

# Blood-derived biomaterial for lower jaw surgery

<b>Submission date</b> 11/05/2024	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
<b>Registration date</b> 30/05/2024	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
<b>Last Edited</b> 04/08/2025	<b>Condition category</b> Surgery	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

Orthognathic surgery is a common treatment approach for severe dentofacial deformities, which is done for repositioning the jaws when there is an incorrect position, shape, or size of the jaw. After large mandibular (jaw) movement during bilateral sagittal split osteotomy (BSSO) surgery, insufficient bone contact may result in compromised bone healing. Injectable platelet-rich fibrin (PRF) can be made from the patient's own blood to stimulate bone formation. The study aims to evaluate the use of PRF in orthognathic surgery in comparison to conventional orthognathic surgery.

### Who can participate?

Patients aged 18-50 years with diagnosed dentofacial deformities who are undergoing bilateral sagittal split osteotomy (BSSO) surgery

### What does the study involve?

Patients are assigned randomly to one of two groups – the study group and the control group. Control group patients undergo conventional BSSO. Study group patients provide blood samples 1-2 days before surgery for i-PRF preparation and laboratory analysis. Study group patients undergo BSSO, but during surgery prepared i-PRF is applied. At 7-12 days and 1 year after surgery all patients undergo CT scans.

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

The use of i-PRF can lead to improved surgical results leading to improved aesthetic results and patient satisfaction with surgery.

The researchers do not expect any significant risks as i-PRF is made from the patient's own blood.

### Where is the study run from?

Riga Stradins University Institute of Stomatology (Latvia)

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

July 2020 to March 2025

### Who is funding the study?

Riga Stradins University Institute of Stomatology (Latvia)

Who is the main contact?

Dr Lana Micko, lana.micko@gmail.com, lana.micko@rsu.lv, lana.micko@rsusi.lv

## Contact information

### Type(s)

Public, Scientific, Principal investigator

### Contact name

Dr Lana Micko

### ORCID ID

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## Additional identifiers

### Protocol serial number

Nr. 6-1/09/8

## Study information

### Scientific Title

Evaluation of platelet-rich fibrin effectiveness in contour defect modelling in orthognathic surgery

### Study objectives

The use of platelet-rich fibrin (PRF) promotes newly formed bone volume increase in orthognathic surgery contour defect sites in comparison to conventional orthognathic surgery.

### Ethics approval required

Ethics approval required

### Ethics approval(s)

approved 10/09/2020, Riga Stradins University Research Ethics Committee (Dzirciema iela 16, Riga, LV-1007, Latvia; +371 (0)67061547; pek@rsu.lv), ref: Nr. 6-1/09/8

### Study design

Single-center interventional study randomized controlled trial.

### Primary study design

Interventional

## **Study type(s)**

Prevention, Efficacy

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

Prevention of mandibular lower border defects after bilateral sagittal split osteotomy

## **Interventions**

Patients are randomly allocated to study and control groups by stratified randomisation method using a computer program. Patients know their allocated groups.

Before surgery, peripheral venous blood samples were collected from study group patients. Blood samples are used to prepare i-PRF using centrifugation for further i-PRF testing in the laboratory. ELISA assays are used according to the protocol to find the concentration of EGF, VEGF, PDGF, TGF1, and IL-8 in i-PRF. i-PRF samples are also used for anti-microbial tests against different microorganisms.

Bilateral sagittal split osteotomy (BSSO) surgery is carried out for control and study group patients. Study group patients during the surgery receive i-PRF, applied in osteotomy sites, i-PRF is prepared during the surgery from patients' venous blood samples.

1-2 weeks after surgery surgical results are evaluated using cone-beam computed tomography (CBCT). CBCT is also done 1 year after the surgery. Both CBCTs are analyzed using digital subtraction analysis and newly formed bone volume is measured at the vertical osteotomy site.

After all data is obtained statistical analysis is done.

## **Intervention Type**

Other

## **Primary outcome(s)**

1. Presence/absence of inferior border bone defects at the mandible near the vertical osteotomy site measured using CBCT at 1 year after surgery
2. Newly formed bone volume at the site of BSSO vertical osteotomy site measured using CBCT at 7-12 days and 1 year after orthognathic surgery

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

1. Bone resorption/remodelling near the osteotomy site measured using CBCT at 7-12 days and 1 year after surgery
2. Concentration of proteins in i-PRF and their correlation at 1-2 days before surgery:
  - 2.1. EGF (pg/ml) measured using ELISA assay
  - 2.2. VEGF (pg/ml) measured using ELISA assay
  - 2.3. PDGF (pg/ml) measured using ELISA assay
  - 2.4. TGFb1 (pg/ml) measured using ELISA assay
  - 2.5. IL8 (pg/ml) measured using ELISA assay
3. The anti-microbial effect of i-PRF measured using the agar-diffusion method, zone of inhibition (mm) at 1-2 days before surgery

## **Completion date**

03/03/2025

# Eligibility

## Key inclusion criteria

1. Aged 18-50 years
2. Patients diagnosed with dentofacial deformities, who were planned to undergo bilateral sagittal split osteotomy
3. A serum vitamin D level of more than 30 ng/ml is considered sufficient thereby patients were included in the study
4. Health condition - without any chronic disease, had no regular medication intake, had no abnormal nicotine or alcohol use

## Participant type(s)

Patient

## Healthy volunteers allowed

No

## Age group

Adult

## Lower age limit

18 years

## Upper age limit

50 years

## Sex

All

## Total final enrolment

40

## Key exclusion criteria

Patients who did not have cone-beam computed tomography 7-12 days and 1 year after surgery

## Date of first enrolment

10/09/2020

## Date of final enrolment

06/02/2024

# Locations

## Countries of recruitment

Latvia

## Study participating centre

**Riga Stradins University Institute of Stomatology**  
Dzirčiema iela 20  
Riga  
Latvia  
LV-1007

**Study participating centre**  
**Pauls Stradins Clinical University Hospital**  
Pilsonu iela 13  
Riga  
Latvia  
LV-1002

## Sponsor information

**Organisation**  
Riga Stradiņš University

**ROR**  
<https://ror.org/03nadks56>

## Funder(s)

**Funder type**  
University/education

**Funder Name**  
Rīgas Stradiņa Universitāte

**Alternative Name(s)**  
Rīga Stradiņš University, Rīga Stradiņš University, Universitas Rigensis Stradina, Riga Medical Institute, Medical Academy of Latvia, RSU

**Funding Body Type**  
Government organisation

**Funding Body Subtype**  
Universities (academic only)

**Location**  
Latvia

# Results and Publications

## Individual participant data (IPD) sharing plan

The datasets generated and analysed during the current study will be available upon request from Dr Lana Micko (lana.micko@gmail.com; lana.micko@rsu.lv)

The type of data that will be shared: i-PRF obtaining and processing protocol for application in surgery, i-PRF obtaining and processing protocol for ELISA assay, and primary and secondary outcome measurements.

Dates of availability: 5 years after the end of the study.

Whether consent from participants was required and obtained: consent from study participants was required and obtained.

Comments on data anonymization: data are anonymized according to the European General Data Protection Regulation (GDPR).

## 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>		01/08/2025	04/08/2025	Yes	No