

# Aging and Disability

**Implementation of Radiomics Workflow in Understanding Oral Frailty: Ageing Associated Oral Function Deterioration** SYS Poon, Prof. E. Kwong, Prof. H. Chen, HM. Chen, Prof. A. Leung, SWM. Chan, YSW. Lam, CLA. Cheng. *Gerontechnology* 25(s)

**Purpose** Ultrasound assessment offers vivid visualisation of ageing-associated deterioration in oral muscle and salivary gland morphology, and will offer valuable diagnostic information on oral frailty, the age-related functional decline of orofacial structures [3]. Objective evaluation of image features was proposed by The Image Biomarker Standardisation Initiative [5], but of the author's knowledge, no previous research attempts to investigate the ageing-associated shape features and grey level co-occurrence matrix (GLCM) features, which paves the way for this study to visualise the oral frailty conditions. **Method** Three-hundred and ninety-six ultrasound images on salivary glands and masseters of 12 participants from three groups of participants: (1) healthy young adults ( $\leq 60$  years old), (3) healthy older adults ( $> 60$  years old) and (3) oral frailty individuals ( $> 60$  years old and with 3 or more symptoms reported in Tanaka et al. [4] definition) with mean age of  $54.4 \pm 17.75$  years were obtained using B-mode ultrasound and processed with reference to the Image Biomarker Standardisation Initiative (IBSI) [5]. All Regions of Interest (ROI) were segmented through Computer Vision Annotation Tool (CVAT.ai) and implemented to Python 3.9.13 for feature computation and statistical modelling. **Results and Discussion** Investigation of the first order features: (a) pixel surface (i.e. surface area) and (b) mean feature value (i.e. averaged echogenicity) were first conducted. Pixel surface is statistically significant with bilateral submandibular ( $H(2) = 19.54, p < .001$ ;  $H(2) = 23.51, p < .001$ ), bilateral parotid glands ( $H(2) = 15.02, p < .001$ ;  $H(2) = 15.84, p < .001$ ). The increase in pixel surface in the older adult group indicates the 'increased intraglandular adipose tissue' [1], yet the new observation of gland shrinking is seen in Oral frailty individuals. Mean feature value of glands reflected that it is a less reliable feature as it is statistically significant only in left sublingual ( $H(2) = 10.13, p = 0.006$ ) left mandibular ( $H(2) = 13.06, p < .001$ ) and bilateral parotid gland on transverse plane ( $H(2) = 12.75, p = 0.002$ ;  $H(2) = 2.30, p = 0.051$ ), the relatively ineffective parameter is hypothesized to be related to the qualitative properties, as prominent edges of glands observed in young adults group and intraglandular striations in Oral frailty individuals, which would both increased grey level intensity. Further investigation on second order entropy feature and uniformity were further conducted, preliminary results indicated higher entropy values were observed in Oral frailty individuals and higher uniformity values were observed in Young adults, which will be further discussed. **Conclusion** The radiomics workflow investigation allows clinicians to transfer clinical observations into objective statistical measurements, which facilitate and elucidate the construction of Oral frailty symptoms. The illustrations of reduced surface area, and qualitative properties observed in this study demonstrate the feasibility of applying imaging and radiomics workflow to investigate ageing-associated deterioration.

## Key References

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