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Tailoring statin treatment with genetic testing: a personalized approach for better heart health in the UAE

Submission date 17/10/2024	**Recruitment status** No longer recruiting	[_] Prospectively registered [_] Protocol
Registration date 20/10/2024	**Overall study status** Completed	[_] Statistical analysis plan [_] Results
Last Edited 16/07/2025	**Condition category** Circulatory System	[_] Individual participant data [_] Record updated in last year

Plain English summary of protocol

Background and study aims

This study aims to improve how doctors prescribe statins, a type of medication used to lower cholesterol, by using genetic information. Statins are commonly prescribed to prevent heart attacks and strokes, but some people experience side effects, particularly muscle pain. By using genetic testing, this study hopes to identify which patients are more likely to experience side effects and adjust their treatment accordingly. This approach may help improve the safety and effectiveness of statin therapy in the United Arab Emirates (UAE).

Who can participate?

Adults (18 years and older) who are currently taking statins, specifically atorvastatin or rosuvastatin, are eligible to participate. Pregnant women, breastfeeding mothers, and those with certain medical conditions, like severe liver or kidney disease, will not be able to take part.

What does the study involve?

Participants will be randomly assigned to one of two groups. One group will undergo genetic testing to personalize their statin therapy based on their genetic results, while the other group will continue receiving standard statin treatment based on the doctor's decision. All participants will be followed up for one year, with check-ups at 1 month, 3 months, and 12 months to monitor their health and any side effects.

What are the possible benefits and risks of participating?

The potential benefit of participating is that those in the personalized treatment group may have a lower chance of experiencing side effects like muscle pain and may have improved adherence to their medication, as many patients stop taking statins due to side effects. Based on the results of the genetic test, the physician may choose the most appropriate statin for each patient. For example, variants in the ABCG2 gene may indicate sensitivity to rosuvastatin, while variants in the SLCO1B1 gene may indicate sensitivity to atorvastatin.

The risks are minimal, as genetic testing is non-invasive, and statins are widely used, though some participants may still experience muscle pain or other mild side effects.

Where is the study run from?
The study is being conducted across several major hospitals and clinics in the UAE, including Burjeel Hospital, Mediclinic, The Heart Medical Center, and Tawam Hospital.Genetic testing will be conducted in university laboratories, and reports will be sent within 24 to 48 hours after the samples are collected.

When is the study starting and how long is it expected to run for?
December 2021 to June 2025

Who is funding the study?
The study is supported by [UAE Minstry of Education], which aims to advance personalized medicine in the UAE.

Who is the main contact?
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Study information

Scientific Title
Pharmacogenomic-guided personalization of statin therapy: a comprehensive approach in the United Arab Emirates population

Acronym
Statins-EMHEART

Study objectives
Primary Hypothesis:
Patients who undergo pharmacogenomic testing and receive statin therapy tailored to their genetic profile (SLCO1B1 and ABCG2 variants) will have a significantly lower incidence of Statin-Associated Muscle Symptoms (SAMS) after one year compared to those receiving standard statin therapy without genetic testing. Based on their genetic makeup, some patients may benefit more from atorvastatin, while others may respond better to rosuvastatin. For instance, patients with the SLCO1B1 variant may tolerate rosuvastatin better, whereas those with ABCG2 variants may benefit more from atorvastatin. This personalized approach will lead to improved tolerability and reduced adverse events such as muscle pain.

Secondary Hypothesis:
Pharmacogenomic-guided statin therapy will result in either superior or comparable efficacy in lowering LDL-C levels and reducing cardiovascular risk compared to standard statin therapy. After one year, patients in the intervention arm are expected to achieve LDL cholesterol levels and ASCVD risk scores that are either better or non-inferior to those in the control group. This will confirm that the personalized genetic approach does not compromise, and may even enhance, the lipid-lowering effects of statin treatment.

Additional Hypothesis:
Patients in the pharmacogenomic-guided therapy arm are expected to have higher adherence rates due to reduced side effects, especially muscle pain, as genetic testing will help guide more suitable statin selection. Atorvastatin may be more beneficial for patients carrying specific variants, while others may be better suited for rosuvastatin. This personalized treatment will result in fewer cases of discontinuation compared to the standard treatment arm.

Ethics approval required

Ethics approval required

Ethics approval(s)
1. Approved 05/04/2023, United Arab Emirates University Human Medical Research Ethics Committee (UAEU.HREC) (College of Medicine & Health Sciences, UAE University, Al Ain, 15551, United Arab Emirates; +971 3 713 6597; research.office@uaeu.ac.ae), ref: SNA/FA/2020-14

2. Approved 29/06/2020, Abu Dhabi Health Research and Technology Committee (ADHRTC) (Department of Health, Abu Dhabi, UAEBuilding 35 Kanadel Street, Al Rawda, AbuDhabi, 20224, United Arab Emirates; +971 800555; admt@doh.gov.ae), ref: DOH/CVDC/2020/1187

3. Approved 27/10/2021, Abu Dhabi Health Research and Technology Ethics Commitee (Building 35 Kanadel Street, Al Rawda, AbuDhabi, 20224, United Arab Emirates; +971800555; admt@doh.gov.ae), ref: DOH/CVDC/2021/1519

4. Approved 09/03/2022, Mediclinic Research and Ethics Committee (Mediclinic Corporate Office - Dubai Production City, Publishing Pavilion, Dubai, 123812, United Arab Emirates; +971 4 512 2730; MCME-ResearchOffice@mediclinic.ae), ref: MCME.CR.213.MAIN.2021

5. Approved 21/09/2022, renewal letter from the Abu Dhabi Health Research and Technology Ethics Committee (Building 35 Kanadel Street, Al Rawda, AbuDhabi, 20224, United Arab Emirates; +971 800555; admt@doh.gov.ae), ref: DOH/CVDC/2022/1458

6. Approved 09/11/2023, Abu Dhabi Health Research and Technology Ethics Committee (AbuDhabi UAE Building 35 Kanadel Street, Al Rawda, AbuDhabi, 5674, United Arab Emirates; +971 24449822; admt@doh.gov.ae), ref: DOH/CVDC/2023/1952

Primary study design
Interventional

Study design
Multicenter interventional randomized controlled trial

Study type(s)
Safety, Efficacy

Health condition(s) or problem(s) studied
Patients prescribed statins as a primary or secondary prevention of cardiovascular events

Interventions
The study will recruit patients from multiple medical sites and randomize them into two arms using Castor software:

Interventional arm be adjusted based on their genotyping results. Physicians will receive a recommendation report for personalized treatment.
Recommendations include change in statin type or dose based on the genetic results and this is translated on a recommendation based on CPIC guidelines.

Standard Treatment Arm: Patients will receive statin therapy based on the physician's decision without knowledge of the genotyping results.

Follow-up will occur at 1 month, 3 months, and 1 year.

Intervention Type
Genetic

Primary outcome(s)
1. Incidence of SAMS is measured using retrospective medical record review at 1 month, 3 months, and 1 year
2. Relevant diagnostic codes for muscle-related disorders (myopathy, myalgia, rhabdomyolysis) are measured using retrospective medical record review at 1 month, 3 months, and 1 year
3. Adverse events are measured using three phone calls at 1 month, 3 months, and 1 year
4. Symptoms of muscle pain are measured using the SAMS CI tool at 1 month, 3 months, and 1 year
5. Severity of muscle pain is measured using the SAMS CI tool at 1 month, 3 months, and 1 year
6. Timing of pain relative to statin initiation is measured using the SAMS CI tool at 1 month, 3 months, and 1 year
7. Pain location and characteristics are measured using the SAMS CI tool at 1 month, 3 months, and 1 year
8. Other potential causes for muscle symptoms are measured using the SAMS CI tool at 1 month, 3 months, and 1 year

Key secondary outcome(s)
1. Mean LDL cholesterol levels are measured using medical record extraction at baseline and 1 year
2. ASCVD risk score is measured using the ACC/AHA ASCVD Risk Estimator at baseline and 1 year
3. Outcomes in people with an actionable gene-drug interaction are measured using medical record extraction at baseline and 1 year
4. Prespecified margin of greater than 10mg/dL is measured using medical record extraction at baseline and 1 year

Completion date
30/06/2025

Eligibility

Key inclusion criteria
1. Adult patient (18 years and older)
2. Uses any of the study drugs (atorvastatin or rosuvastatin)
3. Takes part in a follow-up study for at least one year
4. Signs the informed consent

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 Years

Upper age limit
85 Years

Sex
All

Total final enrolment
850

Key exclusion criteria
1. The patient is pregnant or breastfeeding
2. The duration of the index drug is planned to be less than 7 days
3. Hepatic insufficiency: ALT or AST > twice the upper limit of the normal range or patients with liver cirrhosis
4. Renal insufficiency: Serum creatinine >1.5 times the upper limit of the normal range or serum creatinine >2.5 mg/dl in the last 7 days, or severe renal function impairment needing dialysis
5. The subject has an active tumor or a recent cancer diagnosis or is under current chemotherapy treatment
6. Hematologic problems: WBC <2 x 10^9/l; platelet counts <100 x 10^9/l; hematocrit <30%
7. The patient has sepsis

Date of first enrolment
12/12/2021

Date of final enrolment
30/06/2024

Locations

Countries of recruitment
United Arab Emirates

Study participating centre
Tawam Hospital
P.O.Box 15258
Alain
United Arab Emirates
15258

Study participating centre
The Heart Medical Centre
Opposite Al Ain Hospital

Alain
United Arab Emirates
18088

Study participating centre
Burjeel Day Surgery Center
Jazeerat Al Reem, The Gate District - Dubai
AbuDhabi
United Arab Emirates
130972

Study participating centre
Mediclinic Al Ain Hospital
Mediclinic Al Ain Hospital
Abu Dhabi Alain
United Arab Emirates
14444

Sponsor information

Organisation
United Arab Emirates University

ROR
https://ror.org/01km6p862

Funder(s)

Funder type
Government

Funder Name
UAE Ministry of Education

Results and Publications

Individual participant data (IPD) sharing plan

The de-identified individual participant data (IPD) collected during this study will be available upon reasonable request. Data will be securely stored using Castor, a cloud-based data management platform, and will be shared with researchers who provide a methodologically sound proposal. Requests for data access should be directed to the corresponding author, and access will be granted upon approval by the study's institutional review board (IRB) or ethics committee.
Data will be available for five years following the publication of study results. Any data sharing will be conducted in compliance with data protection regulations and participant consent agreements.

IPD sharing plan summary

Available on request