2.3: OCCUPATIONAL, SPORT AND LEISURE RELATED PHYSICAL ACTIVITY HAVE CONTRASTING EFFECTS ON NEURAL BAROREFLEX SENSITIVITY. THE PARIS PROSPECTIVE STUDY III

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2.3 OCCUPATIONAL, SPORT AND LEISURE RELATED PHYSICAL ACTIVITY HAVE CONTRASTING EFFECTS ON NEURAL BAROREFLEX SENSITIVITY. THE PARIS PROSPECTIVE STUDY III

Christopher C. Mayer1, Julia Matschkal2, Pantelis A. Sarafidis3, Catherine Guilbout1, Thomas van Sloten1, Frederique Thomas5, Bruno Pannier1, James Sharnam4, Stephanie Laurent1, Xavier Jouven4, Jean-Philippe Empana1

1INSERM U970, France
2APHP, Paris Descartes university, Paris, France
3Investigations Préventives et cliniques (IPC), Paris, France
4Menzies Institute for Medical Research, France
5INSERM 970, France
6INSERM, France
7INS, France

Background: Physical activity (PA) is beneficial for baroreflex sensitivity (BRS), but it is unclear whether the type of PA has similar effects on the neural (nBRS) or vascular (carotid stiffness) components of BRS. We sought to determine this in healthy adults from a community-based study via assessment of occupational (OPA), sport (SPA), leisure (LPA) and total PA (TPA).

Methods: In 8649 adults aged 50 to 75 years, resting nBRS (estimated by low frequency gain, from carotid distension rate and heart rate) and carotid stiffness were measured by high-precision carotid echotracking. PA was self-reported using the Baecke questionnaire, which distinguishes OPA, SPA, LPA and TPA. The associations between PA and nBRS and carotid stiffness were quantified using multivariate linear regression analysis. Analyses were conducted separately in the working and non-working population.

Results: In working adults (n = 5039), OPA was associated with lower nBRS function (p = 0.026) and borderline higher carotid stiffness (p = 0.08). When stratified by education, this association remained only in those with less than tertiary education. SPA was associated with higher nBRS (p = 0.0005) and borderline lower carotid stiffness (p = 0.052). Neither LPA nor TPA was associated with nBRS or carotid stiffness. In non-working adults (n = 3610), SPA and TPA were both associated with lower carotid stiffness (p = 0.012 and p = 0.020), but not nBRS. LPA was not associated with either parameter.

Conclusion: Occupation-related PA is associated with lower nBRS function and higher carotid stiffness, especially in those with lower education. Higher amounts of sport-related PA are associated with higher nBRS and lower carotid stiffness.

2.4 CENTRAL SYSTOLIC BLOOD PRESSURE PROVIDES ADDITIONAL INFORMATION IN RISK PREDICTION IN HEMODIALYSIS PATIENTS

Christopher C. Mayer1, Julia Matschkal2, Pantelis A. Sarafidis3, Stefan Haagmar1, Georg Lorenz1, Susanne Angermann1, Matthias C. Braunsch5, Marco Baumann2, Uwe Heemann2, Christoph Schmaderer2, Siegfried Wassertheurer1

1AIT Austrian Institute of Technology, Center for Health & Bioresources, Vienna, Austria
2Department of Nephrology, Technical University of Munich, Klinikum rechts der Isar, Munich, Germany
3Austrian Institute of Technology, Center for Health & Bioresources, Vienna, Austria
4Department of Nephrology, Hippokration Hospital, Aristotele University of Thessaloniki, Thessaloniki, Greece
5Department of Nephrology, Hippokration Hospital, Aristotle University of Thessaloniki, Thessaloniki, Greece

Background: Association of Ambulatory Blood Pressure Monitoring (ABPM) with mortality depends on cardiac function in hemodialysis patients. Evidence for the predictive power of central Systolic Pressure (cSBP) is inconclusive. Thus, this study aimed to investigate the additional information of ambulatory cSBP in risk prediction in a cohort of hemodialysis patients.

Methods: Within the ISAR-study cohort, 344 hemodialysis patients underwent 24 h ABPM on the dialysis day. All-cause and cardiovascular mortality served as endpoints. Risk prediction was performed using Cox regression in patients with or without atrial fibrillation (AF) or heart failure (HF) for peripheral (pSBP) and central systolic pressure calibrated with peripheral systolic and diastolic pressure (cSBP1) or peripheral mean and diastolic pressure (cSBP2).

Results: During a mean follow-up of 37.6 (17.5 SD) months, 115 patients died, of whom 47 due to cardiovascular reasons. In patients with AF or HF, a negative association to mortality could be observed, independent of pressure location and calibration (see Table). In patients without AF or HF, these associations were opposite to the directions of cSBP2 was superior to pSBP and cSBP1 for all-cause (pSBP; HR = 1.01, p = 0.30; cSBP1: HR = 1.00, p = 0.77; cSBP2: HR = 1.01, p = 0.06) and cardiovascular (pSBP; HR = 1.03, p = 0.02; cSBP1; HR = 1.02, p = 0.06; cSBP2; HR = 1.03, p = 0.003) mortality. This circumstance was confirmed in multivariable analysis combining cSBP and cSBP2 differences between pSBP and cSBP (see Table).

Conclusions: This study provides evidence for the additional information of central systolic blood pressure and its dependency on calibration in risk prediction in hemodialysis patients. Further studies are needed to confirm these findings.

Table: Univariate and multivariable hazard ratios (95% confidence intervals) per mmHg increase and significance levels (p) for all-cause and cardiovascular mortality.

Abbreviations: pSBP, peripheral systolic pressure; cSBP, central systolic pressure

1=brachial systolic and diastolic pressure calibration; 2= brachial mean and diastolic pressure calibration; HR, hazard ratio; AF, atrial fibrillation; HF, heart failure.

2.5 DOES WAVE REFLECTION PROTECT THE MICROVASCULATURE FROM HIGH PULSE PRESSURE?

Avinash Kondiboyina1,2, Joe Smolich3,2, Michael Cheung1,2,6, Benend Westerho5, Nico Westerho5, Jonathan Mynard1,2,6

1Murdoch Children’s Research Institute, Parkville, VIC, Australia
2University of Melbourne, Parkville, VIC, Australia
3Murdoch Childrens Research Institute, Parkville, VIC, Australia
4Royal Children’s Hospital, Parkville, VIC, Australia
5VU University Medical Center, Amsterdam, the Netherlands
6Royal Children’s Hospital, Parkville, VIC, Australia

Background: Wave reflection (caused by a stiffness increase from large to small arteries) has been considered to protect against high microvascular Pulse Pressures (mPP) (1). However, according to transmission line theory, Transmission (T) and Reflection (R) coefficients are proportional (T = 1+R), implying that reflection would not be protective. Proximal arterial stiffening with aging is associated with reduced Total Arterial Compliance (TAC) and increased forward Pressure (Pfw). We hypothesized that a high TAC and low Pfw, rather than high R, are responsible for protection from mPP.

Methods: We constructed a fractal arterial tree containing 5008 vessels across 14 generations (fractal exponent 2.76, asymmetry ratio 0.8). Wave speed in each vessel was prescribed to achieve a uniform reflection coefficient (R = -0.025, 0, 0.025 or 0.05) at each junction, achieved by progressively stiffening distal vessels while keeping aortic wave speed constant ("distal-stiffening") or by progressively stiffening proximal vessels while...