

# MISSION-T2D

Multiscale Immune System Simulator for the Onset of Type 2 Diabetes integrating genetic, metabolic and nutritional data

## What is diabetes?

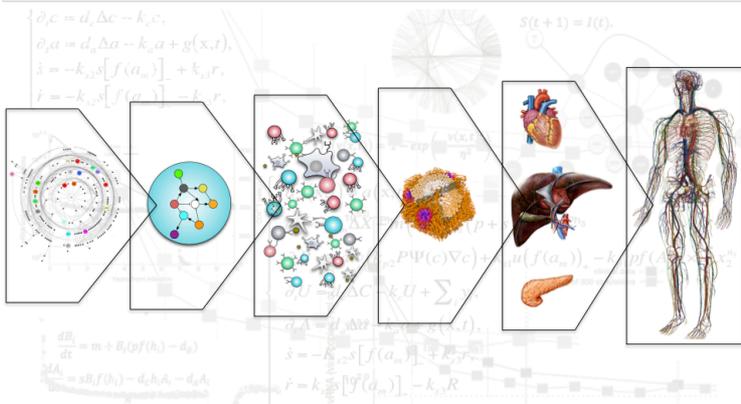
Diabetes is a chronic disease that occurs either when the pancreas does not produce enough **insulin** (type 1 diabetes) or when the body cannot effectively use insulin (type 2 diabetes), a crucial hormone that regulates blood sugar. **Hyperglycaemia**, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to **serious damage** to many of the body's systems, especially the nerves and blood vessels.

**Type 2 diabetes (T2D)** results from the body's ineffective use of insulin. T2D comprises 90% of people with diabetes around the world, and is largely the result of excess body weight and physical inactivity. Symptoms may be similar to those of type 1 diabetes, but are often less marked. As a result, **the disease may be diagnosed several years after onset**, once complications have already arisen. Until recently, this type of diabetes was seen only in adults but it is now also occurring in children.

## The MISSION-T2D project

Europe's growing "obesity epidemic", its ageing population and often-sedentary lifestyle have led to an explosion in the incidence of **type 2 diabetes**. It can be estimated that about 60 million people are at present affected by T2D in the EU, ~50% of which are unaware of being developing the disease.

The project **MISSION-T2D** aims at developing and validating an integrated, **multilevel patient-specific model for the simulation and prediction** of metabolic and inflammatory processes in the onset and progress of the type 2 diabetes.



Integration of biological processes occurring at multiple scales is necessary for the understanding of complex diseases such as T2D

## Contact Person

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## Partners

- National Research Council of Italy (IT)
- Alma Mater Studiorum-University of Bologna (IT)
- The Chancellor, Masters and Scholars of the University of Cambridge (UK)
- University of Rome "Foro Italico" (IT)
- Netherlands Organisation for Applied Scientific Research (NL)
- University of Sheffield (UK)
- Medisana Space Technologies GmbH (DE)

Timetable: from 3/13 to 2/16

Total cost: 2,95 Mln €

EU funding: 2,31 Mln €

Instrument: STREP

Project Identifier: FP7-ICT-600803

## Diabetes facts

Estimation of people who died from consequences of high fasting blood sugar in 2004: **3.4 million**

Number of people worldwide that have diabetes: **347 million**

Percent of world population with diabetes: **5%**

WHO projects that diabetes will be the **7th** leading cause of death in 2030

Source: World Health Organisation



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# MISSION-T2D

Project Partners



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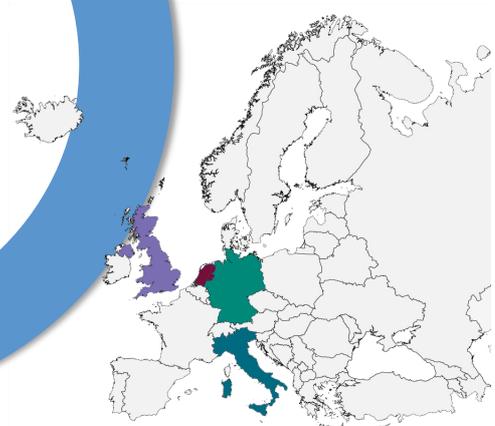


The MISSION-T2D aim will be accomplished by setting up a multi-scale model to study the systemic interactions of the involved biological mechanisms (immunological/inflammatory processes, energy intake/expenditure ratio and cell cycle rate) in response to a variety of nutritional and metabolic stimuli/stressors.

Combining early warning inflammatory signals with knowledge of risks allows earlier diagnosis, augmenting our ability to predict the onset of disease.

MISSION-T2D aims at paving the way for translating validated multilevel immune-metabolic models into the clinical setting of T2D. This approach will eventually generate predictive biomarkers from the integration of metabolic, nutritional, immune/inflammatory, genetic and gut microbiota profiles, as well as of clinical data, suitable to be translated into cost-effective mobile-based diagnostic tools.

Ultimately, the project will develop a cross-platform mobile app that will empower individual patients, allowing them to monitor their own metabolic health, assess the efficacy of various anti-inflammatory therapies and mitigate or lessen the complications associated with the disease. The research team intends for the app to encourage patients to pursue positive lifestyle changes such as the modification of dietary habits or changes in levels of physical activity through the creation of an emotional engagement with their real-time health data.



Therapy regimes can be both personal and personally manageable with apps designed to help patients self-monitoring



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