Title: Changes in serum thyroid function may predict cognitive decline in the very old: longitudinal findings from the Newcastle 85+ study

Presenting author: Dr Earn H Gan, PhD, MRCP
Contact: earn.gan1@ncl.ac.uk
Address: Institute of Genetic Medicine, International Centre for Life, central parkway, Newcastle, NE1 3BZ.

Co-authors

1. Muhammad Yadegarfar, Institute for Ageing, Biomedical Research Building, Newcastle University, Newcastle NE4 5PL
2. Professor Carol Jagger,Institute for Ageing, Biomedical Research Building, Campus for Ageing and Vitality, Newcastle University, Newcastle NE4 5PL
3. Professor Simon Pearce, Institute of Genetic Medicine, International Centre for Life, central parkway, Newcastle, NE1 3BZ

CONTEXT: Perturbations in thyroid function are common in older people and subclinical hyperthyroidism has been associated with increased risk of dementia in people aged 55 years and above. The significance of subtle perturbations of thyroid function in the very old remains poorly understood.

OBJECTIVE: This study sought to determine if subtle abnormalities of thyrotropin and variations of free thyroid hormones within the reference range, at baseline and over 5 years, correlate with cognitive impairment in the very old, using data from the Newcastle 85+ study.

DESIGN: A cohort of 85-year-old individuals was assessed in their own homes for health status and thyroid function. Cross-sectional and prospective data (up to 5 years follow-up) were analysed using linear mixed and regression models for global and memory-specific cognitive performance in relation to baseline and 3-year changes in serum thyrotropin (TSH), free T4 (FT4) and free T3 (FT3). Cognitive performance was assessed using standardized Mini-Mental State Examination and Cognitive Drug Research battery.

SETTING AND PARTICIPANTS: Six hundred and forty-two 85-year-olds with TSH ranged between 0.1-10mU/L, normal free T3 (FT3) of free T4 (FT4) levels and who were not taking thyroid-interfering medication were included.

RESULTS: After adjusting for age, sex, years of education, lifestyle factors, health and morbidities, individuals with higher baseline TSH levels had better MMSE (β(SE): -0.342(0.129), P=0.008) and episodic memory,(β(SE): -0.031(0.013), P=0.020). Higher baseline serum TSH was also found to be associated with better sustained attention (CoA) over 3 years β(SE): -0.064(0.031), P=0.040) for individuals with or without cognitive impairment at baseline. Among cognitively intact individuals at baseline, lower baseline FT3 and higher baseline FT4 were associated with worse global cognition over 5 years (p=0.031 and 0.005 respectively). On the other hand, reduction in serum TSH over 3 years was associated with increased odds of cognitive impairment at 5 but not 3 years (odd ratio 1.60(95% confidence interval 1.14-2.24); p=0.006). The same association was found among cognitively intact individuals at baseline (odd ratio 1.73(95% confidence interval 1.17-2.54); p=0.006).

Following stratification of the results according to gender, this relationship was significant for females but not males.

CONCLUSIONS: Individuals aged 85 years with low but unsuppressed TSH, low free T3 or high free T4 within normal reference range had a significantly worse cognition at baseline. We show, for the first time, that a decreasing TSH trajectory anticipates the development of cognitive decline in later life.