Assistant Professor **Carlos Salomon, PhD, DmedSc, MSc**

Place of employment and host institution: University of Queensland, Australia and Aalborg University

Host principal investigator: Professor Aase Handberg, Aalborg University, Department of Clinical Biochemistry

Title of project: Extracellular vesicles in obesity and diabetes - Circulating liquid biopsies for biomarker discovery and real-time monitoring of metabolic changes in a Danish population

Abstract

My proposed visit to Denmark aims to establish a collaborative network on extracellular vesicles (EVs) research, focussing on their role in the metabolic changes that occur due to obesity and diabetes. Obesity is recognised as an important public health issue in Denmark, where recent findings show that more than half the Danish population is now overweight. In fact, obesity is the most powerful driver for the onset and development of insulin resistance and diabetes. Recent studies highlight the putative utility of extracellular vesicles (EVs) in the diagnosis of disease onset and treatment monitoring. EVs are packaged with tissue-specific signalling molecules (e.g., proteins and miRNAs) and once released, are capable of regulating target cell phenotype, inducing metabolic alterations to contribute to changes in insulin sensitivity in diabetic patients. Thus, there are three major aims of this proposal and they look at the role of EVs in: i) cell-to-cell communication in obesity; ii) biomarker discovery for identification of the population at risk of developing metabolic syndrome and diabetes, to develop early and personalized intervention, and iii) biobank samples from pregnant women. To accomplish these aims, I will establish a collaboration with several research groups in Denmark, including Professor Aase Handberg's group (main collaborative group), located at Aalborg University Hospital. My experience in extensive characterisation of bulk EVs from specific tissues will complete the single vesicle phenotyping approach by Handberg. The combined technologies will be applied to a cohort of obese individuals with non-alcoholic fatty liver disease undergoing intervention, and a healthy control group. In addition, I will collaborate with other Danish research groups on characterising EVs in obese and diabetic pregnant women. Finally, we will isolate and characterise EVs obtained from a Danish biobank to establish their stability and optimal storage conditions. EVs are a unique source of biomarkers, therapeutics and theranostics, as their content is stabilised and protected against enzymatic degradation. An epidemiological approach combining a large unselected biobank,the unique Danish registers and front-line biomarker search will benefit the Danish research community for future projects.