ORAL SESSIONS

ORAL SESSION 7B
EPIDEMIOLOGY OF HYPERTENSION AND METABOLIC DISORDERS 1

7B.01 INTERACTION BETWEEN LEPTIN, LEISURE TIME PHYSICAL ACTIVITY, AND HYPERTENSION IN THE COPENHAGEN CITY HEART STUDY

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Objectives: The mechanisms by which overweight and physical inactivity lead to hypertension are complex. Leptin, an adipocyte-derived hormone, has been linked with hypertension. We studied the relationship between leptin, physical activity, and new-onset hypertension.

Methods: A prospective study design based on data from the 3. and 4. Copenhagen City Heart Study (CCHS). From the 3. CCHS, which was performed in 1991 to 1994, we identified 1111 subjects (744 women and 367) who were normotensive. Based on questionnaire items, the participants were divided into two groups with low (n = 674) and high (n = 437) level of leisure time physical activity, respectively. Between the 3. and the 4. CCHS examination, which was performed in 2001 to 2003, 304 had developed hypertension, defined as systolic blood pressure (SBP) $\geq$140 mm Hg or diastolic blood pressure (DBP) $\geq$90 mm Hg or use of antihypertensive medication.

Results: In a logistic regression model, including age, sex, body mass index, SBP, DBP, level of physical activity, and leptin, we found a significant interaction between leptin and level of physical activity with new-onset hypertension as outcome variable (P = 0.012). When we entered the interaction variables: effect of leptin with low level of physical activity and with high level of physical activity, respectively, in the original model, leptin only predicted new-onset hypertension in participants with low level of physical activity (odds ratio (95% confidence interval): 1.16 (1.01–1.33) for one unit increase in log-transformed leptin levels, P = 0.038), but not in participants with high level of physical activity (0.88 (0.74–1.05), P = 0.15). If we included other risk factors of hypertension and possible mediators of overweight-related hypertension, such as the triglyceride to HDL cholesterol concentration ratio, fibrinogen, glucose, diagnosis of diabetes, adiponectin, and heart rate, in the model, leptin still predicted new-onset hypertension in participants with a low level of leisure time physical activity (P = 0.040).

Conclusion: This study is the first prospective study to report that the hypertensive effect of leptin is modified by leisure time physical activity.

7B.02 EXERCISE SYSTOLIC BLOOD PRESSURE AT 100 WATT PREDICTS CARDIOVASCULAR MORTALITY IN APPARENTLY HEALTHY MEN; A 35-YEAR FOLLOW-UP STUDY

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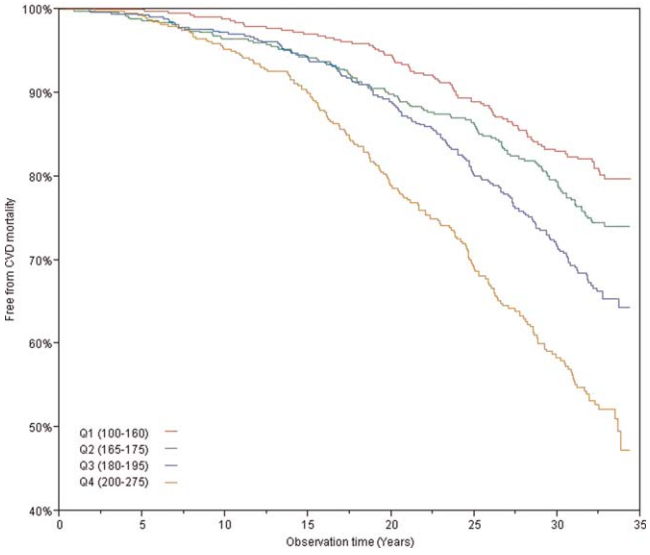
Objective: Systolic blood pressure (SBP) at rest is strongly associated with cardiovascular (CV) mortality, while data on exercise BP have been conflicting. We have previously found peak systolic BP at a workload of 100 Watt (SBP100) to predict CV mortality after a follow-up of up to 21 years. We now aimed to investigate this association after 35 years.

Design and Methods: 2014 apparently healthy men aged 40 to 59 were included after an extensive examination program including a bicycle exercise test in the years 1972 to 1975. 1999 men achieved a workload of more than 100 W. The association between SBP 100, SBP and CV mortality was analyzed among these men, first in separate models and then in the same model using Cox proportional hazard and adjusted for age, smoking and total cholesterol.

Results: Kaplan-Meier plots illustrate CV mortality in different quartiles of SBP100. Cox models were performed using 1 standard deviation (SD). An increase of 1 SD (24.2 mmHg) in SBP100 was associated with a 1.29 (CI 1.19–1.40, $p < 0.001$) fold increased risk of CV mortality; corresponding for SBP was 1.27 (CI 1.17–1.38, $p < 0.001$) fold increased risk of CV mortality was found per 1 SD (17.9 mmHg). Both SBP and SBP100 were independently associated with CV mortality when tested in the same model.

Conclusion: Our data suggest that exercise systolic blood pressure at the moderate ergometer load of 100 Watt is an independent predictor of long term cardiovascular mortality in healthy middle aged men and that the strength of this association is of the same magnitude as for resting systolic blood pressure.



7B.03 HAEMATOCRIT INDEPENDENTLY PREDICTS MORTALITY IN HYPERTENSIVE PATIENTS

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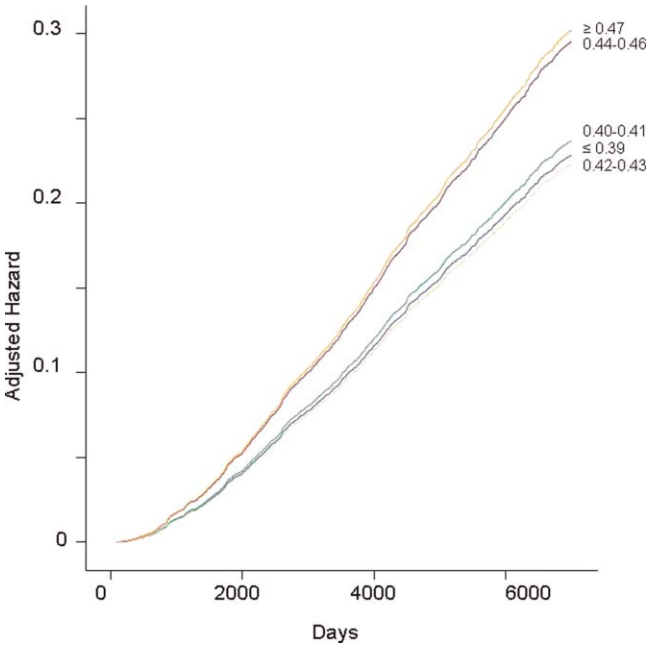
Elevated haematocrit correlates strongly with many independent cardiovascular risk factors including high blood pressure. The association of haematocrit with mortality is variable and suggests a U shaped pattern of risk. We investigated whether the risk associated with haematocrit persisted in treated hypertensive patients attending the Glasgow Blood Pressure Clinic (GBPC).

Methods: We examined the association between haematocrit and mortality in 4835 hypertensive patients attending the GBPC. Covariates in Cox proportional hazards model included age, sex, smoking, BMI, systolic blood pressure, cholesterol, urea and epoch defined by publication of major UK

hypertension treatment guidelines. Haematocrit was treated as a continuous variable in a multivariate analysis.

Results: During 20 years of follow-up, there were 1,202 deaths overall with 719 deaths from cardiovascular causes, and 483 from non-cardiovascular causes. Of the cardiovascular deaths, 455 and 204 were from ischaemic heart disease and stroke respectively. The median haematocrit was 42 (IQR 40–45). For each one percent increase in haematocrit, we observed an increased risk of all-cause (Hazard ratio [HR] 16.4 [95% CI 3.7 – 73.6]; p = < 0.001), cardiovascular (17.3 [2.5–119.2]; 0.004), ischaemic heart disease (30.7 [2.7–350.5]; 0.006), non-cardiovascular (13.8 [1.3–150.5]; 0.31) mortalities respectively. There was a borderline significant trend towards increased stroke mortality with increasing haematocrit (36.4 [0.9–1424.7]; 0.055). The results were similar after adjusting for achieved blood pressure during clinic follow-up, and when haematocrit was analysed as quintiles (figure).

Conclusion: Haematocrit in treated hypertensive patients is an independent predictor of increased cardiovascular mortality.



7B.04 DECREASING SYSTOLIC BLOOD PRESSURE RESULT IN DECLINING MORTALITY RATES IN AN UNTREATED POPULATION. RESULTS FROM THE COPENHAGEN CITY HEART STUDY

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Objective: The aim of the present study was to evaluate mortality risk and its association to developments in population systolic BP and to evaluate secular trends in BP associated mortality risk in the untreated population.

Design: The Copenhagen City Heart Study is a prospective longitudinal epidemiological study. The present analysis comprised subjects from survey 1 and 3.

Methods: BP measurements and other methods were fully standardised and unchanged throughout the observation period. Questionnaires were completed by the participants who were followed by public registers.

Results: 18 077 persons participated. Age, systolic BP, diabetes, gender and habitual physical activity were significant predictors of all-cause death in all age groups. Risk-factor adjusted risk for all-cause death was significantly lower in survey 3 compared to survey 1. Among the elderly, there were no development in mortality risk, but in the age groups 40–49 years and 50–59 years there were survey differences indicating a significant trend towards longer life expectancy compared to their age-matched counterparts in survey 1. No secular trend in risk-factor adjusted mortality risk could be identified.

Conclusion: A declining risk-factor adjusted risk of all-cause death was observed in the younger and middle-aged cohorts of the population. The association of decreasing systolic BP and declining mortality risk in the same age-groups points to a role of systolic BP in age-cohort differentiated improvements of life expectancy. The mortality risk associated with any given level of systolic BP was stationary throughout the observation period.

7B.05 CHANGES IN LEVELS OF SERUM CHOLESTEROL AND DEVELOPMENT OF HYPERTENSION IN THE BRISIGHELLA HEART STUDY

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Rationale and Objectives: Serum cholesterol (S-Chol) levels have been reported to affect blood pressure at young age and hypercholesterolemia might promote the development of hypertension (HBP) probably by activating tissue renin-angiotenin system (RAS). The aim of the present study was to assess the rate of developement of stable HBP over a period of 8 years in a population of patients with normal/high-normal blood pressure with a different control of S-Chol levels.

Methods: 932 subjects enrolled in the Brisighella Heart Study with baseline BP values < 140/90 mmHg and S-Chol levels from normal to elevated, treated or not with lipid lowering drugs were subdivided in 4 different subgroups according to S-Chol changes over a period of 8 years (1996–2004). Group 1 and 2 included subjects whose S-Chol levels respectively remained or decreased within the normal range, while group 3 and 4 included subjects showing S-Chol levels persistently elevated or increased above the normal range. The main measure of outcome was the incidence of stable HBP (BP > 140/90 mmHg and/or treatment for HBP) over the period of follow-up.

Results: No major differences have been observed in the demographic and pressure profile between subjects in group 1–2 vs. group 3–4. The 8-year incidence of HBP was 7,1% in group 1–2 and 13.8% in group 3–4 (2p = 0.002) and was significant after adjustment for the main confounding risk factors. The difference between groups 1–2 and 3–4 was confirmed in male (8.2 vs.13.1%; 2 p = 0.04) and female (6.1 vs.14.5%;2 p = 0.006) subjects while disappeared in the older population (<65 ys = 5.7 vs.10.9%;2 p = 0.11 and >65 ys = 21.9 vs.25.9%;2 p = 0.081). Within each subpopulation of subjects (1/2 and 3/4) HBP rate was higher in subjects older and with higher baseline BP values but this does not affect the impact of the different control of S-Chol.

Conclusions: S-Chol levels are related to the new onset of HBP and a more aggressive strategy of lipid control could reduce the burden of CV risk beyond control of lipid profile.

7B.06 BLOOD PRESSURE IN 2½-YEAR-OLD CHILDREN BORN EXTREMELY PRETERM

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Objective: Adolescents and young adults born preterm have elevated blood pressure (BP).1,2 Little is known about the emergence of high BP in young children surviving extremely preterm birth (EXPT).

Methods: Population-based cohort study of 76 EXPT (gestational age 23–26 weeks, mean birth weight 814 [161] g) surviving to a corrected postnatal age of 32 [1.3] months, and 76 matched controls born at term (BW 3603[482] g). After 15 min acclimatization in the room and 5 min rest in sitting position, systolic (SBP) and diastolic (DBP) BP were measured in the up-right sitting position using a validated oscillometric BP-device (Omron HEM-907). Data are mean [SD] or proportions (%). Appropriate institutional ethics committee clearance and parents' informed consent were obtained.

Results: Blood pressures were successfully measured in 119 of 152 children (78%). There were no differences in postnatal age, gender distribution or resting heart rate (mean 104 and 105 min-1, respectively) between EXPT and controls. In addition, SBP (mean 99 [11] vs 98 [8] mmHg, p = 0.47) did not differ significantly between EXPT and controls. However, DBP was higher in EXPT (mean 67 [11] compared to controls 63 [9] mmHg, p = 0.01) despite that EXPT were on average 1.9 kg lighter (p < 0.001) and 3.3 cm shorter (p < 0.001) than controls. The proportion of boys with an age, gender and height adjusted SBP > 90th percentile3 was 20/46 (44%) in EXPT and 9/44 (20%) in controls (p = 0.013). The corresponding proportions for girls were 6/31 (19%) and 8/31 (26%) (p = 0.54).

Conclusions: Children born extremely preterm, in particular boys, have elevated blood pressure already at 2½ years of age.