

# Does eating mandarin oranges impact cardiometabolic risk factors and omics biomarkers in a general population intervention trial?

<b>Submission date</b> 24/09/2024	<b>Recruitment status</b> No longer recruiting	<input checked="" type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
<b>Registration date</b> 25/09/2024	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 25/09/2024	<b>Condition category</b> Other	<input type="checkbox"/> Individual participant data <input type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

This study focuses on precision nutrition, which aims to tailor dietary recommendations based on new biological markers. The goal is to understand how eating mandarins affects various health markers and gene expressions. Mandarins are rich in vitamin C, fiber, and antioxidants, which may have multiple health benefits.

### Who can participate?

- Volunteers from the general population
- Aged 18 to 55 years old
- Body mass index (BMI) between 23 and 32 kg/m<sup>2</sup>

### What does the study involve?

Participants will be randomly assigned to one of two groups:

Intervention group: Receive 1 kg of mandarins per day for 15 days along with their usual diet.

Control group: Continue their usual diet with recommendations for low mandarin consumption.

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

Participants will be informed that there are no benefits and risks expected.

### Where is the study run from?

The study is conducted by the University of Valencia and the Centro de Investigación Biomédica en Red.

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

October 2023 to 1 December 2025.

Who is funding the study?  
University of Valencia (Spain)  
Conselleria de Cultura, Educació, Universitats i Ocupació, Generalitat Valenciana (Spain)

Who is the main contact?  
Dr Eva Asensio Márquez, [eva.m.asensio@uv.es](mailto:eva.m.asensio@uv.es)

## Contact information

### Type(s)

Public, Scientific, Principal investigator

### Contact name

Dr Eva M Asensio Marquez

### ORCID ID

<https://orcid.org/0000-0003-4558-0988>

### Contact details

University of Valencia-CIBEROBN  
Avda. Blasco Ibanez 15  
Valencia  
Spain  
46010  
+34 (0)963864417  
[eva.m.asensio@uv.es](mailto:eva.m.asensio@uv.es)

## Additional identifiers

### Clinical Trials Information System (CTIS)

Nil known

### ClinicalTrials.gov (NCT)

Nil known

### Protocol serial number

PM\_2405

## Study information

### Scientific Title

Effect of mandarin orange consumption on omics biomarkers and cardiometabolic phenotypes:  
A Randomized clinical trial in the general population (MANSomics)

### Acronym

MANSomics

### Study objectives

The intervention with the daily consumption of a high amount of mandarins in the diet compared to the control group will result in several changes in omic biomarkers. Among them, we will detect metabolic changes in "intake" metabolites in plasma/urine, including the increase of known biomarkers of orange consumption (proline-betaine, among others), as well as other "effect" metabolites. Likewise, the consumption of mandarins will have a positive impact on new transcriptomic biomarkers due to the differential expression of genes that we will be able to identify, such as changes in DNA methylation leading to differential CpG profiles compared to the control group. In turn, these effects can be modulated by genomic markers, by sex, and other characteristics of the individual. Furthermore, we will be able to observe an association with the reduction of oxidative stress, an increase in vitamin C, improvements in blood pressure, blood glucose levels, plasma lipid concentrations, and other classic biochemical and metabolomic markers, as well as in anthropometric parameters (body-weight and body fat distribution).

### **Ethics approval required**

Ethics approval required

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

approved 18/12/2023, Institutional review board of Valencia University (human subjects) (Avda. Blasco Ibanez 13, Valencia, 46010, Spain; +34 (0)963864109; vicerec.investigacio@uv.es), ref: UV-INV\_ETICA-3132572

### **Study design**

Interventional randomized parallel trial

### **Primary study design**

Interventional

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

Prevention

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

Prevention of cardiovascular and metabolic diseases in subjects from the general population

### **Interventions**

Randomized controlled clinical trial with two parallel groups including 70 participants in total. Participants will be randomly assigned 1:1 into two groups using a software program.

1. Intervention group receiving 1 kg (with skin) of mandarins per day for 15 days along with their usual diet.
2. Control group with no provision of mandarins, usual diet with the recommendations for low consumption of mandarins.

### **Intervention Type**

Behavioural

### **Primary outcome(s)**

Changes in multi-omics biomarkers (gene-expression, DNA-methylation, and plasma metabolites) from baseline to 15 days following a daily intervention with 1 kg of mandarin oranges in comparison with the control group. Gene-expression will be measured with a whole transcriptomics human array at baseline and after 15 days. DNA-methylation will be measured by

a genome-wide methylation human array at baseline and after 15 days. Metabolomics will be measured in plasma by Nuclear Magnetic Resonance at baseline and after 15 days.

**Key secondary outcome(s))**

1. Biochemical analysis with hematocrit, lipid profile, blood glucose, renal and hepatic function at baseline and after 15 days.
2. Analysis of parameters related to oxidative stress at baseline and after 15 days.
3. Measurement of blood pressure at the baseline visit and after the intervention at baseline and after 15 days.
4. Weight, height, waist circumference, and body composition through baseline bioimpedance at baseline and after 15 days.
5. Food intake and adherence to the Mediterranean Diet using the food consumption frequency questionnaire and the 14-point adherence questionnaire at baseline and after 15 days.
6. Physical activity measured through the use of accelerometers at baseline and after 15 days.
7. Characteristics of sleep measured using the Epworth Sleepiness Scale and chronotype assessed with the Morningness-Eveningness Questionnaire by Horne and Östberg at baseline and after 15 days.

**Completion date**

19/12/2025

**Eligibility****Key inclusion criteria**

1. Volunteers recruited from the general population
2. Aged 18 to 55 years old
2. Body mass index (BMI) between 23 and 32 kg/m<sup>2</sup>

**Participant type(s)**

Healthy volunteer

**Healthy volunteers allowed**

No

**Age group**

Adult

**Lower age limit**

18 years

**Upper age limit**

55 years

**Sex**

All

**Key exclusion criteria**

1. Do not meet the inclusion criteria.
2. People allergic or intolerant to the consumption of oranges.
3. Pregnant women or breastfeeding period

4. Alcoholism or drug addiction

5. Individuals presenting the following current situations: infectious diseases, renal diseases, liver diseases, cancer, obesity, type 2 diabetes, or other pathologies that may bias the study.

**Date of first enrolment**

15/11/2024

**Date of final enrolment**

30/04/2025

## **Locations**

**Countries of recruitment**

Spain

**Study participating centre**

**University of Valencia. School of Medicine**

Avda. Blasco Ibanez 15

Valencia

Spain

46010

**Study participating centre**

**Centro de Investigación Biomédica en Red, Instituto de Salud Carlos III**

C/ Monforte de Lemos 3-5.

Pabellón 11. Planta 0

Madrid

Spain

28029

## **Sponsor information**

**Organisation**

University of Valencia

**ROR**

<https://ror.org/043nxc105>

**Organisation**

Centro de Investigación Biomédica en Red

ROR

<https://ror.org/02g87qh62>

## Funder(s)

### Funder type

University/education

### Funder Name

Universitat de València

### Alternative Name(s)

University of Valencia, UV

### Funding Body Type

Private sector organisation

### Funding Body Subtype

Universities (academic only)

### Location

Spain

### Funder Name

Conselleria de Cultura, Educació, Universitats i Ocupació, Generalitat Valenciana / Department of Culture, Education, Universities, and Employment General, Generalitat Valenciana

## Results and Publications

### Individual participant data (IPD) sharing plan

Data will not be available outside the core research group as the informed consent form signed by participants stated that individual-level data will not be publicly available. Researchers who are interested in this study can contact the main investigator (Dra. Eva Asensio Márquez) if they have any questions regarding the data or are interested in further collaborations. The participants will receive written information about what the study involves and sign a consent form before entering the study.

### 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="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes

