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# Does nut consumption decrease biological age and improve cardiovascular risk factors? Are cashews better than almonds?

**Submission date**
18/12/2019

**Recruitment status**
Suspended

**Registration date**
20/12/2019

**Overall study status**
Completed

**Last Edited**
17/04/2020

**Condition category**
Other

[X] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

## Plain English summary of protocol

Background and study aims
Currently biological age can be measured by analyzing methylations in selected genes and calculate what is called accelerated aging index that takes into account the difference between biological age and chronological age. Although many studies have focused on measuring these indicators, very few have investigated through intervention studies how dietary components can influence decreasing biological age and accelerated aging. Curiously, nuts, which have been related in multiple studies with a better cardiometabolic profile and lower cardiovascular risk, have not been studied in this sense. The aim is to carry out an intervention study with nuts (50 g per day for 2 months continuously) and compare them with a control group in terms of improving cardiometabolic risk parameters, and fundamentally their impact on DNA methylation and decreasing biological age. It is also interesting to know if all nuts have the same effect or if there are differences. Cashew nuts have been little studied. In this study the cashew nuts will be analyzed in comparison with the raw almonds with skin, and all of them in turn with the control group. A longer-term follow-up will also be carried out, without active intervention with nuts, only recommending their respective consumptions. All this will serve to obtain data that we lack now and assess in the future a broader study including additional determinations.

Who can participate?
Volunteers recruited from the general population, between 25 and 50 years old, with BMI between 23 and 35 kg/m2

What does the study involve?
Participants are randomly allocated into three groups:
1. Intervention group with nuts A: standard diet with supplementation of almonds with raw skin (50 g/day for 2 months)
2. Intervention group with nuts B: standard diet with supplementation of cashew nuts (50 g/day for 2 months)
3. Control group without nuts: standard diet without nut intake (for 2 months)
This is followed by 10 additional months in which no nuts are supplied to any group, but advice is given to consume the nuts of the respective groups A and B, or in the control group to minimise

as much as possible the consumption of nuts, until completing a period of 1 year, after which the parameters of interest are re-evaluated.

What are the possible benefits and risks of participating?
A possible benefit is to have the chance to help other people by contributing to medical research. Participants will be informed that no potential risks are expected.

Where is the study run from?
1. University of Valencia (Spain)
2. CIBER Fisiopatología de la Obesidad y Nutrición (Spain)

When is the study starting and how long is it expected to run for?
October 2019 to June 2021

Who is funding the study?
1. University of Valencia
2. CIBEROBN
3. Importaco

Who is the main contact?
Prof. Dolores Corella
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# Contact information

### Type(s)
Scientific

### Contact name
Prof Dolores Corella

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# Additional identifiers

### Protocol serial number
PCT3E-19

# Study information

### Scientific Title
Effect of nut consumption on the improvement of cardiometabolic risk factors and decrease of biological age in the Mediterranean population: a randomized controlled trial

## Acronym
NUTS-ANTIAGING

## Study objectives
The researchers hypothesized that a regular intake of nuts within a standardized diet is capable of improving several parameters of cardiometabolic risk including: anthropometric, blood pressure and biochemical, as well as in the pattern of DNA methylation as a biological indicator of cellular aging, compared to a control group. Additionally, they hypothesized that according to the nut consumed (almonds or cashew nuts), the improvements in certain parameters will be more specific.

## Ethics approval required
Old ethics approval format

## Ethics approval(s)
Approved 07/11/2019, Institutional review board of Valencia University (human subjects) (Avda. Blasco Ibanez 13. Valencia, ZIP 46010, Spain; Tel: +34 (0)963864109; Email: vicerec.investigacio@uv.es), ref: UV-INV_ETICA-1206123

## Primary study design
Interventional

## Study design
Randomized controlled clinical trial

## Study type(s)
Prevention

## Health condition(s) or problem(s) studied
Cardiometabolic risk and aging

## Interventions
Participants will be randomized into three groups (1:1:2) by simple random assignment through a computer program. Therefore, 20, 20 and 40 subjects will be randomized to the intervention group A, intervention group B and to the control group, respectively:
1. Intervention group with nuts A: standard diet with supplementation of a single nut, almonds with raw skin (50g/day for 2 months)
2. Intervention group with nuts B: standard diet with supplementation of a single nut, cashew nuts (50 g/day, for 2 months)
3. Control group without nuts: standard diet without nut intake (for 2 months)

This will be followed by a long-term (10 additional months) in which no nuts will be supplied to any group, but advice will be given to consume the nuts of the respective groups A and B, or to minimise as much as possible the consumption of nuts in the control group, until completing a period of 1 year, after which the parameters of interest will be re-evaluated.

## Intervention Type
Mixed

## Primary outcome(s)

All the outcome measures will be measured at baseline and after 2 months. In addition, for the primary outcomes and for the main secondary outcomes, measures after the 10 months of follow-up will be obtained.
1. Cardiovascular risk parameters measured as follows:
1.1. Anthropometric: including weight, height, waist circumference and body composition, measured by validated scales and bioimpedance
1.2. Blood pressure: systolic and diastolic blood pressure measured by trained personnel with a validated semiautomatic oscillometer using standard procedures
1.3. Fasting glucose, total colesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, liver and kidney enzymes, CRP and leptin measured in fasting plasma samples by standard procedures
1.4. DNA methylation measured in isolated DNA from blood by standard procedures using the SequenomMassARRAY platform or similar. Biological age calculated based on the methylation pattern according to standard procedures

### Key secondary outcome(s)
All the outcome measures will be measured at baseline and after 2 months. In addition, for the primary outcomes and for the main secondary outcomes, measures after the 10 months of follow-up will be obtained.
1. Dietary patterns measured by validated questionnaires including the 14-item Mediterranean diet adherence score and the 17-item Mediterranean diet score, as well as by food frequency questionnaires
2. Inflammatory markers measured in blood by ELISA and other validated methods
3. Quality of life measured by validated questionnaires (SF-12)
4. Sleep characteristics measured using the Pittsburgh Sleep Quality Index questionnaire
5. Physical activity measured using the short form of the Minnesota physical activity questionnaire
6. Chronotype measured using the Horne and Östberg questionnaire
7. Cognitive performance measured using some cognitive tests, including TMT-A, TMT-B, COWAT
8. Metabolomic markers measured in plasma depending on additional funding. RNM will be used in a multimarker platform
9. Gene expression: depending on additional funding selected gene-expression or whole transcriptome gene expression will be measured by RT-PCR or whole transcriptome human arrays

### Completion date
30/06/2021

## Eligibility

### Key inclusion criteria
1. Volunteers recruited from the general population
2. Between 25 and 50 years old
3. BMI between 23 and 35 kg/m2

### Participant type(s)
Healthy volunteer

### Healthy volunteers allowed
No

### Age group

Adult

### Sex
All

### Key exclusion criteria
1. Diseased
2. Nut allergy or intolerance
3. Immunodeficiency or HIV-positive status
4. Liver cirrhosis or chronic renal failure
5. Serious psychiatric disorders: schizophrenia, bipolar disease, eating disorders, depression, etc
6. Any severe co-morbid condition
7. Alcohol abuse or addition
8. History of major organ transplantation
9. Concurrent therapy with immunosuppressive drugs or cytotoxic agents
10. Current treatment with systemic corticosteroids
11. Current use of weight loss medication
12. Patients with an acute infection or inflammation
13. Any other condition that may interfere with the completion of the study protocol

### Date of first enrolment
27/12/2019

### Date of final enrolment
15/04/2020

## Locations

### Countries of recruitment
Spain

### Study participating centre
**University of Valencia**
Avda. Blasco Ibanez, 15
Valencia
Spain
46010

### Study participating centre
**CIBER Fisiopatología de la Obesidad y Nutrición**
C/ Sinesio Delgado 4-6
Pabellon 11
Madrid
Spain
28029

# Sponsor information

**Organisation**
University of Valencia

**ROR**
https://ror.org/043nxc105

**Organisation**
Importaco

# 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**
CIBEROBN

**Funder Name**
Importaco

# Results and Publications

### Individual participant data (IPD) sharing plan
The data will not be made available because this is indicated in the informed consent signed by the participants.

### IPD sharing plan summary
Not expected to be made available