

# Investigating how assessing gingival recession on 3D scans of teeth compares to dentists' standard clinical assessment

<b>Submission date</b> 12/03/2024	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
<b>Registration date</b> 22/03/2024	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
<b>Last Edited</b> 06/02/2026	<b>Condition category</b> Oral Health	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

Gingival recession happens when the gingiva (gum) starts to shift, either close to the tooth or between the teeth. This can cause sensitivity and lesions where the tooth root is exposed. When you go to the dentist, the clinician assesses if you have recession or not and may monitor the progression of the recession. This is usually done by the dentist identifying landmarks of the teeth and gum that are typically visible in recession. However, these landmarks are not always visible, and the current detection procedure can be inaccurate and difficult to manage. The study will compare a visual assessment of your recession (if you have any), with the recession recorded from your scan. Having an algorithm that can aid in detecting gingival recession on scans would be useful for both clinicians and patients, as you might save time and effort from the current recession detection methods that are used in general dentist practice today. This project is about collecting data that will be used later to check if an algorithm detects gingival recession from intraoral scans comparably to an in-clinic assessment of recession. This research is to aid the Danish company, 3Shape, in developing an algorithm for gingival recession detection aid, which may assist dentists in the future and therefore improve gingival recession management.

### Who can participate?

Healthy volunteers aged 18 years or above

### What does the study involve?

The study involves getting a 3D scan taken by a dental professional and having the gingiva assessed by standard dental care for assessing gingival recession.

### What are the possible benefits and risks of participating?

The possible benefits of participating is discovering the volunteer may have oral conditions they were unaware of. The risks relate to general discomfort many people feel when going to the dentist, such as minor discomfort from having devices in their mouth. The risks are minimal as all devices being used are marketed, and all procedures are standard care procedures.

Where is the study run from?

The Dental Clinical Trials Unit at Bristol Dental Hospital under the University of Bristol (UK)

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

January 2024 to January 2025

Who is funding the study?

3Shape TRIOS A/S (Denmark)

Who is the main contact?

Prof. Nicola West, N.X.West@bristol.ac.uk

## Contact information

### Type(s)

Public, Scientific, Principal investigator

### Contact name

Prof Nicola West

### Contact details

Lower Maudlin Street

Bristol

United Kingdom

BS1 2LY

+44 (0)117 342 9638

N.X.West@bristol.ac.uk

## Additional identifiers

Integrated Research Application System (IRAS)

339903

## Study information

### Scientific Title

Investigating the utility of 3D intra-oral scan imaging to detect gingival recession compared to clinical assessment

### Acronym

CIS002

### Study objectives

Gingival recession happens when the gingiva starts to shift, either close to the tooth or between the teeth. This can cause sensitivity and lesions where the tooth root is exposed.

When you go to the dentist, the clinician assesses if you have recession or not and may monitor the progression of the recession. This is usually done by the dentist identifying landmarks of the teeth and gingiva that is typically visible in recession. However, these landmarks are not always visible, and the current detection procedure can be inaccurate and difficult to manage.

Having an algorithm that can aid in detecting gingival recession on scans would be useful for

both clinicians and patients, as you might save time and effort from the current recession detection methods that are used in general dentist practice today.

This project is about collecting data that will be used later to check if an algorithm detects gingival recession from intraoral scans comparably to an in-clinic assessment of recession. In this study, teeth and mouth are examined in order to assess the level of recession, if any. This research is also to aid the Danish company, 3Shape, in developing an algorithm for gingival recession detection aid, which may assist dentists in the future and therefore improve gingival recession management.

### **Ethics approval required**

Ethics approval required

### **Ethics approval(s)**

approved 13/02/2024, London - Riverside Research Ethics Committee (2 Redman Place, Stratford, E20 1JQ, United Kingdom; +44 (0)207 104 8171; riverside.rec@hra.nhs.uk), ref: 24/PR/0088

### **Study design**

Single-centre non-randomized non-interventional cross-sectional study

### **Primary study design**

Observational

### **Study type(s)**

Screening

### **Health condition(s) or problem(s) studied**

Healthy volunteers with varying degrees of gingival recession ranging from no recession to severe recession

### **Interventions**

This study is a single-arm, cross-sectional, open single-site study that uses CE-marked medical devices within its intended purpose and involves standard dentist procedures.

After enrolment, the participant's mouth (teeth, gingiva, palate, tongue) will be examined. Then, the participant will be scanned with an intraoral 3D scanner (3Shape TRIOS A/S, Copenhagen, Denmark). An examiner (dentist or dental research nurse) will clinically assess gingival recession using a periodontal probe as per standard procedure. This is the end of participant involvement.

Another examiner (dentist or dental research nurse) who is blinded to the clinical assessment will assess gingival recession directly on the scan.

After a wash-out period of 2 weeks, the first examiner who did the clinical assessment will assess gingival recession directly on the scan. After a second wash-out period of 1-2 weeks, the examiner will again assess gingival recession on the scan.

### **Intervention Type**

Device

### **Phase**

Not Applicable

## **Drug/device/biological/vaccine name(s)**

TRIOS 5 intraoral 3D scanner system

## **Primary outcome(s)**

Diagnostic accuracy measures of sensitivity and specificity for comparison of the manual on-scan assessment to the clinical assessment of gingival recession using a periodontal probe. The minimally acceptable performance goal is 75% for both sensitivity and specificity. Measured at one timepoint for the patient; the on-scan assessments are performed by the dentists twice at later timepoints (after a wash-out period of 2 weeks and after a second wash-out period of 1-2 weeks) but this does not include the patient.

## **Key secondary outcome(s)**

1. Measurement agreement measures as used in Bland-Altman analysis, i.e., mean difference and 95% limits of agreement, for comparison between the on-scan assessment and the clinical assessment of gingival recession at the site level – a predefined accepted limit of agreement is 2 mm.
2. Diagnostic precision measures to assess variability between (i.e., reproducibility - inter-examiner variability) and within examiners (i.e., repeatability - intra-examiner variability) for the on-scan assessment of gingival recession - the proportion of agreement and Cohen's kappa will be used for qualitative binary outcome data and the graphical and point estimate representations of the concordance correlation coefficient and the Bland and Altman limits-of-agreement will be used for quantitative continuous outcome data
3. Diagnostic accuracy measures of sensitivity and specificity for comparison of an algorithm on-scan assessment to the clinical and manual on-scan assessment of gingival recession at the site level by using binary outcome data indicating the presence or absence of gingival recession constructed by defining a cut-off, i.e., 1 mm or greater
4. Measurement agreement measures as used in Bland-Altman analysis for comparison of an algorithm on-scan assessment to the clinical and manual on-scan assessment of gingival recession at the site level

Measured at one timepoint for the patient; the on-scan assessments are performed by the dentists twice at later timepoints (after a wash-out period of 2 weeks and after a second wash-out period of 1-2 weeks) but this does not include the patient.

## **Completion date**

23/01/2025

## **Eligibility**

### **Key inclusion criteria**

1. Willing and able to give informed consent for participation in the study
2. Male or female, aged 18 years or above
3. Good general health (i.e., absence of any condition that the Principal Investigator evaluates as a risk either to the subject or to the data quality)
4. Able (in the Investigators opinion) and willing to comply with all study requirements
5. Minimum of 20 natural teeth from upper right 7 to upper left 7 and lower right 7 to lower left 7

### **Participant type(s)**

Healthy volunteer

**Healthy volunteers allowed**

No

**Age group**

Mixed

**Lower age limit**

18 years

**Upper age limit**

100 years

**Sex**

All

**Total final enrolment**

109

**Key exclusion criteria**

Any other significant disease or disorder which, in the opinion of the Investigator, may either put the participants at risk because of participation in the study, or may influence the result of the study, or the participant's ability to participate in the study.

**Date of first enrolment**

18/03/2024

**Date of final enrolment**

11/07/2024

**Locations****Countries of recruitment**

United Kingdom

England

**Study participating centre**

**Bristol Dental Hospital**

Lower Maudlin Street

Bristol

England

BS1 2LX

**Sponsor information**

## Organisation

3Shape (Denmark)

## ROR

<https://ror.org/042cmjn68>

## Funder(s)

### Funder type

Industry

### Funder Name

3Shape

## Results and Publications

### Individual participant data (IPD) sharing plan

### IPD sharing plan summary

Not expected to be made available

### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Results article</a>		10/01/2026	06/02/2026	Yes	No