ImmunoTools *special* Award 2017

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Evaluation through microparticle-characterization of the effects of cooked tomato sauce intake on the cardiovascular system of pre-metabolic syndrome volunteers

Atherosclerosis is a silent chronic vascular pathology that is the cause of the majority of cardiovascular ischemic events. The evolution of vascular disease involves a combination of endothelial dysfunction, extensive lipid deposition in the intima, exacerbated innate and adaptive immune responses, proliferation of vascular smooth muscle cells and remodeling of extracellular matrix, resulting in the formation of an atherosclerotic plaque. Platelet, endothelial cells and leukocytes are key players in the pathogenesis of atherothrombotic processes. Platelet and leukocyte adhesion and aggregation at sites of atherosclerotic plaque rupture or vessel injury lead to the development of either mural or occlusive thrombus, triggering acute coronary syndromes, peripheral cardiovascular disease and finally, cardiovascular death. However, the contributing factors beyond the underlying triggering atherosclerotic plaque rupture are still not fully identified.

Several epidemiologic and prospective studies have provided convincing evidence that a diet rich in a variety of fruits and vegetables (eg, the Mediterranean diet) results in a lower risk of developing coronary heart disease (CHD). In this regard, dietary intake of tomatoes and tomato-based products has been associated with lower risk of CHD and myocardial infarction. Despite the fact that tomatoes are a valuable source of micronutrients, tomato-related health benefits have been mainly ascribed to the presence of lycopene, the main tomato carotenoid. The protective effects of tomato ingredients have been mainly attributed to their capacity to prevent atherogenesis by their antioxidant properties, which play a crucial role.

Microparticles (MPs) are submicron plasma membrane vesicles (0.1 to 1 μm) released during cell activation that harbor at their surface transmembrane proteins initially present at the parent cell surface, conferring to MPs a dynamic storage pool of bioactive molecules. Although the existence of shed membrane MPs has been known from many years, recent studies have shed light on the pivotal role of these

MPs in cell signaling related to several aspects of vascular biology such as thrombosis, inflammation or angiogenesis. Although MPs are released in physiological conditions due to spontaneous cell renewal; elevated numbers of specific subset of MPs have been reported in vascular disorders when cells are activated by pathological insults and/or enter apoptosis. Indeed, MPs likely play a significant role in CVD and are modified by CV risk factors. MPs can originate from platelets, endothelial cells, leukocytes, erythrocytes and smooth muscle cells, and are found in circulating blood at relative concentrations determined by the pathophysiological context.

Whether and how MP-phenotype, defined by parental cell biomarkers and levels of circulating MPs, is regulated by tomato-based products still remains unknown and their measurement will be a good surrogate marker of the vascular effects of this antioxidant–rich dietary component.

Therefore, the aim of our proposal is study the effect of cooked tomato sauce intake in circulating MPs in premetabolic syndrome individuals. For this purpose we will perform a prospective, randomized, single-center human intervention trial with a crossover design. To this end, forty overweight/obese (Body Mass Index [BMI] 27-<35 kg/m2) adults aged 40-60 years with untreated borderline dislipidemia will be recruited. Half of subjects will consume 100g tomato sauce/day and other half of subjects will not consume any type of tomato or derivatives during 4-week periods with a 4-week washout period in between. The MPs present in plasma from blood samples obtained from subjects in the different conditions of the study, will be analyzed by flow cytometry. To achieve this goal, ImmunoTools flow cytometry antibodies selected here below will be essential to phenotype and quantify circulating microparticles in plasma obtained from these subjects.

Therefore, obtaining the ImmunoTools Award would contribute greatly to the execution of this proposal, as it will provide the necessary reagents to characterize circulating MPs.

ImmunoTools *special* AWARD for **Javier Crespo** includes 25 reagents

FITC - conjugated anti-human CD3, CD11a, CD14, CD29, CD33, CD41a, CD54, CD56, CD58, CD62P, CD63, CD69, CD235ab

PE - conjugated anti-human CD9, CD11b, CD11c, CD15, CD34, CD42b, CD45, CD50, CD61, CD62L, CD105

APC - conjugated anti-human Annexin V

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