

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.



Purpose

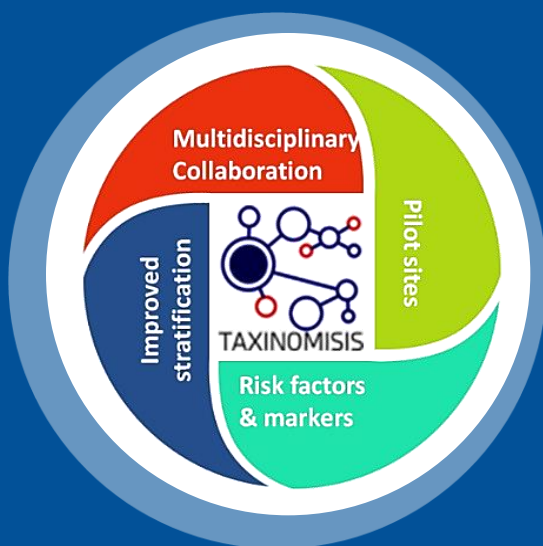
Provide novel disease mechanism-based stratification for carotid artery disease patients to address the need for stratified and personalised therapeutic interventions in the current era.



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

TAXINOMISIS innovation capacity



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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

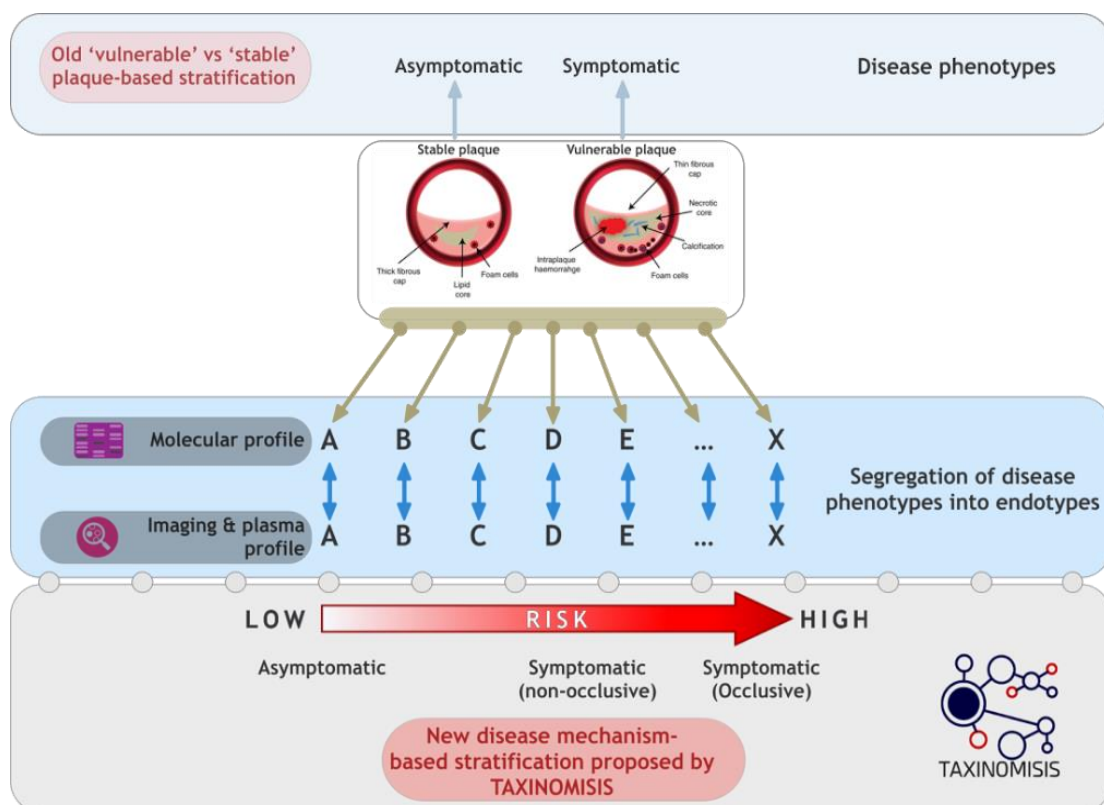
- Common pathways and networks through joint modelling of multi-omics datasets that

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



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

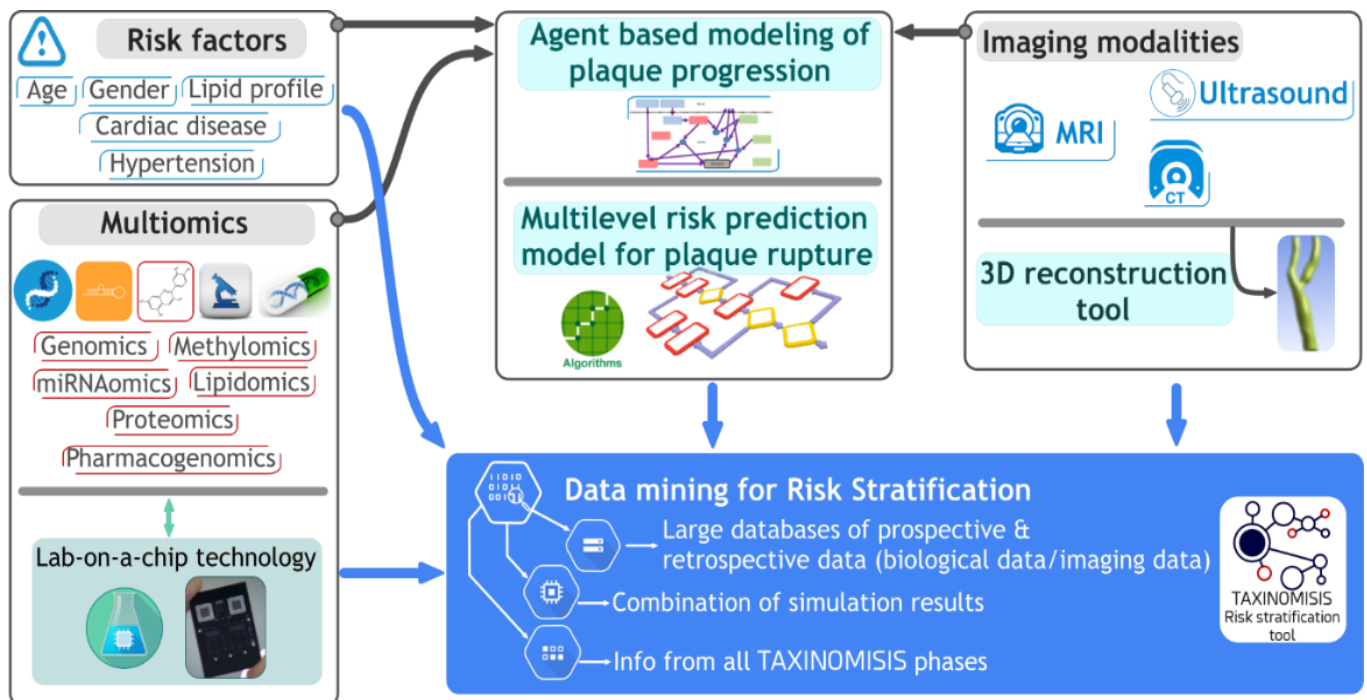
4. Pharmacogenomics analysis and development of a new lab-on-a-chip for further stratification of patients and personalization of medical treatment

- 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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