2.8: RELATIONSHIPS BETWEEN ADIPOSITY AND LEFT VENTRICULAR FUNCTION IN ADOLESCENTS: MEDIATION BY BLOOD PRESSURE AND OTHER CARDIOVASCULAR MEASURES

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keeping average wave speed in all terminal vessels constant ("proximal-stiffening", see Figure). An elastance heart model was applied at the inlet and simulations were performed with a one-dimensional flow solver (2).

Results: Proximal stiffening and distal stiffening had opposing effects on R but the same effects on mPP, whereas mPP increased monotonically with decreasing TAC and increasing PFW in both settings (Figure).

Conclusion: Wave reflection per se does not provide protection from high mPP since greater reflection also entails greater transmitted pressure. Although a decreased R may accompany proximal arterial stiffening, the likely mechanism of increased mPP with aging is decreased TAC and greater PFW.

2.7 FITNESS MODIFIES THE ASSOCIATION BETWEEN EXERCISE BLOOD PRESSURE AND LEFT-VENTRICULAR MASS IN ADOLESCENTS

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Objective: Exaggerated exercise blood pressure (BP) is associated with higher left-ventricular mass index (LVMI). Paradoxically, exercise BP and LVMI may be higher with greater fitness, but underlying factors are poorly understood. This study aimed to determine the influence of fitness on exercise BP and its relationship with LVMI in adolescents.

Methods: 4835 adolescents from the Avon Longitudinal Study of Parents and Children, aged 15.4(0.3) years, 49% male completed a submaximal cycle test. Exercise BP was measured immediately on test cessation and fitness calculated as physical work capacity 170 adjusted for lean body-mass. LVMI (n = 1589), cardiac output (CO, n = 1628) and total peripheral resistance (TPR, n = 1628) were measured by echocardiography 2.4 (0.4) years later.

Results: Each unit of fitness was associated with a 6.46 mmHg increase (95% CI: 5.83, 7.09) in exercise systolic BP. Exercise systolic BP increased step-wise by third of fitness (difference 6.06 mmHg, 95% CI:4.99, 7.13 first vs. middle; 11.13 mmHg, 10.05, 12.20 middle vs. highest). Each 5 mmHg increase in exercise BP was associated with 0.25 g/m². 7 (0.16–0.35) greater LVMI, attenuated with adjustment for fitness. There was evidence of an interaction between fitness and exercise BP on LVMI, more-marked in the middle fitness third (difference -0.27g/m².7, -0.51,0.04 vs. first third), but similar in lowest and highest fitness thirds. CO increased (difference 0.06 L/min, 0.12,0.34), TPR decreased (difference -0.13AU, -0.84,0.59; -0.35 with fitness).

Conclusion: Fitness may modify associations between exercise BP and LVMI in adolescence. Higher CO, but lower TPR suggests a physiological exercise BP-LVMI relationship with higher fitness, rather than pathological elevations in exercise BP and LVMI.

2.8 RELATIONSHIPS BETWEEN ADIPOSITY AND LEFT VENTRICULAR FUNCTION IN ADOLESCENTS: MEDIATION BY BLOOD PRESSURE AND OTHER CARDIOVASCULAR MEASURES

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Oral Session III — Clinical Aspects, Hypertension & Diabetes

3.1 STRAIN DISCONTINUITIES IN CAROTID ATHEROSCLEROTIC PLAQUES — A NOVEL MARKER FOR PLAQUE VULNERABILITY?

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INTRODUCTION: Increased adiposity is associated with poorer left ventricular (LV) function but the mediating role of blood pressure (BP) and other cardiovascular measures is unknown. We investigated the roles of potential mediators of adiposity in adolescents in a UK birth cohort, the Avon Longitudinal Study of Parents and Children.

METHODS: Fat and lean mass were assessed by dual energy X-ray absorptiometry (DXA) in 2,068 individuals (age 17.7 (SD 0.32) years; 45% male; weight 67 (SD 13) kg). BP was measured and echocardiography performed. Tissue Doppler systolic (s’), early diastolic longitudinal function (e’) and transmural E/A were used as measures of LV systolic and diastolic function respectively. Mediation was estimated using structural equation modelling; height, sex, socioeconomic position, lean mass and smoking were included as potential confounders in all models.

RESULTS: Table 1 shows the total and direct (total — indirect (mediated)) effects (standardized β) for each potential mediator, alongside %mediation. No convincing associations were found between fat mass and s’ or e’.

CONCLUSIONS: MAP, HR and EDV, an indicator of preload, are important mediators of the effect of adiposity on diastolic function in adolescence, while TPR appears to account for none of the effect. Absence of mediation by PP, in combination with the mediation by TAC, suggests that stroke volume contributes some meditative effect. These findings emphasise the importance of adiposity and risk factor control in adolescence.

<table>
<thead>
<tr>
<th>Mediator</th>
<th>Direct effect (standardized β)</th>
<th>Total effect (standardized β)</th>
<th>% mediation</th>
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<tr>
<td>None</td>
<td>-0.11</td>
<td>-0.14</td>
<td>21</td>
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<tr>
<td>Mean arterial pressure (MAP)</td>
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<td>0</td>
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<td>Pulse pressure (PP)</td>
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<td>-0.13</td>
<td>0</td>
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<tr>
<td>Heart rate (HR)</td>
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<td>-0.14</td>
<td>21</td>
</tr>
<tr>
<td>Total arterial resistance (TAR)</td>
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<td>-0.14</td>
<td>-7</td>
</tr>
<tr>
<td>Total peripheral resistance (TPR)</td>
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<td>-0.15</td>
<td>0</td>
</tr>
<tr>
<td>End-diastolic volume (EDV)</td>
<td>-0.17</td>
<td>-0.15</td>
<td>-13</td>
</tr>
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</table>

3.2 RESERVOIR PRESSURE INTEGRAL IS INDEPENDENTLY ASSOCIATED WITH THE REDUCTION IN RENAL FUNCTION IN AN OLDER POPULATION

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INTRODUCTION: Changes in renal function in older adults are a common and worrying development that affects many aspects of health. Changes in renal function can be attributed to a variety of factors including diabetes, hypertension, and cardiac disease. We aimed to investigate the independent contribution of systemic vascular measures to changes in estimated glomerular filtration rate (eGFR) over a 3-year period.

METHODS: We studied 39 patients with diabetes (17 with diabetes and 22 with diabetes and hypertension) who had a complete set of baseline and 3-year follow-up measurements. The primary outcome was change in eGFR (ml/min/1.73 m2). We used multivariate linear regression to identify potential mediators of this change.

RESULTS: After 3 years, 95 individuals (72.4 ± 7.6 yrs, 26F) had an eGFR reduction of more than 5 ml/min/1.73 m2/year. A multivariate logistic regression analysis revealed that baseline INTPR was independently associated with the eGFR reduction after adjusting for conventional risk factors and baseline renal function (odds ratio 0.975 (95% CI, 0.958–0.993), p = 0.01). When the eGFR reduction was expressed as a continuous variable, baseline INTPR was also independently associated with changes in eGFR (β = 0.115, p < 0.01; multivariate linear regression with adjustment for