

tilda

Staidéar Fadaimseartha na
hÉireann um Dhul in Aois

The Irish Longitudinal
Study on Ageing



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

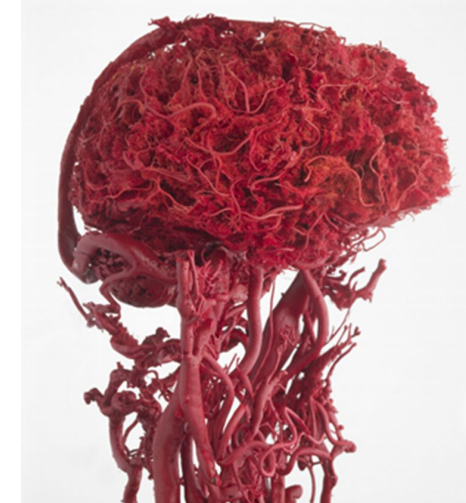
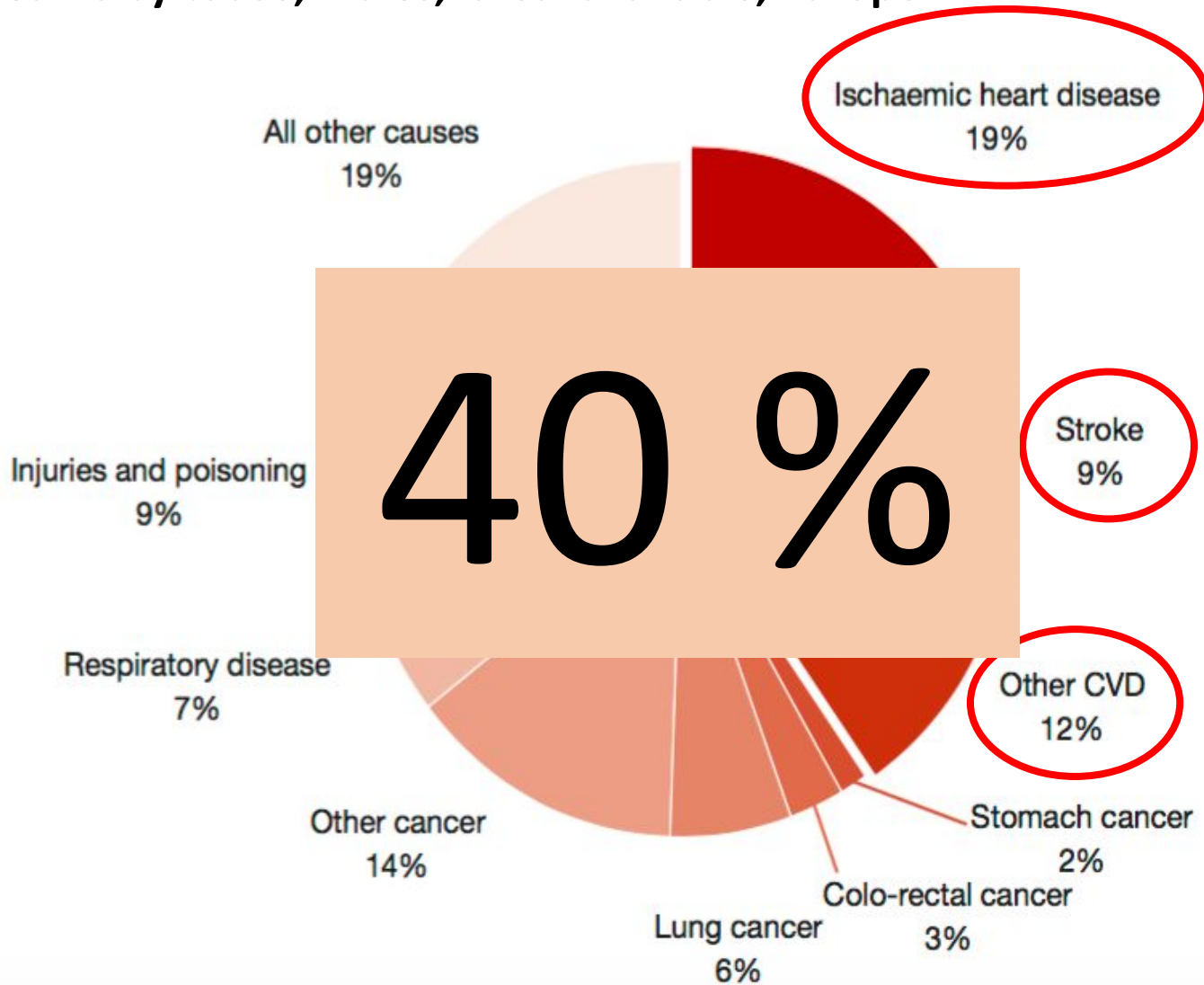
Measuring dynamic blood pressure and cerebral oxygenation in TILDA

Aisling O'Halloran, Louise Newman & Rose Anne Kenny.

NIA Biomarker Network – International Meeting
New Orleans
11th April 2023

Background: Cardiovascular disease burden

Deaths by cause, males, latest available, Europe



Capillary network is 600 km

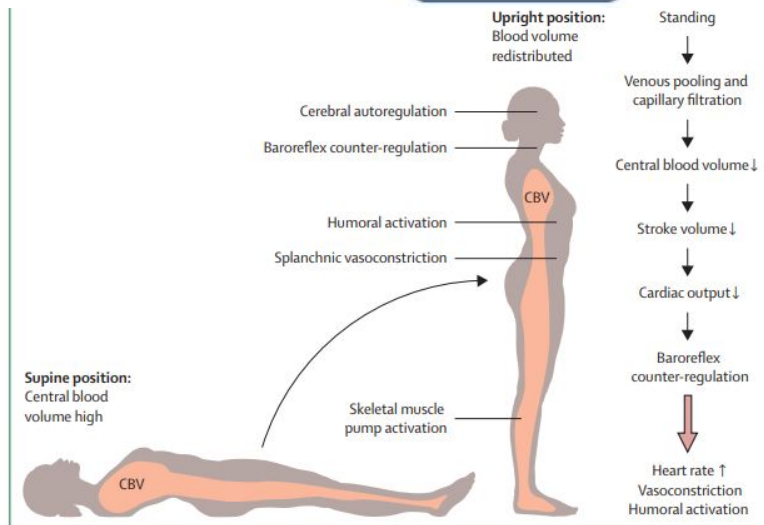
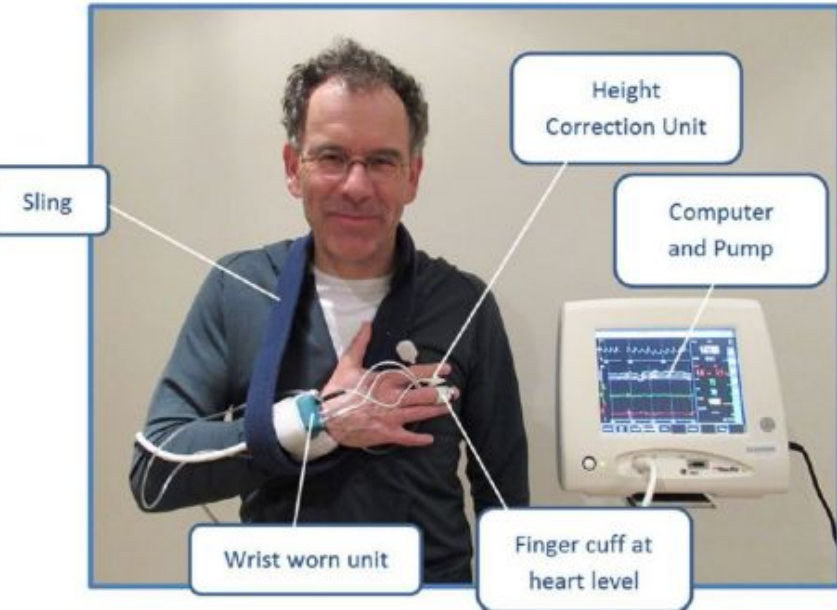
NCVI → Ageing + brain health

Cerebral hypoperfusion is implicated in cerebrovascular & neurodegenerative diseases

Methods: Active Stand and BP and HR

Continuous Beat-to-Beat Blood Pressure Plethysmography

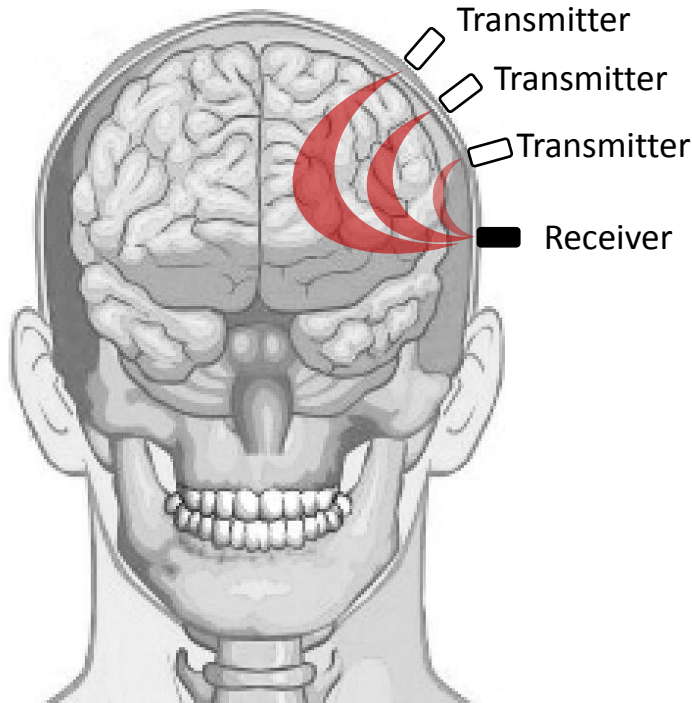
- **Device:** Finometer MIDI device (Finapres Medical Systems BV, Amsterdam, The Netherlands)
- **Dynamic continuous measures SBP, DBP, MAP and HR in response to physiological challenge**
- **Consensus OH** - $\downarrow \geq 20\text{mmHG SBP}$ or $\downarrow \geq 20\text{mmHG SBP}$ within 3 mins
- Sample rate (200Hz)
- More expensive than oscillometric methods (€25k / \$27.3k ex VAT)
- Requires some training
- **N = 4,899 (W1) and N = 3538 (W3)**





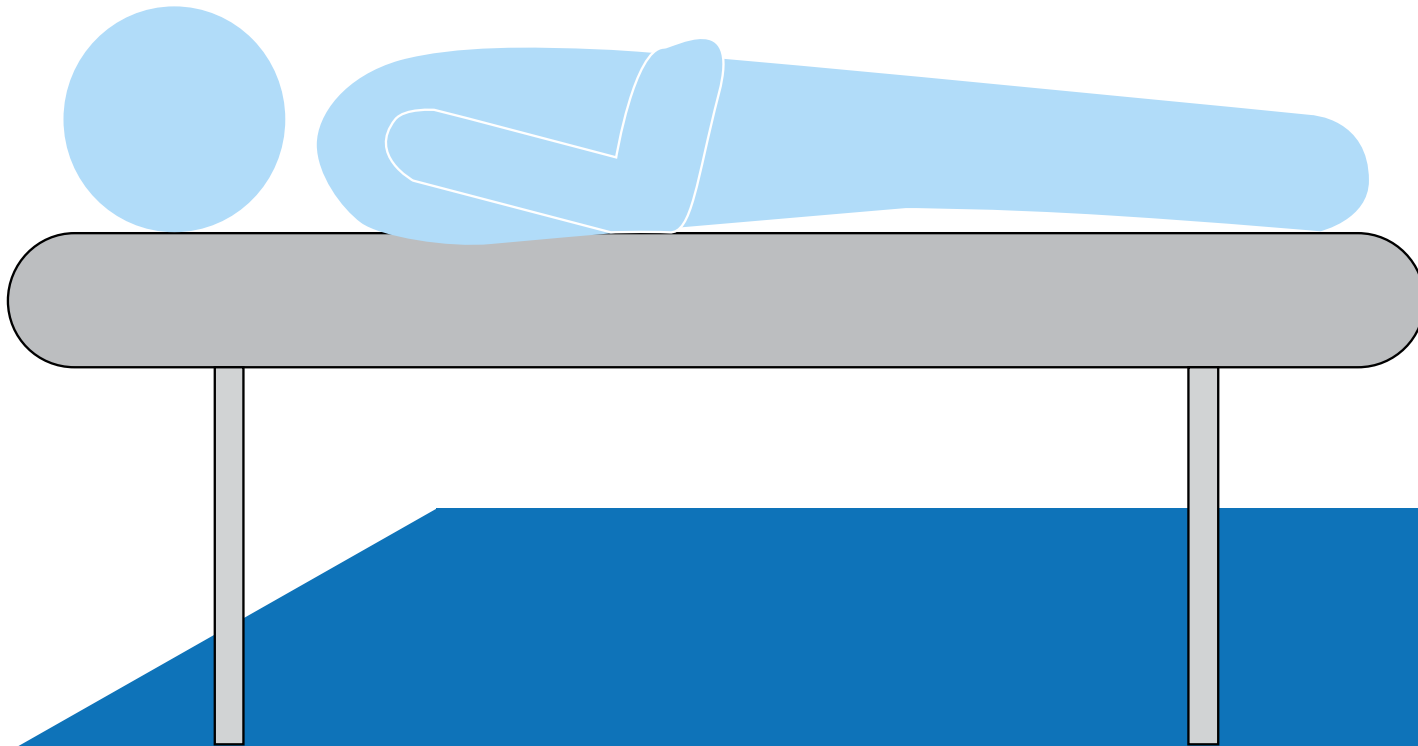
Near Infrared Spectroscopy (NIRS)

- **Device:** *Portalite* (Artinis Medical Systems, Zetten, Netherlands)
- Dynamic continuous measures of cerebral O₂Hb, HHb and TSI in response to physiological challenge
- Measures O₂Hb and HHb concentrations ~2cm below the scalp
- **Absolute Tissue Saturation Index (%TSI) measured using spatial resolved spectroscopy (SRS)**
- High sample rate (50Hz)
- Relatively inexpensive (€9k / \$9.9k ex VAT)
- Requires minimal training to use
- **N = 2,906 (W3)**



Active Stand Protocol

'Rest' - Participants laid supine for ~10 minutes

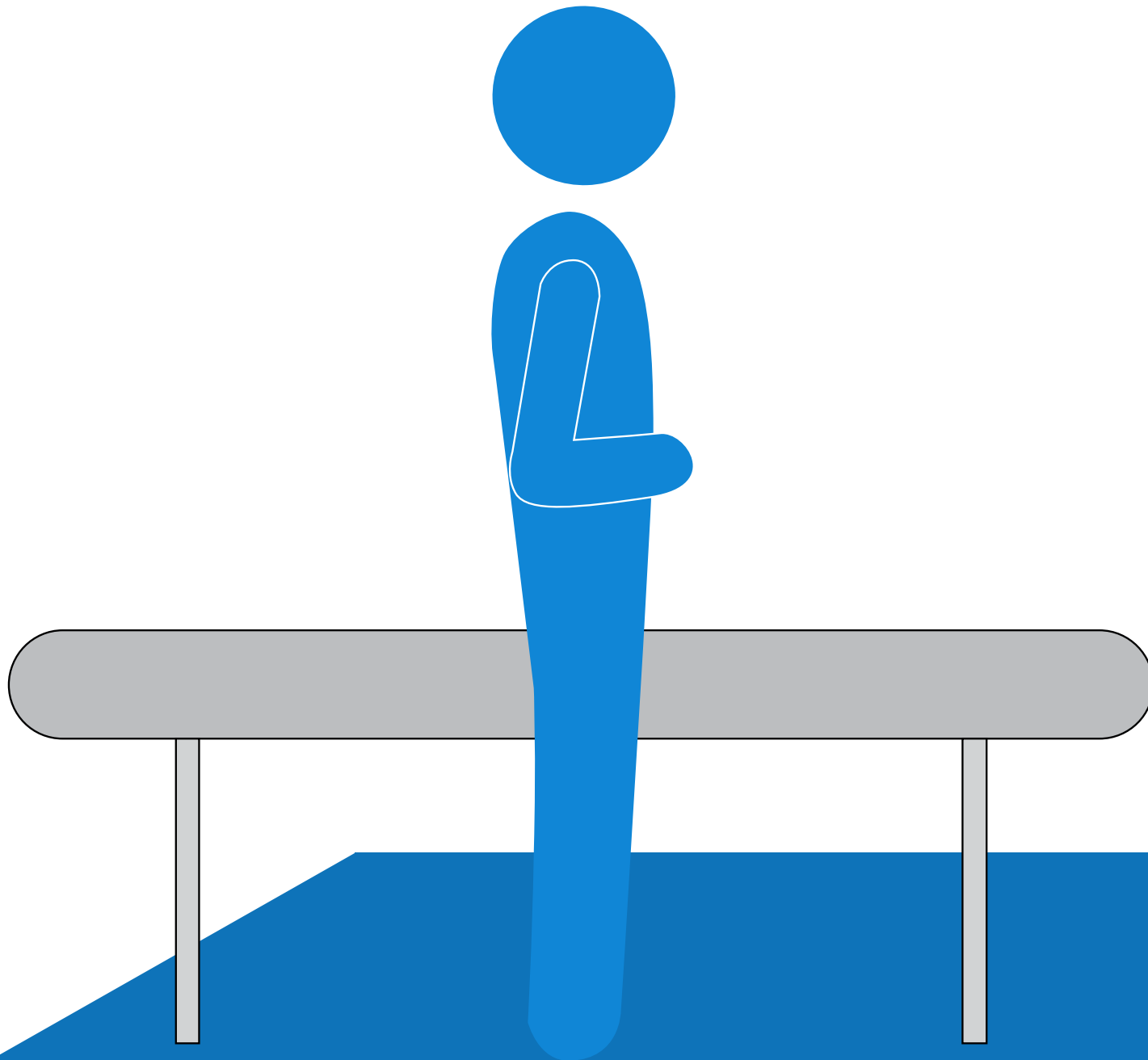




Active Stand Protocol

'Rest' - Participants laid supine for ~10 minutes

'Challenge' - Participants asked to stand (unassisted) as fast as possible



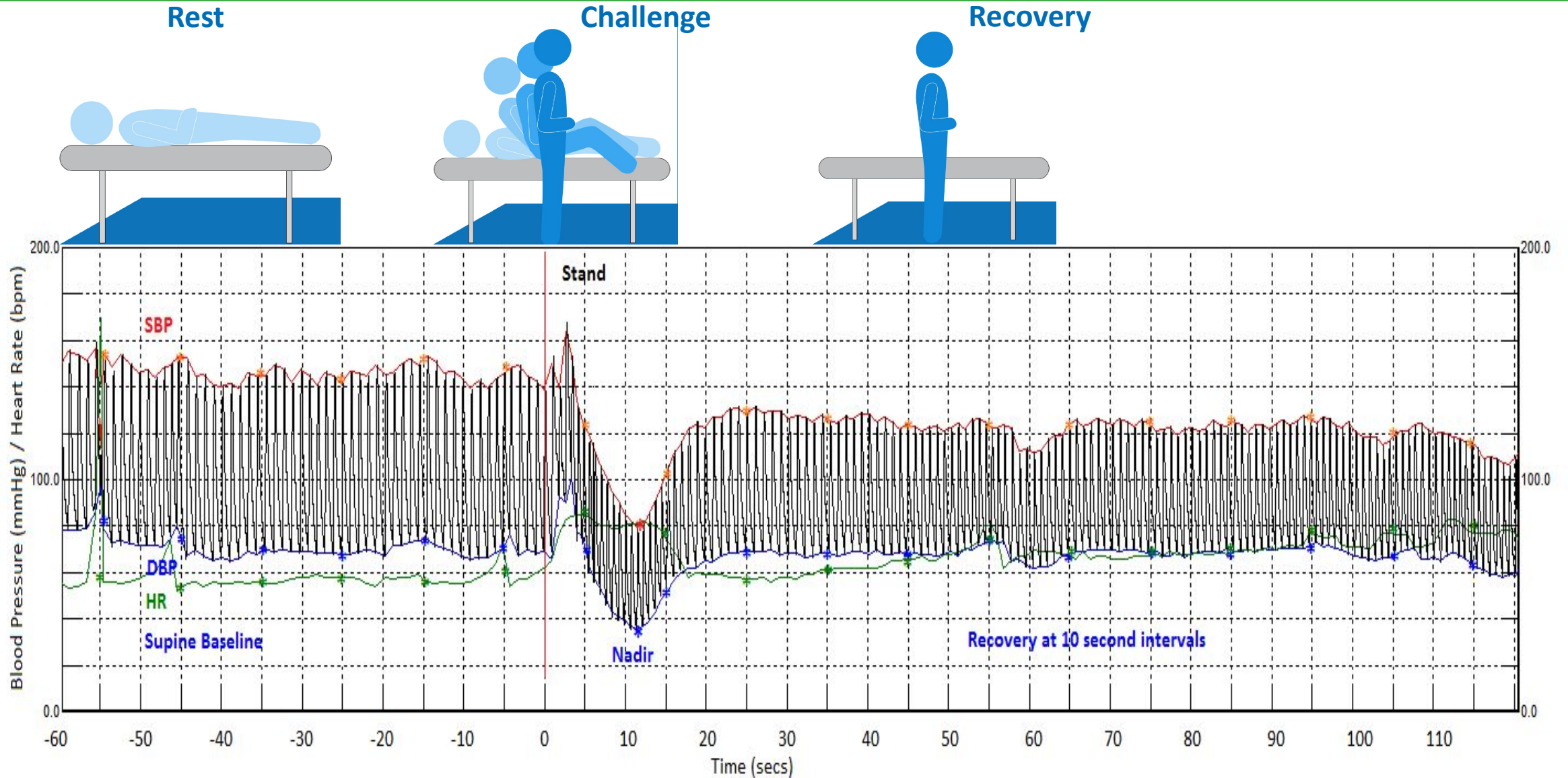
Active Stand Protocol

'Rest' - Participants laid supine for ~10 minutes

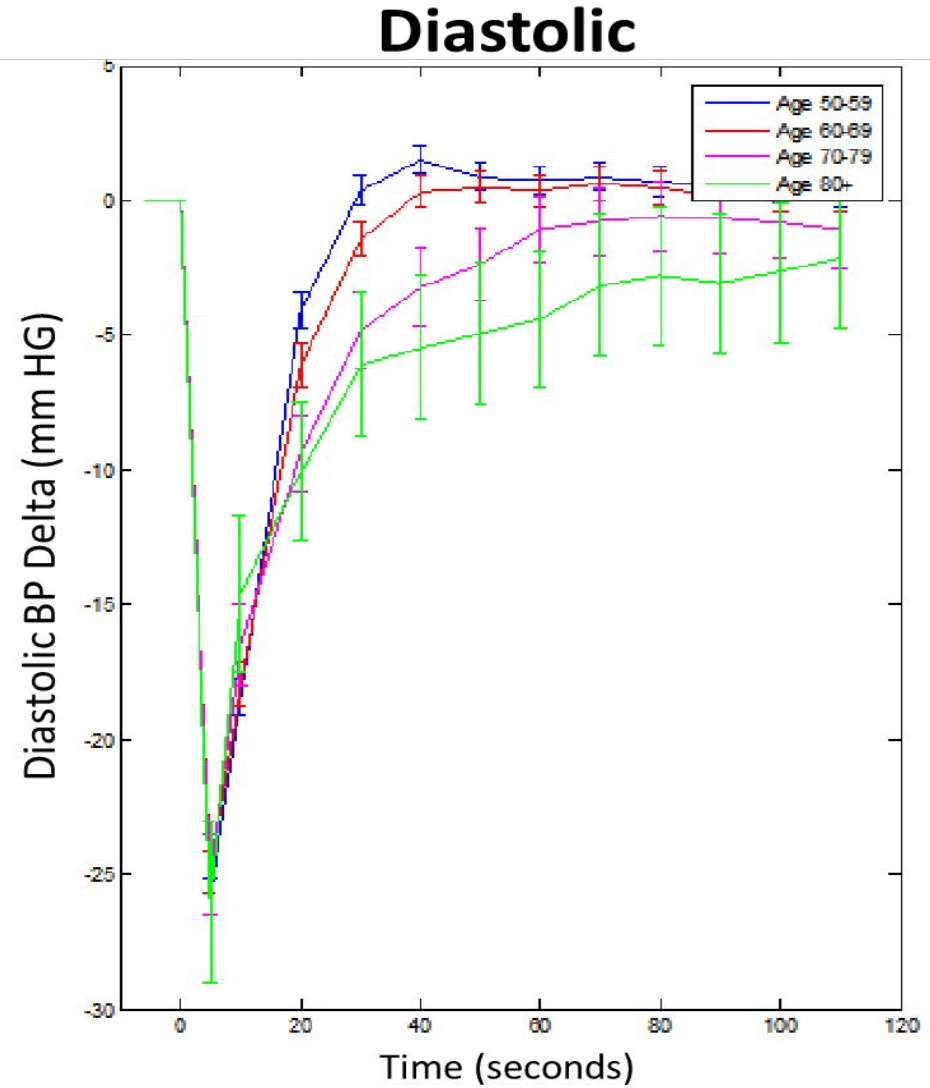
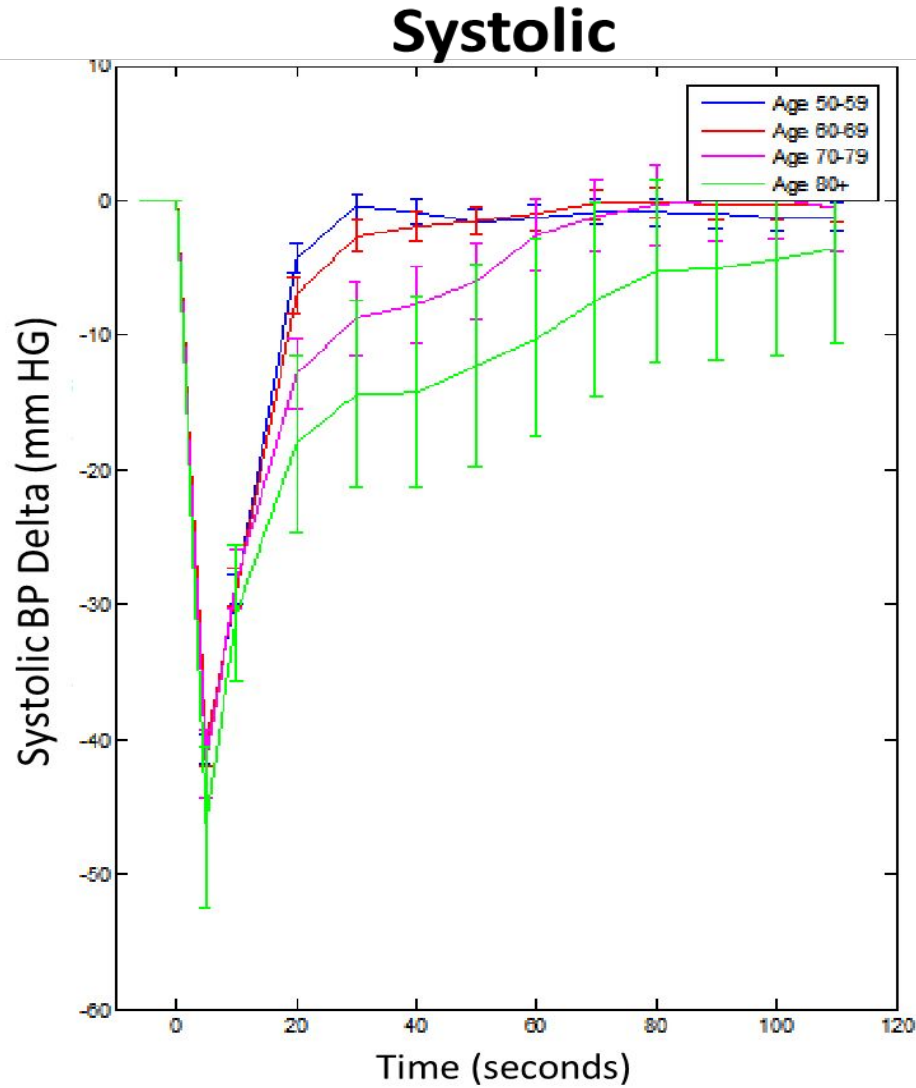
'Challenge' - Participants asked to stand (unassisted) as fast as possible

'Recovery' - Participants remained standing for 3 minutes

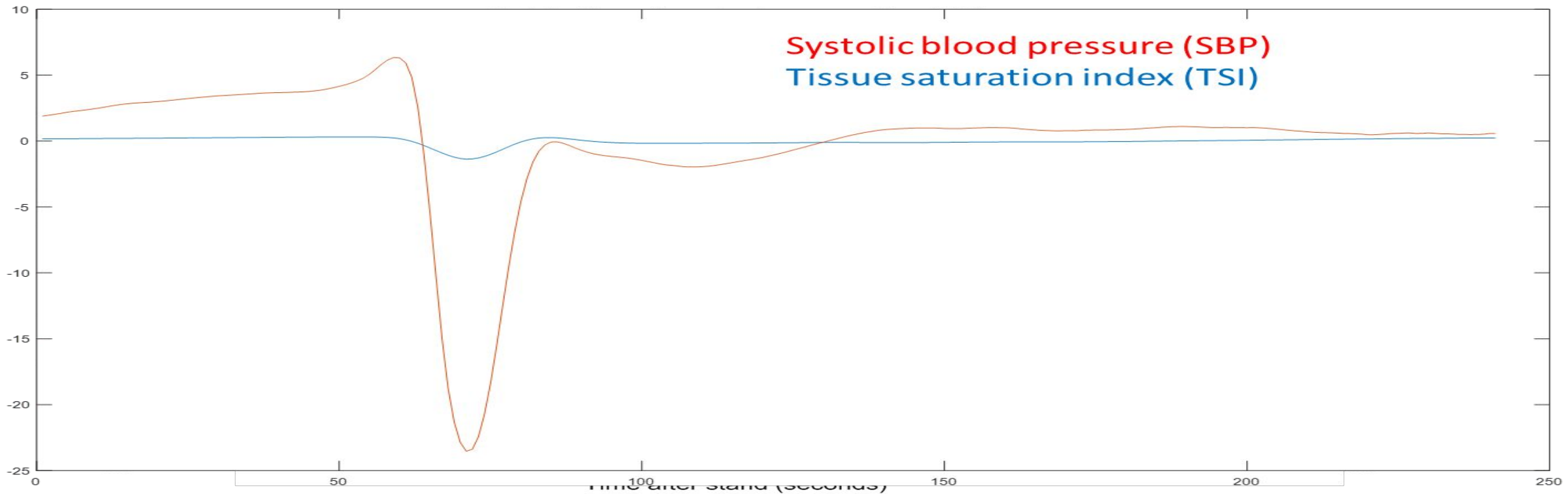
Results: Active Stand - BP and HR Response



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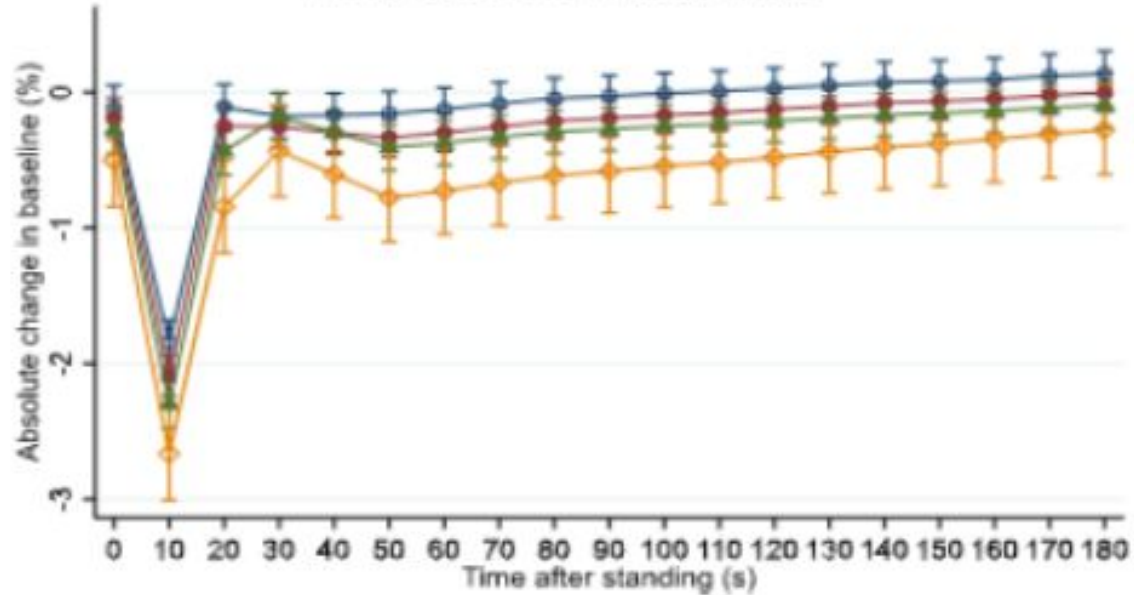


Results: Active Stand – Cerebral Oxygenation (%TSI)



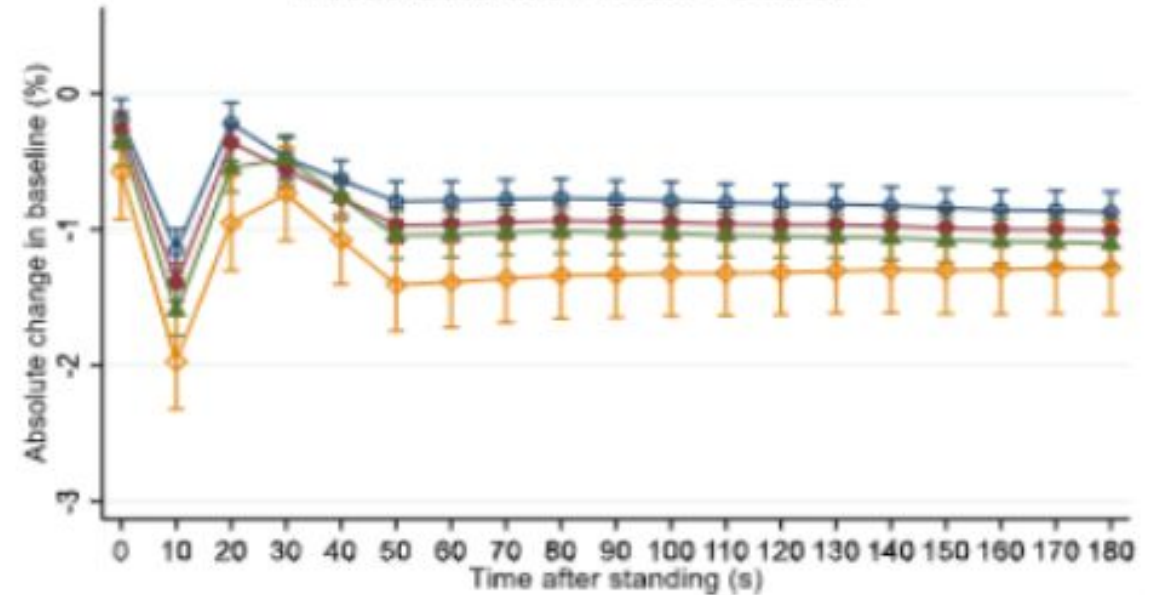
Results: Active Stand – TSI Response

Tissue Saturation Index: Males



● 54-59 years
● 70-79 years

Tissue Saturation Index: Females



● 60-69 years
● >=80 years

Results: Active Stand - BP and HR Response

Circulation

Volume 130, Issue 20, 11 November 2014; Pages 1780-1789
<https://doi.org/10.1161/CIRCULATIONAHA.114.009831>



ORIGINAL ARTICLE

Age-Related Normative Changes in Phasic Orthostatic Blood Pressure in a Large Population Study

Findings From The Irish Longitudinal Study on Ageing (TILDA)

Editorial see p 1772

Ciarán Finucane, MSc, PhD^{*}, Matthew D.L. O'Connell, PhD^{*}, Chie Wei Fan, MD, George M. Savva, PhD, Christopher J. Soraghan, PhD, Hugh Nolan, PhD, Hilary Cronin, PhD, and Rose Anne Kenny, FRCPI, MD

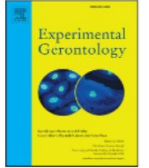


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Experimental Gerontology

journal homepage: www.elsevier.com/locate/expgero



Age and sex related differences in orthostatic cerebral oxygenation: Findings from 2764 older adults in the Irish Longitudinal Study on Ageing (TILDA)

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<https://doi.org/10.1007/s10286-019-00606-y>

REVIEW ARTICLE



A practical guide to active stand testing and analysis using continuous beat-to-beat non-invasive blood pressure monitoring

Ciarán Finucane^{1,2,5} · V. K. van Wijnen³ · C. W. Fan⁴ · C. Soraghan^{1,2} · L. Byrne² · B. E. Westerhof^{6,7} · R. Freeman⁸ · A. Fedorowski^{9,10} · M. P. M. Harms³ · W. Wieling¹¹ · R. Kenny^{2,5}

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Active Stand – BP Response and Cerebral Oxygenation

- **Dynamic measures in response to physiological challenge**
- Tolerated and validated in large number of older adults
- Measures show increasing variability and poorer responses with advancing age.
- Some sex differences also in evidence.
- BP responses associated with falls, frailty, sarcopenia, depression, cognitive decline, and mortality
- Cerebral oxygenation (TSI response) associated with falls, frailty, atrial fibrillation, antihypertensive meds, obesity and depression.

Funders



An Roinn Sláinte
Department of Health



The
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Irish Life



Questions please?

