

The Power of Virtual Twins to Fight MAFLD

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ARTEMIS
The Power of Virtual Twins to Fight MAFLD



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ARTEMIS

Accelerating
the Translation
of virtual twins
towards a
personalized
Management of
fatty liver patients



Cristina
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Scientific Director,
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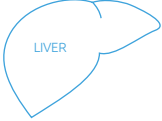


ARTEMIS is destined to set bridges among key stakeholders involved in the fight against fatty liver diseases. In the dawning of the Personalized Medicine Era, ARTEMIS aims to gather clinicians, modelers, patients, and regulators towards the development of a comprehensive therapeutic decision-aid tool. To do so, ARTEMIS is grounded upon three building blocks: **a multimodal and regulatory-grade MAFLD cohort, liver and heart virtual twins, and a user-friendly Smart Dashboard.**

We expect to achieve considerable societal impact, by offering clinicians and patients an interactive visualization tool wherein Real-World Data, risk stratification, and early diagnosis predictions are made easy. This ambitious project involves 9 countries, 21 partners, and a cohort of 7500 patients. But ambition is fundamental when tackling the challenge of **improving MAFLD patients' healthcare journey!**

Aligning Expertise: ARTEMIs Team's Shared Vision

2

ORGANS



7500

PATIENTS



10

MILLION



4

YEARS



9

WORK PACKAGES



4

CLINICAL CASES



21

PARTNERS



9

COUNTRIES

The figure shows a map of Europe with lines connecting to logos of partner institutions. The logos are arranged in two columns, with the left column representing institutions in Western and Southern Europe, and the right column representing institutions in Central and Eastern Europe. The logos include:

- ELPA** European Liver Patients' Association
- SAINT-LUC** Cliniques universitaires UC Louvain BRUXELLES
- BU** Bournemouth University
- Imperial College London**
- ASSISTANCE PUBLIQUE HÔPITAUX DE PARIS**
- Medexprim**
- IHU ican** Foundation for Innovation in Cardiovascular and Nutrition
- inria**
- IIS La Fe** Instituto de Investigación Sanitaria
- Vall d'Hebron**
- MATICAL** Innovation Managers
- SHEBA** Liver Disease Excellence Center
- CHARITÉ**
- HEIDELBERG UNIVERSITY HOSPITAL**
- universität freiburg**
- UNIVERSITÄTS KLINIKUM jena**
- UNIVERSITÄT LEIPZIG**
- dkfz.** GERMAN CANCER RESEARCH CENTER
- betthera**
- MEDIZINISCHE UNIVERSITÄT WIEN**
- SAPIENZA UNIVERSITÀ DI ROMA**

3

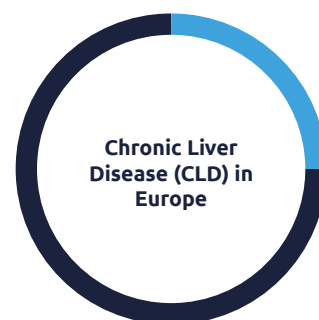


Understanding MAFLD Progression and Related Cardiac Complications: A Gateway to Effective healthcare

Metabolic Dysfunction-Associated Fatty Liver Disease (MAFLD)

is now recognized as the leading cause of chronic liver disease (CLD) in Europe, surpassing viral hepatitis and alcohol-related causes, with a prevalence exceeding **25%**. This rise is linked to escalating risk factors from unhealthy lifestyles. MAFLD's diverse clinical trajectory, including **steatosis, NASH, cirrhosis, and hepatocellular carcinoma**, stems from varied underlying mechanisms. In particular, the inflammatory facet—non-alcoholic steatohepatitis (**NASH**)—heightens **cardiovascular disease (CVD)** risk, a leading cause of death among MAFLD patients. Understanding MAFLD progression and the liver-heart axis is crucial for effective healthcare outcomes. The ARTEMIS project will develop **liver and heart computational models and virtual twins**, offering insights into heart-liver functions across different stages of the disease.

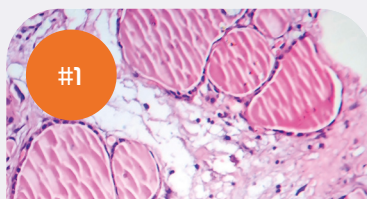
25%
(MAFLD)



Empowering Precision Healthcare with ARTEMIS

ARTEMIS aims to co-design and develop a proof-of-concept (POC) of a Clinical Decision Support System — a cutting-edge clinical visualization tool — offering an overview of patient multimodal data and therapeutic decision-aid, thanks to the integrated virtual twin models. The Clinical Decision Support System provides dynamic and multilevel representations of tissues and organs and will provide support to clinicians to achieve early diagnosis, prediction of disease evolution, assessment of cardiovascular outcomes, and guidance towards specific treatments or interventions. This tool will empower clinicians to implement personalized and responsive care strategies, marking a significant leap forward in MAFLD patient's healthcare.

The project will focus on 4 clinical cases, each one addressing a stage of the MAFLD progression:



Fibrosis progression in MAFLD patients



Fibrosis-associated heart failure patients

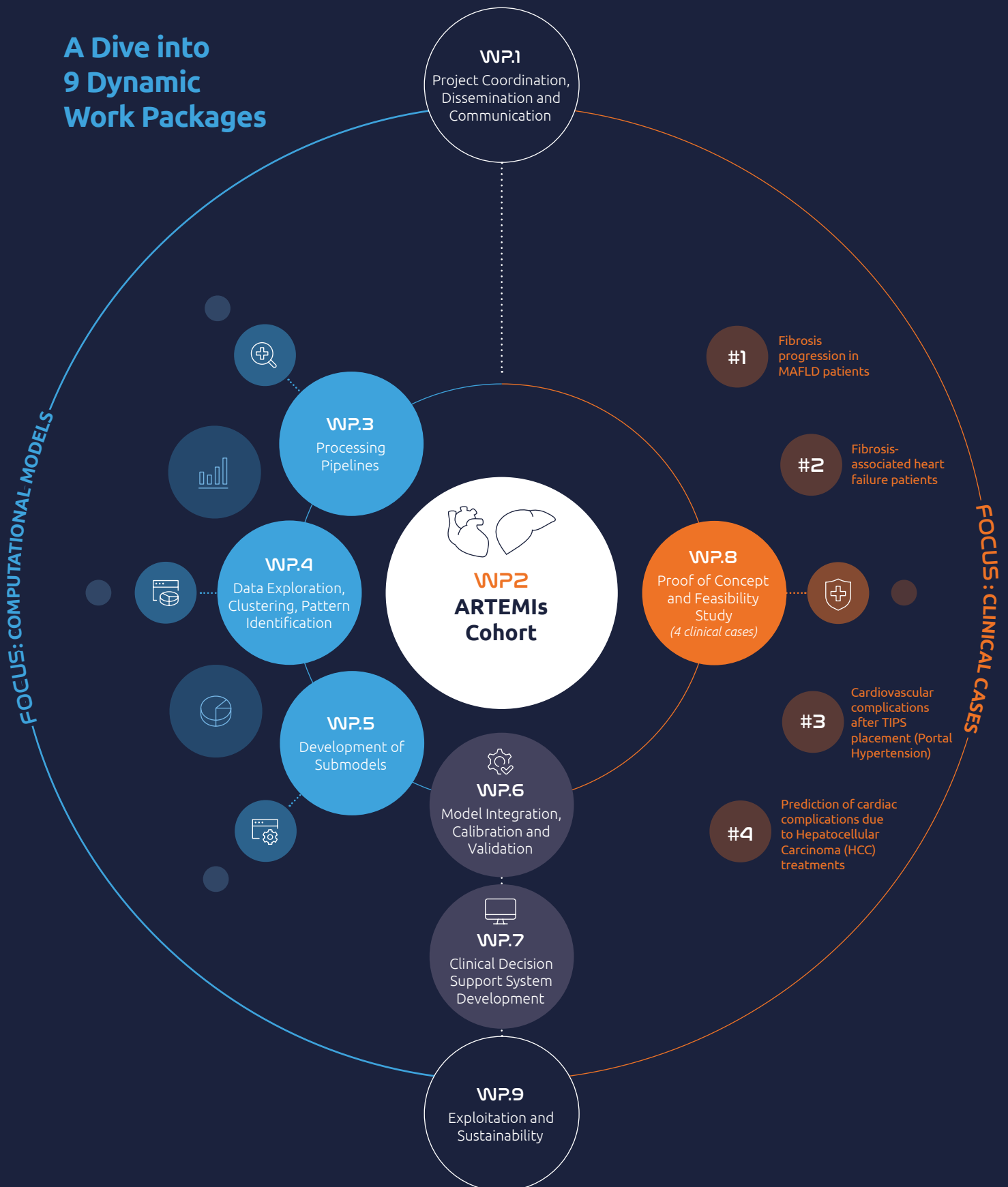


Cardiovascular complications after TIPS placement (Portal Hypertension)



Prediction of cardiac complications due to HCC treatments

A Dive into 9 Dynamic Work Packages



Charting Success: Essential Milestones (MS) for the Next Four Years



Showcasing 5 Transformative Project Outcomes

ARTEMIs envisages filling in the gaps of virtual twins' state-of-the-art and to offer clinicians and patients a user-friendly, therapeutic decision-aid device to improve the MAFLD healthcare pathway. Here are some transformative outcomes that ARTEMIs will bring about:

- **Integrated models** (virtual twins) demonstrator per use case
- **Models performance evaluation** results
- **Clinical Decision Support System** (CDSS) final version
- **POC Feasibility Study results** - Clinical Validation
- **Societal impact** assessment

Discover all project outcomes on the ARTEMIs' official website



Scaling the ARTEMIs Model for Transformative Impact

The ARTEMIs model is designed for scalable deployment to extend its impact to **enhance healthcare across various diseases organs and therapeutic interventions, fostering improved decision-making**. As radiogenomics unveils mechanistic pathways in cancer cells, ARTEMIs' Clinical Decision Support System (CDSS) will evolve to offer an interactive, user-friendly presentation of patients' multimodal data.

We envision furthering integration and development of state-of-the-art computational models within new European Consortia in the near future.

30 MONTHS

MS4
VT submodels developed

36 MONTHS

MS5
CDSS preliminary version with integrated liver-heart Virtual Twins

42 MONTHS

MS6
Final evaluation of CDSS and Virtual Twins models ready to start

48 MONTHS

MS7
Fully functional CDSS, steps towards regulatory approval & commercial exploitation defined

Fostering Collaboration through Multidisciplinary Governance

CLINICAL COMMITTEE



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