TAXINOMISIS

Multidisciplinary approach → stratification of patients with carotid artery disease

TAXINOMISIS plenary meeting Autumn, 2019, Netherlands	**TAXINOMISIS workshop** 68th ESCVS Congress, May 25, 2019, Netherlands	**TAXINOMISIS workshop** Angiology Congress, March 14, 2019, Greece

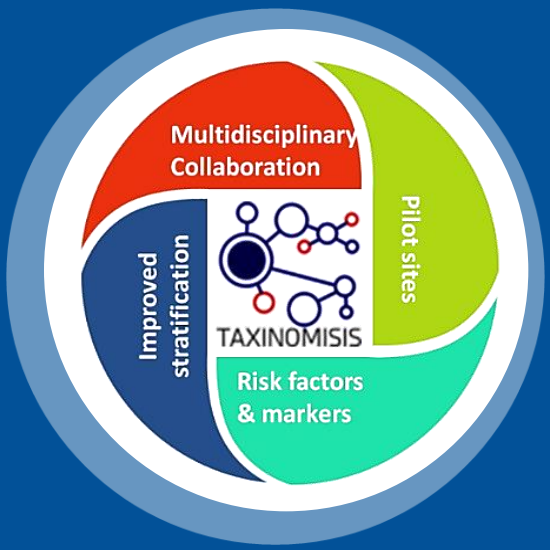
Newsletter 01 March 2019

TAXINOMISIS is a European Commission funded research project which aims to develop a new approach for the stratification of carotid artery disease patients.

TAXINOMISIS takes bold step beyond the state of the art unwinding the pathobiology underlying symptomatic plaques, discriminating distinct disease mechanism-driven states and biomarkers, and developing a multiscale risk stratification model.

TAXINOMISIS will deliver, as a main outcome, a software platform, which can perform the risk stratification.

TAXINOMISIS innovation capacity



Purpose

Provide novel disease mechanism-based stratification for carotid artery disease patients to address the need for stratified and personalised therapeutic interventions in the current era.

Objectives

→ Investigate the causal relationship of the major pathways and factors identified in symptomatic carotid artery disease

→ Study disease phenotypes and disintegrate them into endotypes according to specific pathobiological mechanisms

→ Integrate a computational model and an agent based model of plaque progression in the risk stratification tool

→ Perform a test for determining the presence of single Nucleotide Polymorphisms and predicting drug response

→ Evaluate the risk model of carotid artery disease stratification in an observational multicentre clinical study

→ Present a cost-effectiveness analysis

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 755320

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Project activities

1. Characterize the gene expression profile of symptomatic and asymptomatic plaques

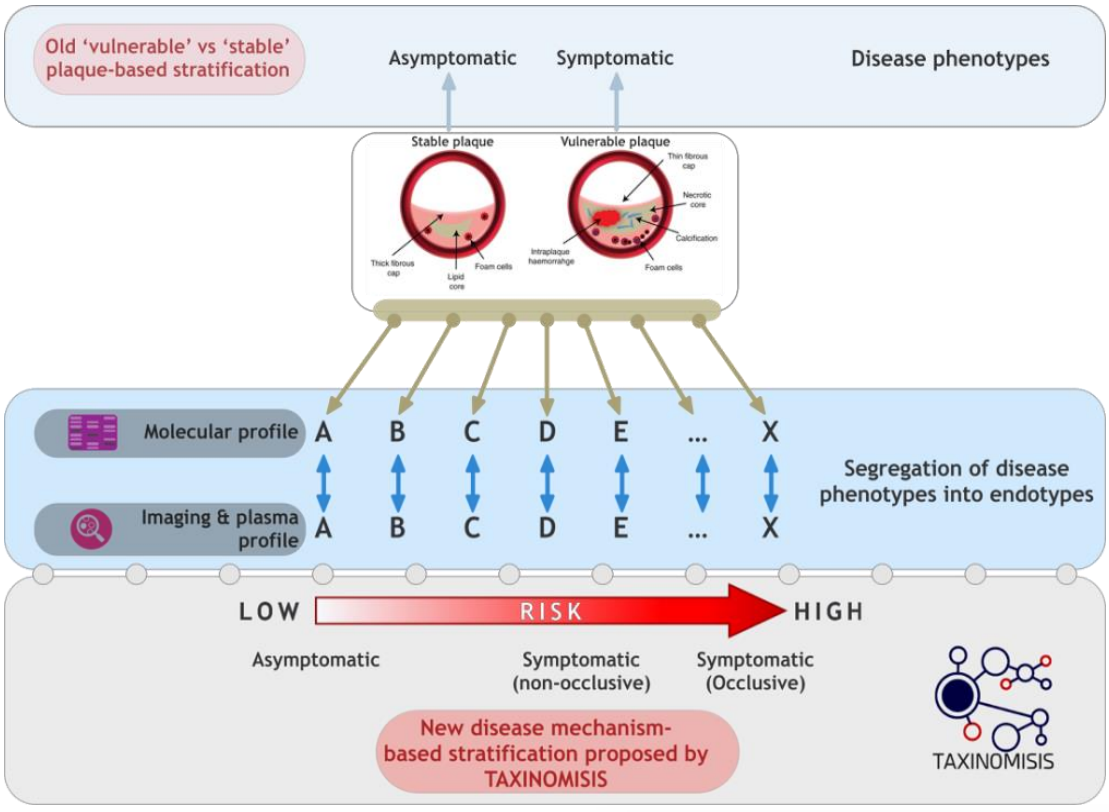
- Cellular composition of atherosclerotic plaques through deep profiling
- Predictive value of ceramides in carotid artery disease
- Predictive value of extracellular vesicle biomarkers in carotid artery disease

2. Disintegration of carotid artery disease phenotypes into endtypes through joint modelling of multiple omics datasets and systems medicine approaches

- Common pathways and networks through joint modelling of multi-omics datasets that cluster plaques into biologically and clinical risk-relevant subtypes
- Circulating biomarker profiles that can be used as surrogate markers to identify distinct plaque subtypes
- Carotid artery disease endotypes and their use to refine patient stratification according to risk

3. Risk stratification model

- Refinement of the existing multilevel computational model of plaque progression
- Agent based model of plaque progression
- New risk stratification tool
- Validation of the individual models and the new risk stratification tool



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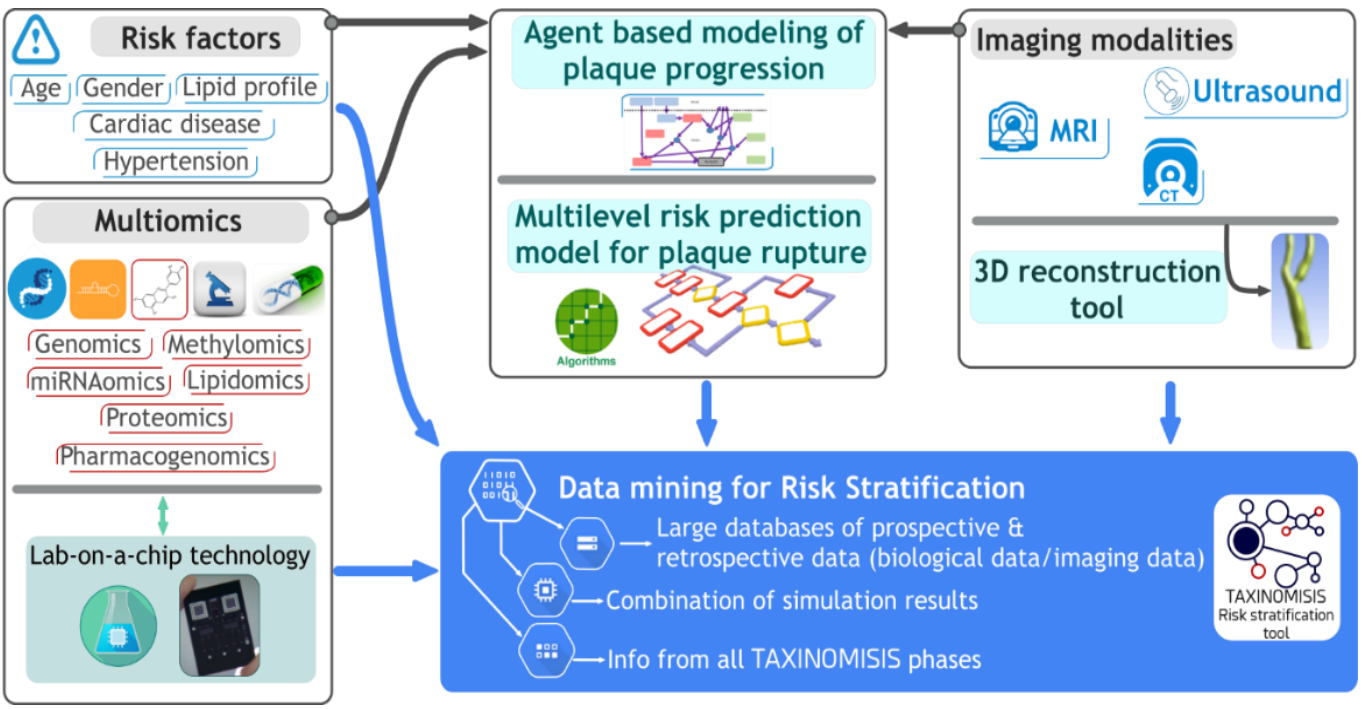
Project activities

4. Pharmacogenomics analysis and development of a new lab-on-a-chip for further stratification of patients and personalization of medical treatment

- Informative pharmacogenetic markers for patient stratification and personalized (precision) treatment
- Single cavity pipet PCR devices and thermal controller enabling the different temperature steps (PCR cycling)
- Fluidic testing of multiple cavity lab-on-a-chip
- Individual PCR reactions on lab-on-a-chip
- Multiplex PCR using a single lab-on-a-chip

5. Evaluation of the new risk stratification tool in a prospective observational clinical study

- Prospective observational clinical study in patients with carotid artery disease
- Predictive performance of the new risk stratification model
- Ability of the new risk stratification model to reduce unnecessary treatment, morbidity and healthcare costs



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Consortium

TAXINOMISIS encompasses a highly multidisciplinary group of researchers with remarkable track record and complementarity from 12 world-leading institutions of clinical and research excellence and 3 pioneering SMEs including:

- ✓ Medical experts
- ✓ Vascular surgeons
- ✓ Cardiologists
- ✓ Neurologists
- ✓ Biologists
- ✓ Software engineers
- ✓ Biomedical engineers
- ✓ Lab-on-a-chip experts
- ✓ Health research experts

TAXINOMISIS researchers are international leaders in their respective fields and have contributed to our current understanding of:

- the **clinical medicine surrounding carotid artery disease** (UMC, TUM, UBEO, USMI, FCRB, NKUA),
- **the molecular mechanisms** driving atherosclerosis in carotid and coronary arteries (UMC, TAUH, BRFAA, ZORA, USMI, UOXF),
- the **immuno-inflammatory processes involved** (UMC, BRFAA, USMI, UOXF, UBEO),
- the identification of **diagnostic markers and treatments** for cardiovascular disorders (TAUH, ZORA, IMEC, UMC, TUM, USMI, FCRB),
- **the development of new algorithms and simulation tools for atherosclerotic plaques and CVDs** (UOI, BIOIRC, END),
- **the development of risk prediction models** (UOI, BIOIRC),
- the design and production of **lab-on-a-chip devices** based on nanoelectronics (IMEC) and
- the provision of **retrospective data and cohorts** (NIVEL, TAUH, UMC)

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