



## Role of Extracellular Vesicles (EVs) in Mediating Antioxidant Response to a Glucoraphanin Rich Meal

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Aging is associated with increasing oxidative stress and declining antioxidant defences, making the body susceptible to various chronic conditions. Cruciferous vegetables contain glucoraphanin, which is metabolised into sulforaphane (SFN) in the gut<sup>(1)</sup>. SFN activates a mechanism enhancing antioxidant defences that may contribute to a reduction in risk of age-related chronic diseases. Our hypothesis proposes that consuming cruciferous vegetables releases hepatic extracellular vesicles (EVs), which carry with a cargo of antioxidant proteins, into the systemic circulation<sup>(2)</sup> that are transported to 'at risk' tissues. We seek to characterise the antioxidant protein content of EVs from blood samples of healthy human volunteers from a prospective dietary intervention study trial called (GLOBE). The GLOBE study employs a randomised, single-blind, two-arm crossover design and involves 12 healthy male or female adults aged >55 years, at the time of enrolment, have a BMI in the range of 18.5-30 kg/m<sup>2</sup>, and have self-reported healthy (are not suffering from current illness like cancer, and gastrointestinal diseases including coeliac, Crohn's, colitis, and irritable bowel syndrome) and not using any medications like antacids, laxatives and antibiotics which can interfere with normal digestive or metabolic processes. The dietary intervention consists of two commercially available treatments, one of which is a glucoraphanin-rich vegetable soup, while the other vegetable soup lacks glucoraphanin. Our initial focus lies in optimizing and standardizing a method for routinely characterizing EVs derived from healthy volunteers participating in dietary intervention studies. We specifically aim to extract EVs from a minimal plasma volume (2ml) using size exclusion chromatography (SEC). Subsequently, we intend to employ this method to analyse EVs obtained from 161 plasma samples collected from 12 participants during the GLOBE study for different time points like 0, 120, 240, 360, 480 min, 24 and 48 hr. Our goal is to gain insight into the role of EVs as part of the mechanisms by which consuming a moderate quantity of cruciferous vegetables may confer health benefits. Our research carries the potential to establish a standardised approach to the characterisation of EVs from healthy individuals which has several applications in nutrition research.

**Keywords:** aging; chronic diseases; extracellular vesicle; glucoraphanin

### Ethics Declaration

Yes

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### References

1. Santín-Márquez R, Alarcón-Aguilar A, López-Diazguerrero NE *et al.* (2019) *GeroScience* **41**(5), 655–70.
2. Urabe F, Kosaka N, Ito K *et al.* (2020) *Am J Physiol - Cell Physiol* **318**(1), C29–39.