# Measurement of orthodontic tooth movement with dental magnetic resonance imaging

| Recruitment status No longer recruiting  | <ul><li>Prospectively registered</li></ul>        |  |  |
|--|---|--|--|
|  | Protocol  |  |  |
| Overall study status Completed           | Statistical analysis plan                         |  |  |
|  | [X] Results                                       |  |  |
| <b>Condition category</b><br>Oral Health | Individual participant data                       |  |  |
|  | Overall study status Completed Condition category |  |  |

### Plain English summary of protocol

Background and study aims

The objective of this clinical investigation is to examine different types of gums before starting orthodontic treatment and to analyze how the soft and hard tissues around the lower front teeth change during the process of moving them with braces. We will be using a new technique called dental MRI, which doesn't involve radiation like traditional CBCT imaging, to examine the dimensions of both soft and hard tissues around the lower front teeth..

# Who can participate?

Adolescent (aged 12 - 18 years) patients with substantial treatment need and crowding in the mandible.

# What does the study involve?

In this study, we will examine different types of gums using both clinical assessments and imaging techniques such as CBCT scans and intraoral scans. Additionally, we will use a new method called dental magnetic resonance imaging (MRI), which can show both soft and hard tissues. We will compare the measurements obtained from CBCT and intraoral scanning with those from dental MRI. We're particularly interested in the thickness of the free gingiva, the gingiva above and below the crest of the bone, and the size of the bone around the lower front teeth. Throughout the treatment process, we will monitor the lower front teeth of the patients for five months using dental MRI.

What are the possible benefits and risks of participating?

Benefits of participation are the combination of radiologically assessed soft tissue dimensions and their monitoring throughout the initial treatment phase, ensuring that patients do not undergo unnecessary surgical procedures such as soft tissue augmentation, while at the same time selecting those who do require such a procedure.

Risks associated with the study interventions include patients experiencing claustrophobia during the MRI scan.

Where is the study run from? Medical University of Vienna (Austria) When is the study starting and how long is it expected to run for? May 2021 to May 2024

Who is funding the study? Investigator initiated and funded

Who is the main contact?
Dr Linda Schwarz, linda.schwarz@meduniwien.ac.at

# Contact information

# Type(s)

Public, Scientific, Principal investigator

#### Contact name

Dr Linda Schwarz

### **ORCID ID**

https://orcid.org/0000-0003-0565-1155

#### Contact details

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# Additional identifiers

# Clinical Trials Information System (CTIS)

Nil known

# ClinicalTrials.gov (NCT)

Nil known

#### Protocol serial number

CPMS1090

# Study information

#### Scientific Title

A novel approach for measurement of orthodontic tooth movement with dental magnetic resonance imaging

### **Study objectives**

There is no statistical significant difference in tissue dimensions in patients before, and after start of orthodontic treatment

### Ethics approval required

Ethics approval required

### Ethics approval(s)

approved 06/07/2021, Ethics Committee of the Medical University of Vienna (Borschkegasse 8b, Vienna, 1090, Austria; +43 1 40400 21470; ethik-kom@meduniwien.ac.at), ref: 1654/2021

### Study design

Prospective pilot study

### Primary study design

Observational

### Study type(s)

Diagnostic, Treatment

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

Moderate to severe crowding in the mandible

### **Interventions**

2 MRI examinations, one before (T0) and one five months after (T1) start of orthodontic treatment.

### Intervention Type

Other

# Primary outcome(s)

Gingiva and bone thickness around the lower anterior teeth measured using MRI before (T0) and one five months after (T1) start of orthodontic treatment

# Key secondary outcome(s))

Tooth movement measured using MRI before (T0) and one five months after (T1) start of orthodontic treatment

# Completion date

01/05/2024

# Eligibility

# Key inclusion criteria

- 1. Crowding in the mandible of >3mm
- 2. All permanent teeth in the mandible, no missing teeth in the mandible
- 3. >12 years of age, orthodontic treatment need (IOTN 4 or 5)

### Participant type(s)

Patient

### Healthy volunteers allowed

No

# Age group

Child

### Lower age limit

12 years

# Upper age limit

18 years

### Sex

All

# Key exclusion criteria

- 1. Claustrophobia
- 2. Systemic diseases
- 3. Cranio-facial anomalies
- 4. Smoking

### Date of first enrolment

01/01/2022

### Date of final enrolment

15/01/2025

# Locations

### Countries of recruitment

Austria

# Study participating centre Medical University of Vienna

Sensengasse 2a Vienna Austria 1090

# Sponsor information

### Organisation

Medical University of Vienna

#### **ROR**

https://ror.org/05n3x4p02

# Funder(s)

# Funder type

Other

### Funder Name

Investigator initiated and funded

# **Results and Publications**

# Individual participant data (IPD) sharing plan

The datasets generated during and analysed during the current study are not expected to be made available due to the highly sensitive nature of radiologic datasets.

# IPD sharing plan summary

Not expected to be made available

# **Study outputs**

| Output type                   | Details                       | Date created | Date added | Peer reviewed? | Patient-facing? |
|-------------------------------|-------------------------------|--------------|------------|----------------|-----------------|
| Results article               |                               | 15/05/2025   | 16/05/2025 | Yes            | No              |
| Participant information sheet | Participant information sheet | 11/11/2025   | 11/11/2025 | No             | Yes             |