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Proteomic Profiling of Cellular Spatiotemporal Processes Related to Human Artificial Arteries Models

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According to the World Health Organization (WHO), almost 60% of deaths are due to a cardiovascular disease (CVD) cause, and by the year 2025 well over 80–90% of all the cardiovascular diseases in the world will be occurring in low income and middle income countries. Atherosclerosis is a chronic, progressive disease with a long asymptomatic phase. Subclinical atherosclerosis is a latent precursor of clinical CVD, including myocardial infarction (MI) and stroke. Atherosclerosis can affect any artery in the body, including arteries in the heart, brain, arms, legs, pelvis, and kidneys. As a result, different diseases may develop based on which arteries are affected. Treatment for artery disease usually involves lifestyle changes and drugs and certain medical procedures. Sometimes more aggressive treatment is needed like angioplasty and stent placement (i.e. percutaneous coronary revascularization) and coronary artery bypass surgery. The availability of suitable artificial arterial grafts would mean that more patients could benefit from the bypass operation whilst avoiding having a wound following removal of a patient's own veins or arteries to be used as grafts, as current practice requires. Nowadays, we are working on arteriogenesis using 3D microfluidic devices to validate human artificial artery prototypes, a crucial step toward creating arteries for bypass patients.

Proteomics provides a systematic approach for the quantitative and qualitative mapping of the whole human artery proteome. In this area, our laboratory is focusing on understanding the interactions between cells and 3D scaffolds that modulate adhesion, migration, proliferation, differentiation and extracellular matrix interactions.

I will describe the application of multidimensional liquid chromatography coupled to electrospray ion trap mass spectrometry to study the proteomic profilings of new arteries growing into the 3D biomimetic scaffolds (artery-on-chip).

Biography

Mario Hugo Genero, M.D. As a Medicine Doctor (Buenos Aires University), I've been immersed in the ever-changing genomics, bioinformatics and proteomics world since the mid 90's, and to this day my goal has remained the same: Give to my patients validated cutting-edge, personalized prevention and treatments. If I can achieve that, then I can be proud of my work at the end of the day. I am also a Consultant in many companies and Scientific Boards, and a Member of the Cardiovascular Initiative at the Human Proteome Organization (CVI-HUPO). I am also serving at the Education and Training Committee of The Human Proteome Project (HUPO) as coordinator of specific educational needs of "Proteomics less advanced Countries" and serving as an editorial board member of Journal of Proteomics and Bioinformatics.

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