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Buccal cells: a non-invasive measurement of selenium, zinc and magnesium status, and telomere length

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Background – There is a need to develop minimally invasive methodologies to measure changes in tissue nutrient levels and alterations in disease risk biomarkers.
Objective – We aimed to evaluate the use of buccal cells as a non-invasive approach to measure nutrient levels (selenium, zinc and magnesium) and markers of oxidative stress and accelerated ageing (telomere length) in cross-sectional study.
Design – Buccal cells and blood samples were collected from 91 volunteers. This cohort comprised 18M and 25F in the young group (aged 18-31 years), and 25M and 23F in the older group (65-75yrs). Se, Zn, Mg and Ca were measured in serum and buccal cells (by ICPMS and ICPOES). Telomere length measures were determined in lymphocytes and buccal cells (by Flow and qRTm-PCR).
Outcomes – Only Se levels were significantly correlated in serum and buccal cell samples ($r=0.3$, $p<0.01$). Serum Ca was negatively correlated with buccal cell Ca ($r=-0.25$, $p<0.01$). There were significant correlations of age with: serum Se ($r=0.27$, $p<0.01$) and buccal Ca ($r=0.24$, $p<0.05$), buccal Se ($r=0.28$, $p<0.01$). Telomere length correlated negatively with age in lymphocytes ($r=-0.28$, $p<0.01$) and positively with age in the buccal cells ($r=0.22$, $p<0.05$).
Conclusions –Trace elements and telomere length can be measured in buccal samples. However, with the exception of Se, results in cells were not positively correlated with each other. These data indicate that the measurements in plasma and buccal samples are not interchangeable. The positive correlation of telomere length with age in buccal cells indicates a strong difference from lymphocytes and suggests differences in telomere length dynamics in the haematopoietic and epithelial tissue.

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Evaluation of phytochemical compounds in pineapple and their antioxidant activity

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Background – Pineapple is an important tropic fruit crop. Unlike other common fruits, the antioxidant properties of pineapple have not been well characterized. In addition, when pineapple is processed into food products (i.e. canned, juices or jams), the processing results in 35% as wastage, comprising of the core, skin and butt ends. Pineapple waste is known to contain high concentration of dietary fibre, but its antioxidant potential is not known.
Objective – To examine pineapple fruit parts (flesh, crown ['field-waste'], core and bran ['processing by-products']) for phytochemical compounds and their antioxidant activity.
Design – Core, flesh, bran, and crown of three pineapple varieties (Mareeba Gold, Smooth Cayenne, and Bethonga Gold) were analysed for their antioxidant activities by total phenols assay and Oxygen Radical Absorbance Capacity (ORAC) assay and their phytochemical composition by HPLC coupled with photodiode array detection and mass spectrometry.
Outcomes – The antioxidant activities varied considerably among the pineapple fruit varieties and parts investigated. In general, the lowest antioxidant activity was found in the core. To date, ten phytochemical compounds have been identified in pineapple core extracts. They include typical phenolics/antioxidants such as p-coumaric acid and chlorogenic acid, aroma compounds such as furaneol (which showed antimicrobial effects against human pathogenic bacteria and fungi) and its glucoside, aromatic amino acids like tryptophan and other more complex compounds such as N-L-glutamyl-S-sinapyl-L-cysteine.
Conclusions – All parts of pineapple demonstrated strong antioxidant properties. The core and bran can be potential sources of functional ingredients with antioxidant properties.