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## The effect of elderly simulated gastrointestinal *in vitro* digestion (SGID) on the antioxidant properties of different cheese matrices

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### Abstract

The world's population is getting older. By 2050 it is projected that 22% of the global population will be over 60 years of age. Aging is characterized by a decline in physiological functions and an increase in malnutrition and associated disease. Oxidative stress is associated with several age-related conditions, including cardiovascular disease, obesity, neurodegenerative disease and cancer. The negative effects of reactive oxygen species (ROS) are neutralized by antioxidants, which can be endogenously synthesised or consumed through the diet. Cheese is a nutritious dairy food and previous research has highlighted the antioxidant potential of some cheese types. Physiological changes associated with age can impact digestion processes, thus the ability to efficiently release bioactive compounds, including antioxidants, may be impaired with age. Cheese products varying by milk source, texture and fat content were subjected to simulated gastrointestinal *in vitro* digestion (SGID) using a modified model to account for physiological changes associated with aging. The antioxidant potential of undigested and digested cheese (n = 11) was determined *in vitro* using DPPH radical scavenging, ferric reducing antioxidant power (FRAP) and total phenolic content (TPC) assays. Cellular antioxidant potential was also investigated using the reduced glutathione assay (GSH) in the human macrophage cell line (U937). Experiments were carried out in triplicate. Statistical analysis by T-test demonstrated that digestion significantly increased ( $P < 0.05$ ) FRAP and TPC of all cheese products analysed. Of the eleven cheese products investigated, goats' cheese displayed a significant increase ( $P < 0.05$ ) in radical scavenging properties (89.8% inhibition). Low fat white cheddar had significantly higher ( $P < 0.05$ ) GSH levels compared to full fat white cheddar ( $0.16 \pm 0.01$ ,  $0.11 \pm 0.01$   $\mu\text{mol GSH/mg protein}$ , respectively). Findings from this study suggest that despite physiological changes associated with age, cheese digestates retain, and in some cases, possess higher antioxidant potential than undigested samples. Cheese demonstrates potential as a functional food for the elderly by neutralizing the negative effects associated with age-related oxidative stress.

### Conflict of Interest

There is no conflict of interest.