performance of the intraoral scanner with NIRI technology to fiber optic transillumination, clinical examination, and laser fluorescence. Insights gained from this investigation can enhance caries diagnosis in orthodontic patients, contributing to improved clinical practice. Additionally, Michou *et al.* explored the validity of an intraoral scanner system equipped with NIR transillumination and found it to exhibit comparable diagnostic performance to the DIAGNOCam, especially for initial caries lesions. These findings emphasize the potential of NIR technology for caries detection. Moreover, the complementary nature of transillumination and optical coherence tomography (OCT) for diagnosing enamel caries is highlighted in a Cochrane review. These techniques offer non-invasive detection and early-stage caries identification. Incorporating transillumination, NIRI, and OCT into conventional diagnostic approaches can enhance precision in caries diagnosis and monitoring, particularly in challenging orthodontic cases, leading to improved treatment outcomes and patient care.