mRNA-1273-P910: Clinical course, outcomes and risk factors of myocarditis and pericarditis following administration of Moderna vaccines targeting SARS-CoV-2.

First published: 23/05/2023

Last updated: 14/07/2025

Study Finalised

Administrative details

EU PAS number

EUPAS105009

Study ID

105010

DARWIN EU® study

No

Study countries

- ☐ Denmark
- ☐ Norway
- ☐ Spain

United Kingdom

Study description

The overarching goal of this study is to describe the clinical course, outcomes and risk factors for myocarditis and pericarditis associated with Moderna vaccination targeting SARS-CoV-2.
We will investigate the clinical course in terms of morbidity, and identify the relevant prognostic factors using the study objectives.

Study status

Finalised

Research institutions and networks

Institutions

Julius Clinical Research

Netherlands

First published: 02/03/2021

Last updated: 06/03/2024

Institution | Non-Pharmaceutical company | ENCePP partner

Aarhus University & Aarhus University Hospital DEPARTMENT OF CLINICAL EPIDEMIOLOGY

Denmark

First published: 20/07/2021

Last updated: 02/04/2024

Institution | Educational Institution | ENCePP partner

Drug Safety Research Unit (DSRU)

United Kingdom

First published: 10/11/2021

Last updated: 16/02/2024

Institution | Not-for-profit | ENCePP partner

Fundació Institut Universitari per a la Recerca a l'Atenció Primària de Salut Jordi Gol i Gurina, IDIAPJGol

Spain

First published: 05/10/2012

Last updated: 23/05/2025

Institution | Educational Institution | Laboratory/Research/Testing facility | Not-for-profit | ENCePP partner

The Foundation for the Promotion of Health and Biomedical Research of Valencia Region (FISABIO)

Spain

First published: 01/02/2024

Last updated: 31/10/2025

Institution

University of Oslo

First published: 01/02/2024

Last updated: 01/02/2024

Institution

Contact details

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Study contact

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Primary lead investigator

David Ong

Primary lead investigator

Study timelines

Date when funding contract was signed

Planned: 23/03/2022

Actual: 23/03/2022

Study start date
Planned: 31/03/2023

Actual: 31/03/2023

Date of final study report
Planned: 30/06/2025

Actual: 30/06/2025

Sources of funding

- Pharmaceutical company and other private sector

More details on funding

Moderna Tx

Study protocol

Moderna Myocarditis_Nat History Study_Protocol_version 4.0_CLEAN fv_Final_redacted_pdfA_archive.pdf (2.06 MB)

Regulatory

Was the study required by a regulatory body?

Yes

Is the study required by a Risk Management Plan (RMP)?

EU RMP category 3 (required)

Other study registration identification numbers and links

mRNA-1273-P910

Methodological aspects

Study type

Study type list

Study type:

Non-interventional study

Scope of the study:

Assessment of risk minimisation measure implementation or effectiveness

Disease epidemiology

Data collection methods:

Secondary use of data

Study design:

The study will include 2 distinct designs:

- A case-cohort design to assess risk factors for development of post-vaccine myocarditis and pericarditis;
- A cohort design to characterize the clinical course, outcomes, and risk factors for severe myocarditis and pericarditis.

Main study objective:

The primary objectives of this study are:
1. To identify possible risk factors for myocarditis and pericarditis following Moderna vaccination targeting SARS-CoV-2, including demographic characteristics, medical history, and vaccination characteristics.
2. To characterize the clinical course of myocarditis and pericarditis of varying origin, including myocarditis and pericarditis associated with Moderna vaccination targeting SARS-CoV-2, and myocarditis or pericarditis not associated with vaccinations targeting SARS-CoV-2, and to identify prognostic factors in the course of myocarditis and pericarditis.

Study Design

Non-interventional study design

Case-control

Cohort

Other

Study drug and medical condition

Study drug International non-proprietary name (INN) or common name

COVID-19 MRNA VACCINE (NUCLEOSIDE-MODIFIED)

Anatomical Therapeutic Chemical (ATC) code

(J07BN01) covid-19, RNA-based vaccine

covid-19, RNA-based vaccine

Medical condition to be studied

Myocarditis

Pericarditis

Population studied

Short description of the study population

For the case-cohort design, individuals with at least one dose of Moderna vaccination targeting SARS-CoV-2 will be used to define a cohort of Moderna vaccination recipients.

Inclusion criteria are at least one year of enrolment in the applicable database prior to the index vaccine dose and without myocarditis events within 6 months prior to receiving a Moderna vaccination targeting SARS-CoV-2.

Cases are those individuals who develop myocarditis or pericarditis any time during the follow-up after Moderna vaccination targeting SARS-CoV-2.

Cases should be able to meet the adjudication criteria according to the Brighton Collaboration Case Definition for possible, probable, or definite myocarditis or pericarditis.

The controls will be sampled from the exposed cohort, such that they align with the distribution of cases based on the month and year of documented Moderna vaccination receipt.

For the cohort design, individuals meeting the criteria of myocarditis or pericarditis, with at least one year of enrolment in the applicable database prior to the index myocarditis or pericarditis event will be included.

Cases of myocarditis and pericarditis will be excluded if these individuals have no record of a Moderna vaccine targeting SARS-CoV-2 but a record of another vaccine targeting SARS-CoV-2 within 30 days prior to the onset of myocarditis or pericarditis.

Within the cohort design, all cases following vaccination are adjudicated according to the Brighton Collaboration Case Definition.

A 1:1 matched sample of the cases not following vaccination matched based on sex and age will also be adjudicated. Only cases that meet the adjudication criteria for possible, probable, or definite myocarditis or pericarditis are included.

Age groups

- **Paediatric Population (< 18 years)**
  - Infants and toddlers (28 days – 23 months)
  - Children (2 to < 12 years)
  - Adolescents (12 to < 18 years)
- **Adult and elderly population (≥18 years)**
  - Adults (18 to < 65 years)
    - Adults (18 to < 46 years)
    - Adults (46 to < 65 years)
  - Elderly (≥ 65 years)
    - Adults (65 to < 75 years)
    - Adults (75 to < 85 years)
    - Adults (85 years and over)

Estimated number of subjects

6800000

Study design details

Setting

This study will include information from multiple databases, utilizing routinely collected health and administrative data of four European countries: Denmark, Norway, Spain (2 databases), and the United Kingdom (UK).

The study databases are representative of the source population in each country.

Outcomes

Primary:

1. Risk factors for myocarditis and pericarditis that could potentially include

demographics characteristics, lifestyle factors, medical history and vaccination history
2. Clinical outcomes (death, subsequent cardiovascular events, cardiac hospitalizations) after myocarditis or pericarditis

Secondary:
Risk factors for myocarditis and pericarditis, as well as severe myocarditis and pericarditis

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Data analysis plan
For the case-cohort analysis, all cases of myocarditis and pericarditis and the full control cohort will be described with respect to demographics, lifestyle factors, medical- and vaccination history.
A conditional logistic regression methodology will be applied to identify potential risk factors for development of myocarditis and pericarditis within the Moderna vaccination targeting SARS-CoV-2-exposed population (Primary objective 1).

To identify differences in clinical course (Primary objective 2) and differences in risk factors (Secondary objective 1) for vaccine associated myocarditis/pericarditis and vaccine unrelated myocarditis/pericarditis, cases in the cohort analysis will be compared based on vaccination status.
Outcomes and follow-up care will also characterized, where feasible.
Standard descriptive statistics will be used to characterise clinical course, outcomes, and long-term outcomes following the initial myocarditis/pericarditis episode.
Cox regression analysis will be utilized to compare the presence of sequelae following myocarditis/pericarditis.

Data management

ENCePP Seal

The use of the ENCePP Seal has been discontinued since February 2025. The ENCePP Seal fields are retained in the display mode for transparency but are no longer maintained.

Data sources

Data source(s)

Danish registries (access/analysis)

Clinical Practice Research Datalink

The Information System for Research in Primary Care (SIDIAP)

Norwegian Health Registers

The Valencia Health System Integrated Database

Data sources (types)

Administrative healthcare records (e.g., claims)

Disease registry

Electronic healthcare records (EHR)

Use of a Common Data Model (CDM)

CDM mapping

Yes

CDM Mappings

CDM name

ConcepTION CDM

CDM website

https://www.imi-conception.eu/

CDM release frequency

6 months

Data quality specifications

Check conformance

Unknown

Check completeness

Unknown

Check stability

Unknown

Check logical consistency

Unknown

Data characterisation

Data characterisation conducted

Unknown