Dunedin Multidisciplinary Health & Development Study

Concept Paper Form

Provisional Paper Title: Cardiovascular risk factors and retinal vessel calibre. What is the longitudinal relationship?
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Today's Date: 30/4/18

Objective of the study:

The aim of this project is to determine whether blood pressure, body mass index, smoking status, and socioeconomic status from the age of 7 years, physical fitness from 15 years are associated with retinal vessel calibre at age 38 years.

Data analysis methods:

Multiple linear regression modelling to relate the above cardiovascular risk factors to retinal vessel calibre.

Variables needed at which ages:

- Systolic bood pressure and SBP trajectory data{ages 7, 9, 11, 13, 15, 18, 26, 32, 38}
- Smoking status and pack years smoked at each age{ages 9, 11, 13, 15, 18, 21, 26, 32,
- Body mass index and BMI trajectory data{3, 5, 7, 9, 11, 13, 15, 18, 21, 26, 32, 38}
- Sex
- Cardiorespiratory fitness {age 15, 26, 32, 38}
- Socioeconomic status {1-15 and all available up to age 38}
- Central retinal artery equivalent (CRAE) and central retinal vein equivalent (CRVE) {age 38}

Significance of the Study (for theory, research methods or clinical practice):

There is an old saying that the 'eyes are a window to your soul';[1] and this is not too far from the truth. The retinal vasculature can be viewed in vivo directly and non-invasively providing an early individualised biomarker for cardiovascular disease,[2] with evidence for association with cardiovascular risk factors even in children;[3-5] however, the relationship between longitudinal cardiovascular risk factors and retinal vessel calibre is unknown.[5] Wider retinal venular calibres and narrower arteriolar calibres have been associated with an increased risk of cardiovascular disease.[2, 6, 7]

There is currently evidence suggesting that cardiovascular risk factors such as hypertension, smoking, obesity are associated with changes in retinal vessel calibre.[2] There is limited information on the effect of physical fitness on retinal vessel calibre. Previous studies are cross sectional and correlated the above risk factors with retinal vascular calibre. There is some evidence that retinal vessel calibre changes occur in childhood in relation to many of these cardiovascular risk factors.[5] However, there is currently no good longitudinal data measuring the impact of childhood cardiovascular risk factors on retinal vessel calibre in early mid life at 38 years.

The Dunedin cohort study provides a complete birth cohort (n=1037) of a metropolitan area (Dunedin) in New Zealand, born over a span of one year between April 1st 1972 and March 30th 1973 who had a multitude of cardiovascular disease correlates measured over multiple visits;[8] as well as digital retinal fundus photographs taken of both eyes at age 38 and CRAE and CRVE diameters obtained using a standardised protocol.[9]

The Dunedin study is particularly well placed to provide us with robust longitudinal associations of cardiovascular risk factors over a lifetime with retinal vessel calibre at age 38, to supplement international data as well as provide New Zealand specific data. This research is both essential and timely and may make a significant contribution to the international literature.

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