TAXINOMISIS

Multidisciplinary approach
→ stratification of patients with carotid artery disease

supported by the ESCVS The European Society for Cardiovascular and Endovascular Surgery — The European Society for Cardiovascular Surgery

Newsletter September 2019

TAXINOMISIS plenary meeting	TAXINOMISIS workshop	TAXINOMISIS presentation
October 14 - 15, 2019, Netherlands	33rd Annual Meeting of ESCVS September 25, 2019 Germany	19th annual IEEE International Conference on Bioinformatics Bioengineering October 28 - 30, 2019 Greece

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

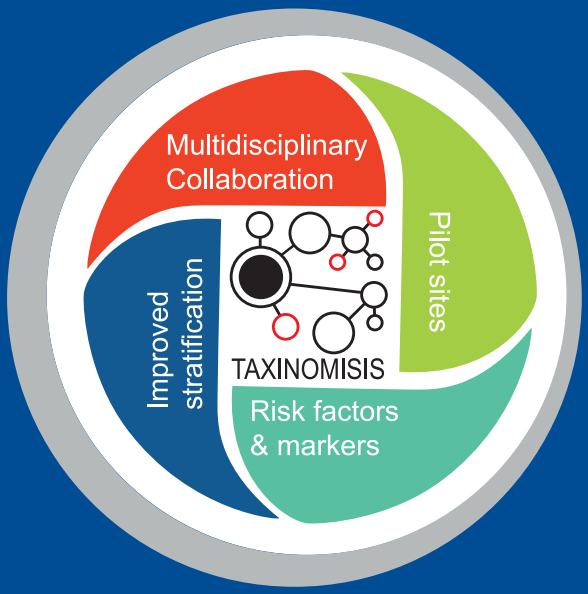
TAXINOMISIS takes bold step beyond the state of the art unwinding the pathobiology underlying symptomatic plaques, discriminating distinct disease mechanism driven states and biomarkers, and developing a multiscale risk stratification model.

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

Purposes

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

TAXINOMISIS innovation capacity



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 mechanism.**
- 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 founding from European Union's Horizon 2020 research and innovation program under grands agreement No 755320.

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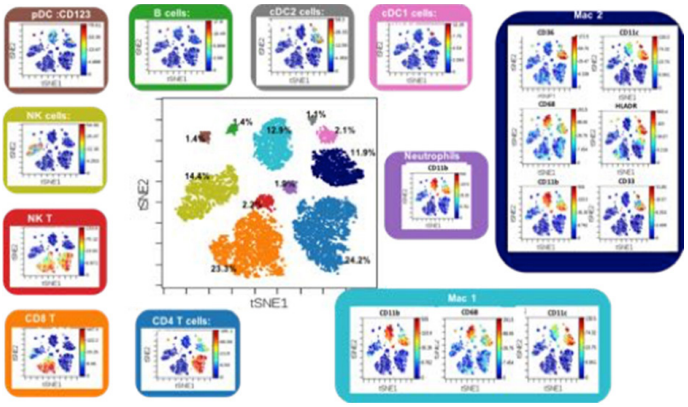
Project activities

Within the first 18 months of the project significant achievements have been accomplished.

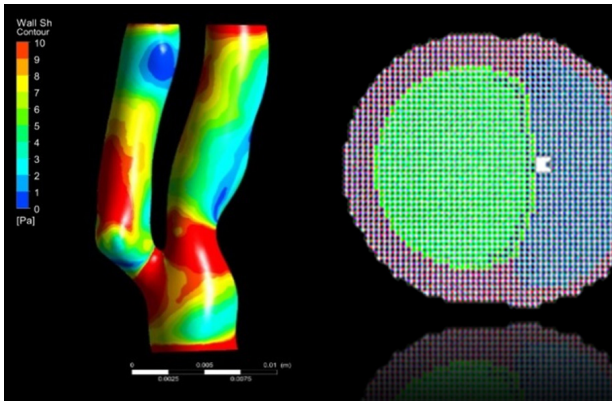
Specifically:

➔ The **patient recruitment** process has shown significant progress and 300 patients will be enrolled in the TAXINOMISIS prospective clinical study by mid-October, 2019.

➔ The **project handbook**, risk management and quality assurance plan has been established.
➔ The **global gene expression profile** of carotid atherosclerotic plaques is being analyzed using some of the finest cohorts/biobanks available such as Athero Express.



➔ The **data management** plan of the project has been prepared.
➔ An electronic **case report** form according to the needs of the TAXINOMISIS clinical study has been developed.
➔ **Pharmacogenetic markers** for refining patient stratification were selected and microchip based PCR devices were designed and fabricated.
➔ The conceptual architecture of the **software platform** has been established.
➔ The development of the **computational model**, as well as of the agent based model of plaque progression is under progress.



➔ The first version of the **communication and dissemination activities** plan was prepared in June, 2019.
➔ The first version of the **exploitation and innovation plan** was prepared in June, 2019.

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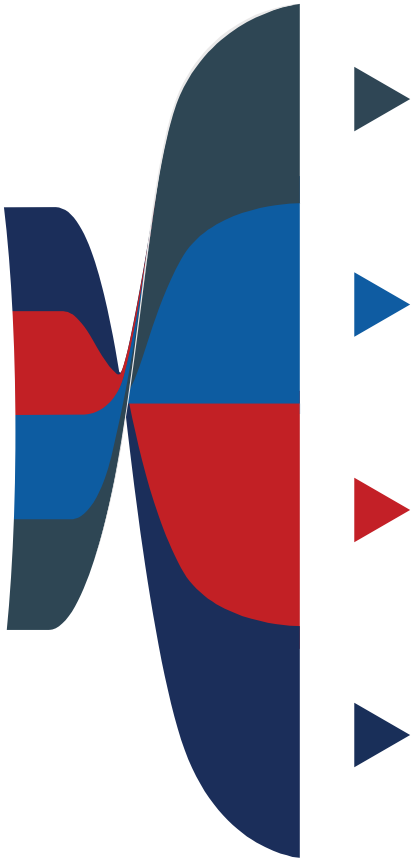
Conceptual architecture of the Risk Stratification platform

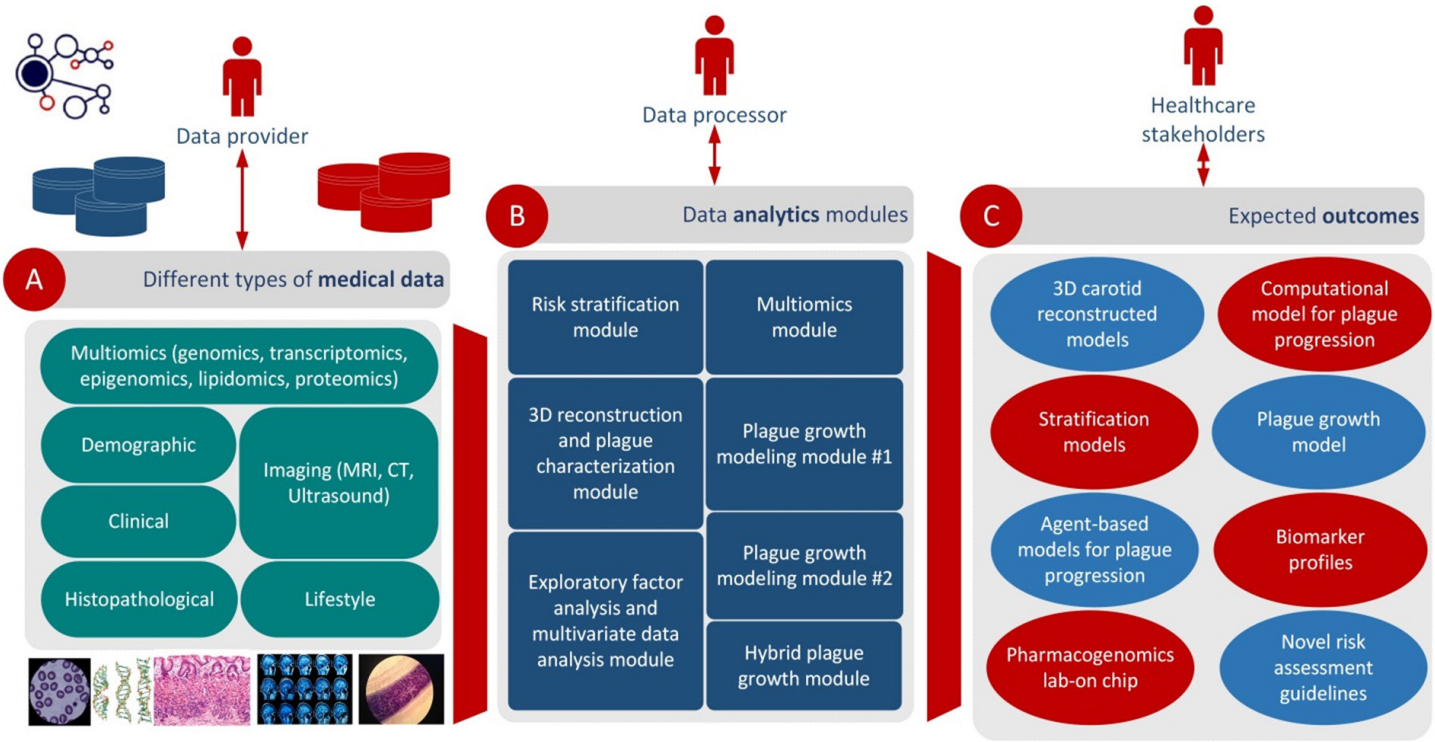


The **data providers** will upload prospective and retrospective medical data in the platform, including: (i) demographic, (ii) multiomics (lipidomics, transcriptomics, proteomics, epigenomics, genomics), (iii) imaging, (iv) clinical, (v) histopathological, and (vi) lifestyle data.

The **data analytics modules** include: (i) the risk stratification module, (ii) the multiomics module, (iii) the plaque growth modeling module, (iv) the hybrid plaque growth module, (v) the exploratory factor analysis and multivariate data analysis module, and (vi) the 3D reconstruction and plaque characterization module.

The **data sharing process** will be GDPR compliant fulfilling all the necessary legal and ethical requirements. The data processor is responsible for the establishment of the data analytics modules which offer the basis for addressing the objectives of the TAXINOMISIS initiative.

The **expected outcomes** of the TAXINOMISIS platform are: (i) 3D carotid reconstructed models, (ii) computational models for plaque progression, (iii) risk stratification models, (iv) plaque growth models,(v) biomarker profiles, (vi) agent-based models for plaque progression,(vii) pharmacogenomics lab-on chip, and (viii) novel risk assessment guidelines.



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Consortium

TAXINOMISIS encompasses 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 **immunoimmuno-inflammatory processes involved** (UMC, BRFAA, USMI, UOXF, UBEO),
- → the identification of **diagnostic markers and treatments** for cardio vascular 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 nano-electronics (IMEC) and
- → the provision of retrospective data and cohorts (NIVEL, TAUH, UMC).

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