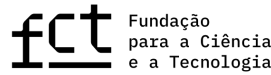


Co-funded by:



PROJECT SPEC SHEET (EN)

RheumaAID - ARTIFICIAL INTELLIGENCE-ENHANCED REFERRAL OF RHEUMATIC AND MUSCULOSKELETAL DISEASES

Project no.:

2024.07650.IACDC

Supported by: Projetos de IC&DT – Inteligência Artificial, Ciência dos Dados e Cibersegurança de relevância na Administração Pública

Partners: Fraunhofer Portugal AICOS (coordinator); Universidade Nova de Lisboa

Start Date: 01/02/2025

Conclusion Date: 31/01/2026

Total eligible cost: 124 901,82€

National Funding: 124 901,82€ (100%)

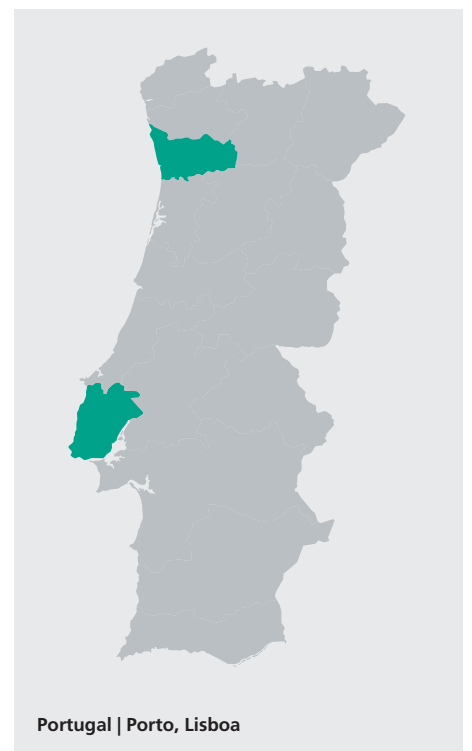
Project Overview

Rheumatic and Musculoskeletal Diseases (RMDs) are a leading cause of disability worldwide, significantly impacting over 120 million people in Europe. In Portugal, the prevalence of RMDs is rising, leading to increased costs in rheumatology care, primarily supported by the National Health Service (SNS).

Inflammatory RMDs exhibit diverse clinical manifestations, complicating timely suspicion and referral by healthcare professionals. Primary care is pivotal for early diagnosis and ongoing management of RMDs, yet general practitioners (GPs) in Portugal face difficulties due to limited training and time constraints. Rapid referral of adults with suspected persistent synovitis or inflammatory arthritis is essential to prevent delays in diagnosis and treatment, especially for those with multiple joint inflammations or inflammatory axial pain, which are associated with poor prognosis. Early diagnosis and treatment significantly enhance long-term outcomes, physical function, and quality of life. Integrating new technologies and artificial intelligence (AI) could aid GPs in identifying and

referring RMD patients more efficiently, thereby streamlining the referral process and improving patient outcomes through quicker access to specialized care.

Currently, management and treatment of RMDs rely heavily on patient-reported outcome measures (PROMs), which are subjective and prone to variability due to



factors such as recall bias and differing interpretations of symptom severity. In fact, there has been limited exploration of multimodal assessment of RMD patients using objective data from digital endpoints. Smartphones and wearable sensors have demonstrated utility in tracking other chronic diseases, suggesting potential benefits for RMDs when combined with artificial intelligence (AI) techniques. Such technologies can provide continuous, objective and continuous monitoring, reducing the burden on clinicians and patients, lowering healthcare costs, and offering trustworthy measures for predicting health outcomes of disease activity.

Recent studies highlight the potential of digital endpoints to accurately predict disease activity and health outcomes, yet their application in RMDs remains scarce. There is a critical need for a comprehensive multimodal assessment framework that integrates data from inertial sensors, keyboard typing dynamics, and PROMs to enhance RMDs management. Existing studies typically focus on a single type of digital endpoint and there is a gap in research integrating multiple data sources to provide a more holistic assessment of RMDs. While such biomarkers have been explored for other chronic diseases, their

application in RMDs is limited, demanding research to validate and optimize these technologies in rheumatology. Moreover, few studies have explored AI-driven models to predict and forecast disease status in RMD patients either through existing clinical or digital endpoints.

To address these gaps, this project proposes to develop an innovative AI-driven framework leveraging multimodal data to predict and forecast disease activity in RMD patients. The primary objectives are:

- Predicting Outcomes: Develop models that predict reliable clinical outcomes for critical dimensions of rheumatic disease, such as mobility and finger dexterity, using digital endpoints from sensors;
- Discovering Disease Activity Patterns: Identify and estimate patterns of disease activity progression and their predictors based on clinical and sociodemographic data available on a National health registry of rheumatic patients (Reuma.pt) and a population-based cohort assessing the health status of the national population, including rheumatic diseases (EpiDoC);
- Forecasting Disease Activity: Use data from predictors to forecast future disease

activity, enabling a proactive approach to enhance disease management and stratification of patient severity.

The proposed research will involve (1) exploring disease trajectories from large databases, (2) discovering distinct disease course profiles and their predictors, (3) building an algorithm capable of stratifying patients based on clinically reported information and estimated evolution, and (4) using multimodal sensor data (e.g., including inertial sensor data, keystroke dynamics) to predict such outcomes and help predict disease activity.

RheumaAID aligns with guidelines from the European League Against Rheumatism (EULAR) that recommend the integration of digital endpoints and AI to enhance rheumatology care. This project aims to transform RMDs management, uncovering predictors of disease activity profiles, reducing reliance on subjective measures, and improving the prediction of clinical outcomes, ultimately leading to better decision-making strategies and patient care.

Photos, videos and other dissemination materials



Workshop

RheumaAID

Melhoria da referência para Reumatologia em Portugal

17 Março
12:00 > 13:00 · Online

NOVA MEDICAL SCHOOL Fraunhofer PORTUGAL fct