

# FRailty and Arterial stiffness : the role of oXidative stress and Inflammation (FRAXI) - a pilot study

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## Introduction

There is an association between frailty and arterial stiffness<sup>1</sup>. However, arterial stiffness does not uniformly correlate with the spectrum of frailty states. Both oxidative stress and inflammaging contribute to vascular aging<sup>2</sup>. Although oxidative stress and inflammaging (the chronic state of inflammation in ageing) are known to be associated with frailty and considered to be underlying vascular aging, there are no observational studies in human, on the effects of these three on frailty.

This study aims to: i) examine the relationship between arterial stiffness, oxidative stress and inflammation with frailty status among older adults ii) to assess if inflammation, oxidative stress and arterial stiffness can be used as an objective measure for frailty. iii) to assess if recruitment, retainment, review and follow-up of participants is feasible for a larger study.

## Methods

This is an on-going pilot observational longitudinal cohort study of 50 older adults (≥70 years) with clinical frailty scores (CFS) ≤6 over six months. All study measurements will be taken at baseline.

Frailty assessment will include hand-grip strength (HGS) with Takei® hand grip dynamometer, timed-up and go test (TUGT), mini-mental state examination (MMSE), geriatric depression scale (GDS-15) and sarcopenia using body composition measurements with Tanita®. Arterial stiffness measurements will include carotid-femoral pulse wave velocity (cfPWV) and carotid-radial pulse wave velocity (crPWV) using Complior® (ALAM Medical, France). CAVI® device (Fukuda Denshi, UK) will measure cardio-ankle vascular index and ankle brachial index (ABI). Oxidative stress blood markers nitrotyrosine (NT) and 8-hydroxy-2'-deoxyguanosin (8-oxo-dG) and inflammation markers high sensitive C-reactive protein (hs-CRP) and interleukin-6 (IL-6) will be measured at baseline and 6 months along with lipid profile and glycated haemoglobin.

## Data analysis

Descriptive statistics for continuous data using means and standard deviations for normality distributed variables or medians and inter-quartile ranges for skewed variables will be used. Participants will be categorized into CFS 1-3, and CFS 4-6. Categorical data will use frequencies and comparison between groups. Change in frailty between the groups over 6 months will be compared using paired t-test. Simple linear regression will be done between frailty measures, arterial stiffness, inflammation, and oxidative stress biomarkers. Significance will be at p<0.05.

## References

1. Orkaby, A. R. *et al.* Cross-sectional association of frailty and arterial stiffness in community-dwelling older adults: The framingham heart study. *Journals Gerontol. - Ser. A Biol. Sci. Med. Sci.* **74**, 373–379 (2019)
2. Inglès, M. *et al.* Oxidative stress is related to frailty, not to age or sex, in a geriatric population: Lipid and protein oxidation as biomarkers of frailty. *J. Am. Geriatr. Soc.* **62**, 132

## Results

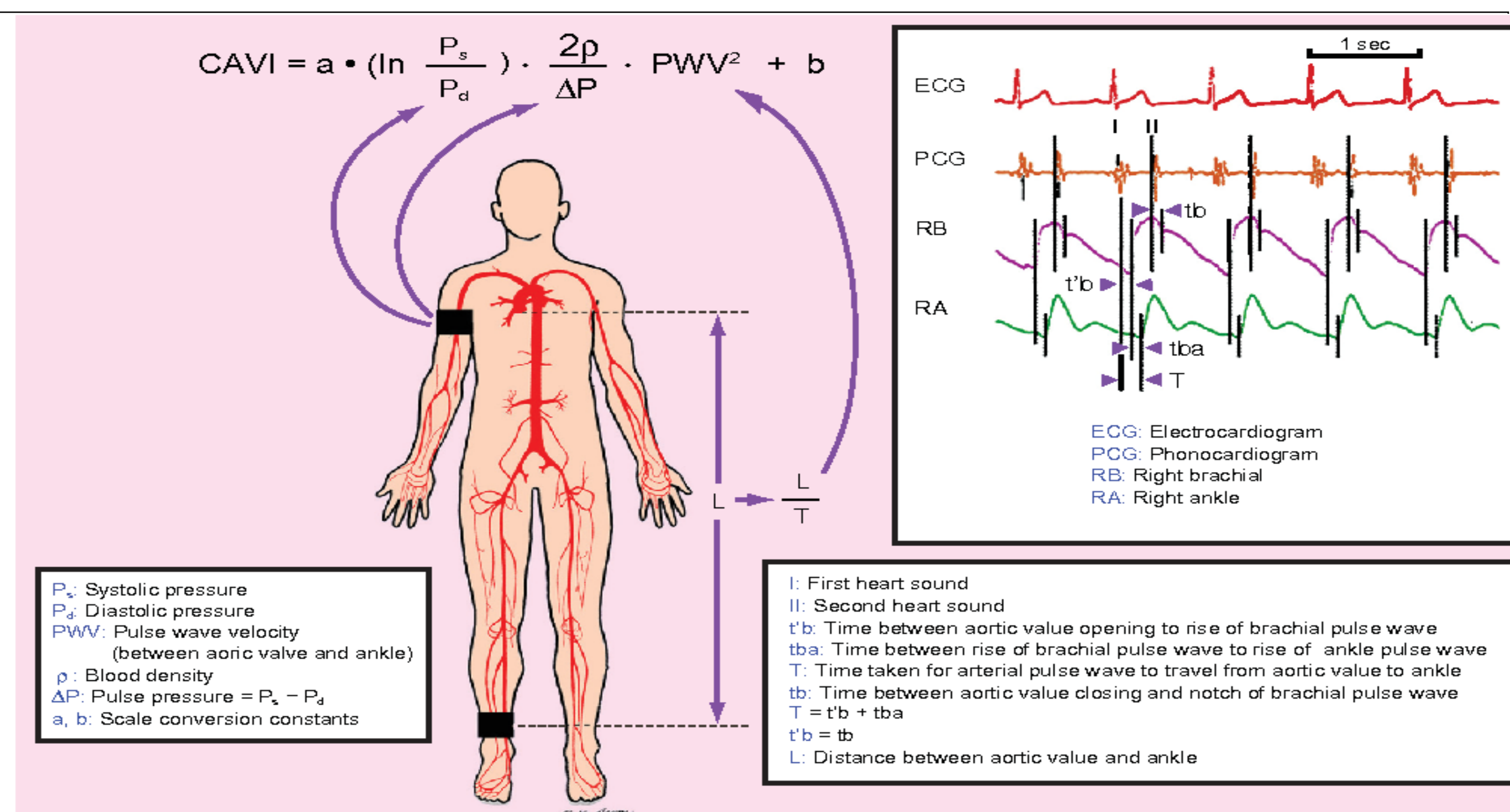


Figure 1: Measures of arterial stiffness, adapted from Cheuk-Kwan Sun, Cardio-ankle vascular index (CAVI) as an indicator of arterial stiffness, *Integrated Blood Pressure Control* 2013;6 27–38

40 participants have been recruited so far, and the table below shows descriptive statistics of parameters assessed:

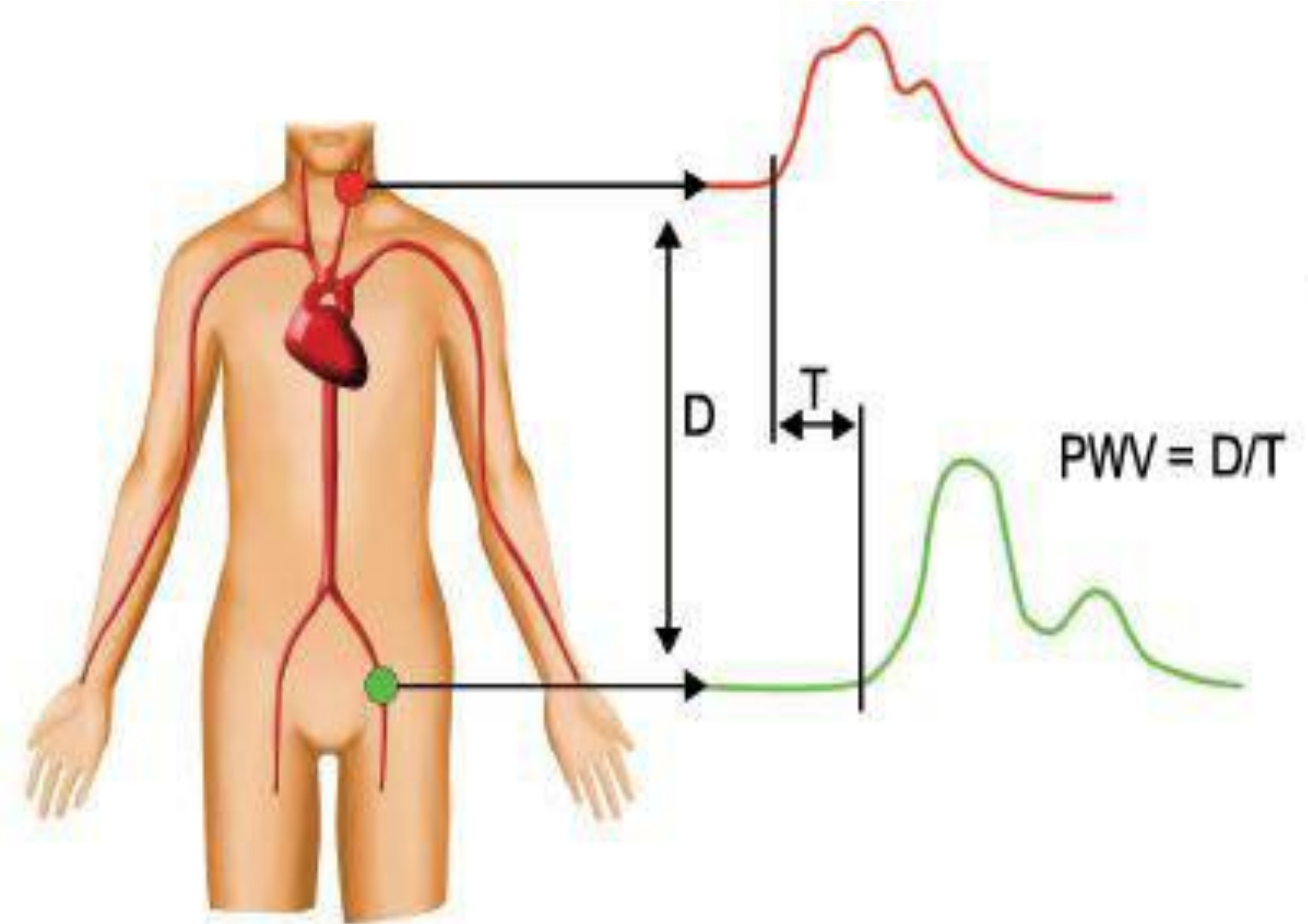


Figure 3: Pulse wave velocity as assessed with Complior. Image from ALAM Medical website

## Conclusions

With 40 participants recruited so far, study will be completed within the time schedule planned. The following observations can be concluded:

- Recruitment is feasible.
- Follow up of 20 participants have been done with no issues
- Further analysis will be done involving the biomarkers at baseline and at the 6months follow up.

Study protocol has now been published by Biomarkers Insight Journal.