Polyphenols and vascular health: Demonstration of the role of polyphenols in the vascular protective effects of citrus fruits

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To cite this version:
Christine Morand, Dragan Milenkovic. Polyphenols and vascular health: Demonstration of the role of polyphenols in the vascular protective effects of citrus fruits. 11. SLACA, 2015, n.p. hal-02738663

HAL Id: hal-02738663
https://hal.inrae.fr/hal-02738663
Submitted on 2 Jun 2020

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Flavonoids are abundant plant micro-constituents in our foods that are known for their high bioactivity. Due to the wide range of their biological properties described in animal and cell studies, these compounds may help to promote the health benefits of plant-based foods. Accumulating evidence from cohort studies indicate that an increased intake of dietary flavonoids may reduce the risk of cardiovascular diseases (CVD). This evidence is supported by studies conducted in animal models with isolated flavonoids (Del Rio et al, 2013) and in humans consuming flavonoid-rich foods (Hooper et al, 2008). The most convincing clinical data are available for few flavonoid-rich products, including tea, cocoa and soy that are also the most studied. These studies have reported beneficial effects of flavonoid-rich product consumption on some intermediate risk factors for CVD, including LDL-cholesterol, blood pressure and endothelial function. However, available trials with flavonoid-rich foods often cannot dissociate the specific effect of flavonoid compounds from that of the entire food due to the lack of appropriate controls.

Although fruits have been recognized as major contributors to dietary flavonoid intake in humans, clinical studies focusing on fruit flavonoids remain scarce. Flavanones are specifically and abundantly found in citrus foods. However until recently, the role of polyphenols in citrus health effects has been poorly investigated. Our research aimed to provide clinical evidence of the contribution of flavanones in the vascular protective effects of citrus food products and to identify the molecular mechanisms underlying these protective effects, using a holistic nutrigenomics approach to consider their multifaceted bioactivity and physiologically-relevant cell experiments. Our findings from randomized controlled trials show that vascular protective effects induced by the consumption of citrus fruit juices are specifically related to flavanones. Nutrigenomic studies in human PBMCs and in mice aortas revealed that citrus flavanones might be effective in reducing the interactions between immune cells and vascular endothelium, as confirmed in cell experiments. Overall, our findings demonstrate a beneficial impact of citrus flavanones on vascular health in humans and suggest that flavanones may act through complex nutrigenomic mechanisms to protect vascular integrity and function.