proposed approach implies that the resulting master regulatory molecules along with the differentially expressed genes extracted, can be considered as new targets, and are candidates for further experimental and in silico validations.

References

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3. Information Technology in Healthcare
03.07. Decision support systems, and tools in healthcare

A novel concept of the management of coronary artery disease patients based on machine learning risk stratification and computational biomechanics

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Coronary artery disease (CAD) is one of the most common causes of death in western societies. SMARTool project proposes a new concept for the risk stratification, diagnosis, prediction and treatment of CAD. Retrospective and prospective data (clinical, biohumoral, computed tomography coronary angiography (CTCA) imaging, omics, lipidomics, inflammatory and exposome) have been collected from ~250 patients. The proposed patient risk stratification, relying on machine learning analysis of non-imaging data, discriminates low (Class I) and medium-to-high risk (Class II) patients, with the latter category indicating the need for CTCA imaging. The CAD diagnosis module is based on the 3D reconstruction and automatic blood flow dynamics of the coronary arteries, and the non-invasive estimation of smartFFR, an index correlated with invasively measured fractional flow reserve (FFR). CAD prediction is based on complex computational models of plaque growth considering the blood rheology, the lipoproteins transport and the major mechanisms of plaque growth, such as the inflammation and the foam cells formation. Finally, the treatment module is based on the simulation of virtual stent deployment. Preliminary analysis of 101 patients yielded an overall accuracy of 85.2% with the sensitivity of Class II reaching 98%. The reconstruction methodology is validated against intravascular ultrasound data and the correlation of the geometry derived metrics such as the degree of stenosis, minimal lumen area, minimal lumen diameter, plaque burden are 0.79, 0.85, 0.81 and 0.75, respectively. SmartFFR has been validated compared to invasively measured FFR with a correlation coefficient of 0.90. Plaque growth modelling demonstrates that the inclusion of variables such as the macrophages and foam cells concentrations can increase to 75% the prediction accuracy of regions prone to plaque formation.

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03.07. Decision support systems, and tools in healthcare

TERMOPLANTE-IR Intraoperative DICOM Video Documentation

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TERMOPLANTE is an original instrument designed to record thermal and visual images during surgical procedures. The interactive features allow to create both paper headed (PDF) or Electronic Clinical Record documents in CDA format compatible with HL7. TERMOPLANTE-IR is able to determine an approximation of the temperature of parts of the images, as evidence of re vascularization in case of organ transplant, inflammation during critical moments of the procedure, and in all case as an additional document for the record.
Infrared cameras are mounted in the head lamp handle (cialytic illumination).
The images are captured and stored in DICOM format. The CDA files and the identification of patients follow the national recommendation of the SALUD.UY program, to allow national semantic interoperability of medical information systems

Contribution ID: 663
3. Information Technology in Healthcare
03.07. Decision support systems, and tools in healthcare

An interpretable data-driven approach with application to non-exercise based cardiorespiratory fitness stratification

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Objectives: The continued exploration of clinically relevant predictive models continues to be an important pursuit. The aim of the current study was to develop a data-driven model, based on computational intelligence techniques, to predict the maximum oxygen consumption as a measure to be used in cardiorespiratory fitness stratification. While the maximum oxygen consumption is a direct mark of the cardiorespiratory fitness, several studies have also confirmed it as a powerful predictor of risk for adverse outcomes, such as hypertension, obesity, and diabetes. Therefore, the existence of simple and accurate models, establishing an alternative to standard cardiopulmonary exercise tests, with the potential to be employed in the stratification of the general population in daily clinical practice, would be of major importance.
Methods: The primary hypothesis to be explored in this work is that individuals with similar characteristics present similar cardiorespiratory fitness levels. Therefore, this work addresses the development of data-driven stratification models able to learn distinct groups (classes) of subjects assessing the similarity between characterizing variables. Moreover, the stratification scheme should permit the definition of interpretable models that characterize the distinct subjects, aligned