

Drug interaction study with thyroid hormone and magnesium preparation in healthy volunteers

Submission date 16/10/2023	Recruitment status No longer recruiting	<input checked="" type="checkbox"/> Prospectively registered
Registration date 17/10/2023	Overall study status Completed	<input type="checkbox"/> Protocol
Last Edited 17/10/2023	Condition category Nutritional, Metabolic, Endocrine	<input type="checkbox"/> Statistical analysis plan
		<input type="checkbox"/> Results
		<input type="checkbox"/> Individual participant data
		<input type="checkbox"/> Record updated in last year

Plain English Summary

Background and study aims

Levothyroxine is a medication commonly taken with products that have certain types of minerals like calcium. When you take it with calcium, it can make your body absorb less of the levothyroxine. However, we don't have any information yet about how magnesium, which is also a similar kind of mineral, affects the absorption of levothyroxine. It's very possible that magnesium might also have an impact on how your body takes in levothyroxine. So, the aim of this study is to figure out how much magnesium affects the absorption of levothyroxine.

Who can participate?

Participants are healthy volunteers aged 18-65 years who have signed the informed consent form.

What does the study involve?

After giving initial information either in person or over the phone and signing the informed consent form, a comprehensive medical history is taken, along with a physical examination. Blood samples are collected to check certain factors that help determine if participants can participate in the study or not. If they meet all the requirements to join the study and don't have any factors that exclude them, they are randomly assigned to one of three groups: one that takes levothyroxine by itself, one that takes levothyroxine with Magnesium Citrate, and one that takes levothyroxine with Magnesium Aspartate.

During each of these administrations, we measure Thyroxin levels at a total of 6 different time points. This helps us calculate and compare the area under the curve (AUC) for Thyroxin. To make the process more comfortable and avoid multiple needle pricks during each visit, we use a catheter in the vein to draw blood. The duration of the visits can vary. The information session typically lasts 20-30 minutes, the screening phase takes about 30-60 minutes, and the following three visits each last around 6.5 hours.

All these visits need to happen within a 6-month period, and there should be at least 4 weeks between visits 3, 4, and 5 to ensure that any remaining medication from the previous visit doesn't affect the results

What are the possible benefits and risks of participating?

The participation has no direct advantage for the participants. Potential risks mainly concern the levothyroxine-sodium, since a higher dose than the one described in the prescription drug information is taken. Potential adverse effects of levothyroxine like insomnia, nervousness, diarrhea, tremor, diaphoresis, headache, tachycardia, dysrhythmias and angina pectoris cannot be excluded. But these are expected to be mild and transient in nature. Since there are only three doses of levothyroxine administered, the negative impact on the subjects is expected to be minimal. The administration of two standard doses in total of magnesium preparations are not likely to pose a significant risk to subjects, the potential adverse event of soft stool/diarrhea is unlikely after one dose and transient as well.

Where is the study run from?

University Hospital of Zurich (Switzerland)

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

March 2023 to December 2024

Who is funding the study?

University of Zurich (Switzerland)

Who is the main contact?

Dr Jérôme Bonzon, jerome.bonzon@usz.ch

Contact information

Type(s)

Public, Scientific, Principal Investigator

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Additional identifiers

EudraCT/CTIS number

Nil known

IRAS number

ClinicalTrials.gov number

Nil known

Secondary identifying numbers

2.1

Study information

Scientific Title

Single Centre Drug-Drug Interaction study with Levothyroxine/Magnesium-Citrate and Levothyroxine/Magnesium-Aspartate in healthy subjects

Acronym

ThyroMag

Study hypothesis

The two treatments with a magnesium compound will reduce the AUC of thyroxine compared to levothyroxine alone, but no difference is expected between the combination of levothyroxine with magnesium-citrate vs. magnesium-aspartate.

The null hypothesis is that the three treatments do not differ regarding the AUC of thyroxine.

Ethics approval required

Ethics approval required

Ethics approval(s)

Approved 06/10/2023, Kantonale Ethikkommission Zürich (Stampfenbachstrasse 121, Zürich, 8090, Switzerland; +41 43 259 79 69; admin.kek@kek.zh), ref: 2023-01493

Study design

Open-label drug-drug-interaction study with cross-over design

Primary study design

Interventional

Secondary study design

Randomised cross over trial

Study setting(s)

Hospital

Study type(s)

Safety

Participant information sheet

Not available in web format, please use the contact details to request a patient information sheet.

Condition

Hypothyroidism

Interventions

Cross-over study with three groups. Each of the three treatments is during only 360 minutes: The time required to take the blood samples. A wash-out phase of min. 4 weeks is planned between each treatment. No specific follow-up is planned.

Group 1: One dose of Magnesium-Aspartate (10 mmol) in powder form, taken orally along with levothyroxine 1 mg

Group 2: One dose of Magnesium-Citrate (300 mg) in powder form, taken orally along with levothyroxine 1 mg, compared to

Group 3: One dose of levothyroxine 1 mg alone

Randomization: Due to the cross-over design of the trial, subjects will receive all treatments. The subjects will be block-randomized to three different treatment sequences in a 1:1:1 fashion with a block size of 6. Treatment sequences are chosen to ensure that each treatment appears once in each position (1st, 2nd, 3rd), ABC, BCA and CAB, A being levothyroxine alone, B being levothyroxine + magnesium citrate and C being levothyroxine + magnesium aspartate. The randomization list is prepared in advance by the trial statistician, and allocation concealment will be handled via sequentially numbered, opaque and sealed envelopes by a person at the study center that is not involved in the trial. Only after sealing, the envelopes are handed to the investigators. After inclusion of a participant, the four-digit-number assigned to the participant is written in wet ink on the envelope, before the seal is broken. The envelopes are opened according to their sequential number. Should a participant decide to terminate the study early, the sequences are re-used after all envelopes have been used up (for the 13th participant who replaces the participant that did not complete all visits).

Intervention Type

Drug

Pharmaceutical study type(s)

Pharmacokinetic

Phase

Phase IV

Drug/device/biological/vaccine name(s)

Euthyrox® (Levothyroxin-Natrium), Magnesiocard® (Magnesium-Aspartat) 10 mmol, Magnesium Diasporal® (Magnesium-Citrat) 300 mg

Primary outcome measure

AUC of total thyroxin in the serum up to 6 hours after ingestion of levothyroxine, with measurements at 0 min, 30 min, 60 min, 120 min, 240 min and 360 min.

Secondary outcome measures

1. Cmax of total thyroxin in the serum during a 6-hour period after ingestion of levothyroxine
2. Tmax of total thyroxin in the serum during a 6-hour period after ingestion of levothyroxine

Overall study start date

15/03/2023

Overall study end date

31/12/2024

Eligibility

Participant inclusion criteria

1. Age 18-65 years
2. Informed Consent as documented by signature

Participant type(s)

Healthy volunteer

Age group

Adult

Lower age limit

18 Years

Upper age limit

65 Years

Sex

Both

Target number of participants

12

Participant exclusion criteria

1. Contraindications to the drugs under study, e.g. known hypersensitivity or allergy
2. Need for any kind of drug therapy for the duration of the study
3. Women who are pregnant or breastfeeding
4. Intention to become pregnant during the course of the study
5. Lack of safe contraception, defined as: Female participants of childbearing potential, not using and not willing to continue using a medically reliable method of contraception for the entire study duration. Female participants who are surgically sterilised / hysterectomized or post-menopausal for longer than 2 years are not considered as being of child bearing potential.
6. Other clinically significant concomitant disease states (e.g., renal failure, thyroid dysfunction, cardiovascular disease, arterial hypertension, any other medical condition that could lead to an albumin deficiency such as anorexia etc.)
7. Abnormal findings in the screening tests (laboratory, ECG, physical examination).
8. Inability to follow the procedures of the study, e.g. due to language problems, psychological disorders, dementia, etc. of the participant
9. Participation in another study with investigational drug within the 30 days preceding and during the present study
10. Previous enrolment into the current study
11. Enrolment of the investigator, his/her family members, employees and other dependent persons

Recruitment start date

01/12/2023

Recruitment end date

30/06/2024

Locations

Countries of recruitment

Switzerland

Study participating centre

USZ

Klinik für Klinische Pharmakologie & Toxikologie

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Sponsor information

Organisation

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Funder(s)

Funder type

University/education

Funder Name

Universität Zürich

Alternative Name(s)

University of Zurich, Switzerland, University of Zurich, UZH

Funding Body Type

Government organisation

Funding Body Subtype

Universities (academic only)

Location

Switzerland

Results and Publications

Publication and dissemination plan

Planned publication in a high-impact peer-reviewed journal.

Intention to publish date

31/12/2025

Individual participant data (IPD) sharing plan

The datasets generated and/or analysed during the current study will be published as a supplement to the results publication.

IPD sharing plan summary

Published as a supplement to the results publication