

Inspection Time as a Biological Marker for
Functional Age

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ABSTRACT

Inspection Time (IT) is a speed measure that has been primarily investigated in the field of individual differences. However, Nettelbeck and Wilson (2004) proposed that IT could have promise as a biomarker for functional outcomes, particularly cognitive aging. The premise behind biomarker research is that chronological age is simply a proxy for the physiological and cognitive changes that occur in the body with advancing age. Biomarkers are measures that 'mark' the aging process and represent the biological age of an individual rather than the years since his/her birth. Speed of processing tasks offer promise as biomarkers because decline in speed of processing is one of the most robust findings in cognitive aging research. However, traditionally used tasks are problematic because they confound speed and accuracy and some are sensitive to cohort effects. Inspection time is a speed of processing measure that is free from these problems and is therefore a promising candidate for a biomarker. This dissertation presents the first empirical investigation of this proposition.

One hundred and fifty elderly participants were assessed on IT, traditionally used biomarkers (e.g. grip strength, visual acuity), a battery of cognitive tasks (e.g. fluid ability and crystallised ability) and measures of everyday functioning (e.g. activities of daily living). These individuals were assessed on three separate occasions over a period of 18-months. For the biomarkers, initial scores, 6-month change scores and 18-month change scores were generated and used to predict final scores and 18-month change scores on the functional outcomes (cognition and everyday functioning). Results revealed that slow IT at the start of the study was associated with dependence in activities of daily living and poorer fluid ability at the end of the study. There was also evidence that slow IT at the start was associated with decline in fluid reasoning over the subsequent 18-months. Moreover, consistent with the major aims of this study, decline in IT over time was associated with more cognitive problems in daily life and poor fluid ability at the end of the study. Given that initial and change scores for IT were independent, due to the methodology used to estimate them, the two measures explained unique variance in the functional outcome measures.

These findings are extremely encouraging, particularly given the relatively short time frame for this study. IT has predictive validity for everyday functioning and cognitive aging over an 18-month period, and therefore, it is concluded that IT has promise as a valid biomarker for functional age. Recommendations for further research include investigating the link between IT and mortality, examining the association between IT and a broader range of functional age measures, the replication of these findings in a different sample, and means for improving the sensitivity and specificity of the current IT estimation procedure.

DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being made available in all forms of media, now or hereafter known.

Tess A. Gregory

Date

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KEY TO ABBREVIATIONS

ADL	Activities of Daily Living
ADAS-Cog	Alzheimer's Disease Assessment Scale - Cognitive
BP	Blood Pressure
CA	Chronological Age
CCFT	Cattell Culture Fair Test
CDL	Cognition in Daily Life
CF	Concept Formation
CNS	Central Nervous System
DS	Digit Symbol
FA	Functional Age
Gc	Crystallised Ability
Gf	Fluid Ability/ Reasoning
Gs	Speed of Processing
IT	Inspection Time
PC	Pattern Comparison
RSPM	Raven's Standard Progressive Matrices
VA	Visual Acuity
VM	Visual Matching