

# Analysis of gingival fluids of orthodontic patients undergoing different treatments

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| <b>Submission date</b><br>26/11/2015   | <b>Recruitment status</b><br>No longer recruiting | <input type="checkbox"/> Prospectively registered<br><input type="checkbox"/> Protocol            |
| <b>Registration date</b><br>17/03/2016 | <b>Overall study status</b><br>Completed          | <input type="checkbox"/> Statistical analysis plan<br><input checked="" type="checkbox"/> Results |
| <b>Last Edited</b><br>12/01/2022       | <b>Condition category</b><br>Oral Health          | <input type="checkbox"/> Individual participant data  |

## Plain English summary of protocol

### Background and study aims

Malocclusion is a problem in the way the upper and lower teeth fit together when biting or chewing. Orthodontic treatment can be used to improve the appearance, position and function of the teeth. In the last few decades increasing numbers of adults have sought orthodontic treatment and expressed a desire for better looking and more comfortable alternatives to traditional metal braces (often referred to as "train tracks"). Clear aligners, also known as "invisible braces", are removable retainers which apply pressure to teeth, pushing them into the correct position. Many adults choose to use this type of appliance because they are made of a clear material, which make them very difficult to notice. They are also considered to be beneficial for good oral hygiene as they can be removed while eating and during tooth brushing. Previous studies have suggested that the movement of teeth when people use clear aligners is different to the movement of teeth seen with traditional braces, which put continuous pressure against teeth. This study aims to examine the mechanisms of tooth movement on a molecular level, by examining the biochemical make-up of the fluid found along the gum line (gingival crevicular fluid) in patients using traditional braces and clear aligners.

### Who can participate?

Adults suffering from malocclusion.

### What does the study involve?

Participants are randomly allocated to one of two groups. Participants in the first group are treated using traditional braces. Participants in the second group are treated using clear aligners. For participants in both groups, before treatment and then after treatment at 1 hour, 7 days and 21 days, samples of fluid from the gum line are taken using special paper strips, which are tested in the laboratory for any chemical markers of tooth movement.

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

Participants will benefit from correction of their malocclusion, regardless of which technique is used. There are no risks expected for those taking part in the study.

### Where is the study run from?

Dental School, University of Torino (Italy)

When is the study starting and how long is it expected to run for?  
May 2014 to April 2016

Who is funding the study?  
Align Technology (USA)

Who is the main contact?  
Dr Andrea Deregibus  
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## Contact information

### Type(s)

Public

### Contact name

Dr Andrea Deregibus

### Contact details

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## Additional identifiers

### Protocol serial number

award2014

## Study information

### Scientific Title

Bio-markers of orthodontic tooth movement in gingival crevicular fluid of patients undergoing treatment with clear aligners or fixed appliances

### Study objectives

The aim of this study is to find out if the bone remodeling induced by Invisalign aligners significantly different from the one induced by self-ligating appliances.

### Ethics approval required

Old ethics approval format

### Ethics approval(s)

Ethics Board of The Health And Science City of Turin (Comitato Etico Interaziendale A.O.U. Città della Salute e della Scienza di Torino), 10/04/2015, ref: 373/2015

## **Study design**

Single-centre randomised parallel trial

## **Primary study design**

Interventional

## **Study type(s)**

Treatment

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

Malocclusion

## **Interventions**

The selected subjects will be randomly allocated into two groups (random number list software generated) accordingly to the following treatment protocol:

Group 1: Fixed Appliance group (FA) with 10 subjects who will be treated consecutively with traditional brackets at the Department of Orthodontics of the Dental School of the University of Torino.

Group 2: Clear Aligners group (CA) with 10 subjects who will be treated consecutively with clear aligners at the Department of Orthodontics of the Dental School of the University of Torino.

GCF samples will be collected using periopaper strips (Harco, Tustin, Calif). Samples will be collected at the mesiobuccal and mesiolingual sites of control and test teeth at baseline, at 1 hour, at 7 days, and 21 days after placement of the appliances. Teeth will be isolated with cotton rolls, cleaned of plaque deposits, and dried gently with air before paper strips will be applied 1 mm subgingivally for 30 seconds. The volume of the sample on the paper strips will be measured using a calibrated Periotron 8000 (Harco). The readings from the Periotron will be converted to an actual volume (microliters) by reference to the standard curve calibrated with human serum.

## **Intervention Type**

Procedure/Surgery

## **Primary outcome(s)**

Cytokine concentration will be determined from GCF samples using titration and centrifugation at baseline, 1 hour, 7 days and 21 days.

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

Identification of the most biologically efficient technique among fixed appliance and clear aligners by analysing concentrations of Interleukin 1-beta, TGF-beta, RANKL, OPG and OPN in GCF at baseline, 1 hour, 7 days and 21 days.

## **Completion date**

01/04/2016

## **Eligibility**

### **Key inclusion criteria**

1. Dentoskeletal Class I malocclusion (Witts appraisal)
2. Mild crowding (mean crowding 6 mm)
3. Permanent dentition
4. Vertebral maturation as assessed on lateral cephalograms more advanced than CS4 (postpubertal)

**Participant type(s)**

Patient

**Healthy volunteers allowed**

No

**Age group**

Adult

**Sex**

All

**Total final enrolment**

10

**Key exclusion criteria**

1. Smokers
2. Have gingivitis
3. Have probing pocket depths  $\geq 4$  mm
4. Have loss of clinical attachment  $\geq 2$  mm in the selected or adjacent teeth
5. Had taken anti-inflammatory or antibiotic medications within the previous 6 months

**Date of first enrolment**

01/05/2014

**Date of final enrolment**

30/09/2014

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

Italy

**Study participating centre**

Dental School, Department of Orthodontics

University of Torino

via Nizza 230

Turin

Italy

10126

# Sponsor information

## Organisation

University of Torino (Italy)

## ROR

<https://ror.org/048tbm396>

# Funder(s)

## Funder type

Industry

## Funder Name

Align Technology

# Results and Publications

## Individual participant data (IPD) sharing plan

Not provided at time of registration

## IPD sharing plan summary

Available on request

## Study outputs

| Output type                                   | Details                       | Date created | Date added | Peer reviewed? | Patient-facing? |
|---|-------------------------------|--------------|------------|----------------|-----------------|
| <a href="#">Results article</a>               |                               | 01/01/2017   | 12/01/2022 | Yes            | No              |
| <a href="#">Participant information sheet</a> | Participant information sheet | 11/11/2025   | 11/11/2025 | No             | Yes             |