

**BP000568****Validation of electronic sphygmomanometers against mercury sphygmomanometers at high altitude in Tibet**S.S. LI<sup>a</sup>, X.S. ZHAO<sup>b</sup>, S. BA<sup>c</sup>, F. HE<sup>b</sup>, L. KE<sup>a</sup>, L.J. YAN<sup>a</sup>, Y.F. WU<sup>a</sup><sup>a</sup>Research and Development, The George Institute, China, Beijing, China<sup>b</sup>Department of Cardiology, Beijing Jishuitan Hospital, Beijing, China<sup>c</sup>Department of Cardiology, Dangxiong Renmin Hospital, Tibet, China

**Objective:** Studies at normal altitude generally showed that electronic sphygmomanometers (ES) yielded different readings from mercury sphygmomanometers (MS) but could be used as a substitute. Little is known about the performance of ES at high altitude, necessitating this validation study. **Design and methods:** In Dangxiong County in Tibet, 4300 m above sea level, a well-trained cardiologist measured the systolic (SBP) and diastolic blood pressure (DBP) of 129 adults (80 men, aged between 19 and 69, mean age 38) 3 times in a quiet room with proper room temperature. An ES (Omron HEM-759P) was connected with the MS by an air control valve and the bulb assembly served as the pressure source, and allowing simultaneous measurement of BP using the 2 instruments. **Results:** Mean SBP measured by ES ( $124.67 \pm 20.39$  mm Hg) was significantly higher than by MS ( $118.91 \pm 20.56$  mm Hg) ( $5.76$  mm Hg,  $p < 0.001$ ) while DBP measured by ES ( $76.54 \pm 12.63$  mm Hg) and by MS ( $76.95 \pm 13.86$  mm Hg) has no significant difference ( $-0.42$  mm Hg,  $p = 0.228$ ). Difference in SBP measured by ES and MS was more pronounced in men ( $6.84$  mm Hg) than in women ( $4.00$  mm Hg) ( $p = 0.002$ ); and for DBP, no gender difference was found ( $-0.93$  mm Hg vs.  $0.42$  mm Hg,  $P = 0.58$ ). The Pearson's correlation coefficients between MS and ES were  $0.974$  for SBP ( $p < 0.001$ ) and  $0.961$  for DBP ( $p < 0.001$ ). The percentages of absolute differences between ES and MS in categories  $\leq 5$  mm Hg,  $\leq 10$  mm Hg and  $\leq 15$  mm Hg for SBP were  $50.4\%$ ,  $82.2\%$  and  $96.1\%$  respectively; and  $86.7\%$ ,  $99.2\%$  and  $100\%$  for DBP respectively. Bland-Altman plots showed good consistency between MS and ES for both SBP and DBP measurements. **Conclusion:** To our knowledge, the first validation study conducted at high altitude demonstrated comparable differences between ES and MS as those at normal altitude. More studies are needed to firmly establish the usability of ES in high altitude.

doi:10.1016/j.jjcard.2009.09.061

**BP000642****Comparison of Korotkoff phases IV and phase V in measuring children's diastolic blood pressure**

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**Objectives:** To test whether Korotkoff phase IV (K4) or Korotkoff phase V (K5) is better for measuring children's diastolic blood pressure (DBP), and to contribute some evidence based support to the establishment of the diagnosis standard of childhood hypertension. **Methods:** We recruited 1,718 children aged 3 to 6 in Beijing in 2009. Data of anthropometric measurements (including height, weight and waist circumference) were collected. The blood pressure (BP) was measured by auscultation with a standard sphygmomanometer and recorded with K1 as the systolic BP, K4 and K5 as DBP. Repeated examinations were conducted if the BP were over the normal standard on 3 occasions with an interval of about 10 days. Hypertension was diagnosed according to sex-age-specific 95th BP percentile in Beijing. Student *t*-test was used to compare the BP among different children. Appropriate institutional ethics committee clearance and participants' informed consent were obtained. **Results:** The levels of K4 and K5 increased with age, and the difference between K4 and K5 was significant ( $P < 0.01$ ). The geometric

means of K4 minus K5 (K4-K5) were ( $11.1 \pm 2.2$ ) mm Hg in boys and ( $10.0 \pm 2.3$ ) mm Hg in girls ( $P < 0.01$ ). There were  $39.7\%$ ,  $43.2\%$ ,  $44.0\%$  and  $43.5\%$  participants whose (K4-K5) value outnumbered 10 mm Hg in 3-year, 4-year 5-year and 6-year groups, respectively. There were  $14.4\%$  ( $19/132$ ) and  $5.3\%$  ( $7/132$ ) children whose K4 were still over the standard on the 2nd and the 3rd occasions, and there were only  $5.6\%$  ( $3/54$ ) and  $1.9\%$  ( $1/54$ ) with K5. The prevalence rates of hypertension were  $9.3\%$  with DBP measured using K4, and  $5.9\%$  with DBP measured using K5. **Conclusions:** Which Korotkoff phase is used for diastolic blood pressure can affect the prevalence rates of hypertension among preschool children. K4 seemed to be a better phase than K5 when using auscultator technique to measure DBP in children aged 3 to 6.

doi:10.1016/j.jjcard.2009.09.062

**BP000653****The study on the association of blood pressure and relative factors with cholesterol and ABI and PWV in hypertensive patients**

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**Objective:** To explore the association of blood pressure and its relative risk factors with ankle-brachial index (ABI) and brachial-ankle pulse wave velocity (baPWV) in high-risk hypertensive outpatients. **Method:** A total of 277 high-risk hypertensive outpatients of our hospital were recruited. The fasting serum lipids, glucose (FBG), CRP and blood pressure were measured. ABI and baPWV were measured too. **Results:** The mean age was  $64.6 \pm 7.5$ . The mean values of BP were  $174$  mm Hg,  $94$  mm Hg for SBP and DBP respectively. The means of lipids were  $4.99$ ,  $1.95$ ,  $1.32$  and  $2.96$  mmol/L for TC, TG, HDL-C and LDL-C respectively. The twenty two patients had ABI value of  $\leq 0.9$  ( $7.9\%$ ), six patients had ABI of  $\geq 1.3$  ( $2.2\%$ ). The simple correlation analysis showed that SBP was significantly positively related to baPWV (left  $r = 0.170$   $P = 0.004$ , right  $r = 0.144$   $P = 0.016$ ). DBP was significantly negatively related to baPWV (left  $r = -0.170$ ,  $P = 0.005$ , right  $r = -0.147$ ,  $P = 0.014$ ). FBG was related to baPWV (right) ( $r = 0.129$ ,  $P = 0.033$ ). TC, LDL-C, and CRP were significantly negatively related to ABI. **Conclusion:** The results suggested that blood pressure, lipids, FBG and CRP were closely associated with ABI and baPWV in high-risk hypertensive patients. ABI and baPWV were useful clinical indices for preventing complication of hypertension.

doi:10.1016/j.jjcard.2009.09.063

**BP000684****Effects of amlodipine plus telmisartan or amlodipine plus amiroride regimen on blood pressure control in hypertensive patients: Preliminary report of Chinese Hypertension Intervention Efficacy (CHIEF) trial**

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**Objective:** To evaluate the effects of amlodipine-based antihypertensive combination regimen on blood pressure control and impact on cardiovascular events. **Methods:** From Oct. 2007 to Oct. 2008, a total of 13,542 hypertensive patients from 180 centers in China were included in this multi-centre randomized, controlled, blind-endpoint assessment clinical trial. Inclusion criteria were: essential hypertension, 50-79 years of age with at least one cardiovascular risk factor and signed consent forms. Patients were randomly assigned to receive low-dose amlodipine + diuretics

(group A) or low-dose amlodipine + telmisartan (group T). The primary endpoints are composite of non-fatal stroke/myocardial infarction and cardiovascular death. All patients will be followed-up for 4 years. **Results:** The characteristics of patients between the two groups were similar: mean age ( $61.5 \pm 7.7$ ) yrs with 19% history of cerebrovascular diseases, 12% coronary diseases, 18% diabetes, 42% dyslipidemia, and mean initial blood pressure of 157/93 mm Hg. After 8-week treatment, mean blood pressure in groups A and B was reduced to  $133.0 \pm 11.0/81.0 \pm 7.6$  and  $132.9 \pm 11.6/80.6 \pm 7.9$  mm Hg respectively. Blood pressure control rates reached 72.1% and 72.6% in groups A and T, respectively. **Conclusion:** Amlodipine-based antihypertensive combination regimens achieved satisfactory blood pressure control rate in patients with essential hypertension in this patient cohort.

doi:10.1016/j.ijcard.2009.09.064

#### BP000690

##### Impact of choice of diastolic Korotkoff phase in childhood on the prediction to arterial compliance

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**Objectives:** The best approach for blood pressure (BP) measurement in children remains controversial, especially on the choice of Korotkoff phase 4 (K4) vs. Korotkoff phase 5 (K5) for diastolic BP (DBP). The relation between hypertension and Arterial Compliance (AC) has been demonstrated in adults but not in children. To compare the differences between K4 and K5 in school-aged children and their predictions to AC. **Methods:** Based on a cross-sectional survey, 555 children aged 6 to 18 years were selected from three schools of Dongcheng district in Beijing. Physical examination included height, weight, heart rate, systolic blood pressure (SBP) and DBP. Body mass index (BMI) was calculated. DBP was measured using K4 and K5, respectively. AC was measured using digital pulse wave analyzing method from pulse trace machine, and then stiffness index (SI) was determined (SI has a negative correlation with AC: the higher the SI value, the worse the AC). Partial correlation analysis was performed to describe the association of K4 and K5 with SI. Logistic regression analysis was conducted to examine the impact of choice of K4 and K5 as DBP in childhood on the prediction to SI. Appropriate institutional ethics committee clearance and participants' informed consent were obtained. **Results:** The value of K4 minus K5 (K4-K5) decreased as age increased. Adjusted for age, gender, heart rate, pubertal development, BMI and SBP, in childhood K4 was better correlated to SI ( $\beta = 0.167$ ,  $P = 0.018$ ) than K5 ( $\beta = 0.079$ ,  $P = 0.078$ ). K4 seems to be superior to K5 in predicting AC, the odds ratio of SI was 1.50 (95% CI: 1.17-2.07) with K4 which was higher than using K5 (OR = 1.32, 95%CI: 1.05-1.65). **Conclusions:** There was significant difference between K4 and K5 in Chinese schoolchildren. K4 is superior to K5 when using auscultator technique to measure DBP.

doi:10.1016/j.ijcard.2009.09.065

#### BP000722

##### Morning blood pressure, heart rate, pulse pressure and rate pressure product in male hypertensives according to ageing

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**Objective:** The aim was to evaluate the relationship between morning systolic (MSP) and morning diastolic blood pressure (MDP),

24-h heart rate (HR), 24-h pulse pressure (PP) and 24-h rate-pressure product (RPP) in male hypertensives according to ageing. **Methods:** Twenty-four ambulatory MSP, MDP, HR, PP and RPP recording (CardioControlWorkstation) were obtained during periodical medical check-ups in 2006 in 67 male (M) sedentary employers with uncomplicated hypertension, divided in two groups: group 1 (54 years and younger) and group 2 (55 years and older). **Results:** Mean 24-h blood pressure in group M1 was 128/81 mm Hg and in group M2 was 127/81 mm Hg. The data are presented in the table. **Conclusion:** Twenty-four hour ambulatory average MSP and MDP were higher in younger male hypertensives. 24-h HR decreased with ageing in male hypertensives. 24-h PP did not change with ageing in male hypertensives. 24-h RPP decreased in male hypertensives with ageing.

doi:10.1016/j.ijcard.2009.09.066

#### BP000775

##### Correlation between aldosterone and hypertension among resistant hypertensive patients

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The aim of the present study was to assess the correlation between aldosterone and blood pressure levels among 575 resistant hypertensive patients depending on office BP, who were diagnosed as essential hypertensive patients after extensive examination. All the patients were recruited from the Department of Hypertension in Ruijin Hospital, Shanghai. The 24 h ambulatory blood pressure was measured under drug taking. Therefore, the ambulatory blood pressure remained normal for 85 patients after administering just three kinds of antihypertensive drugs. Plasma aldosterone was measured in the supine position and after standing for 2 h. The supine and standing plasma aldosterone levels were consistently associated with both average daytime and nighttime ambulatory blood pressures ( $P = 0.05$ ). Moreover, the patients with normal ambulatory blood pressure ( $n = 85$ ) showed relatively lower plasma aldosterone compared to those with high ambulatory blood pressure ( $P = 0.05$ ). Furthermore, there was obvious relationship of supine and standing plasma aldosterone with average daytime and nighttime blood pressures. Taken together, our results documented strong association of daytime blood pressure with supine plasma aldosterone, as well as that of nighttime blood pressure with standing plasma aldosterone, which further indicated that aldosterone might serve as a major risk factor for the elevated blood pressure.

doi:10.1016/j.ijcard.2009.09.067

#### BP000791

##### Is the oscillometric blood pressure measuring device in accord with the intra-arterial invasive blood pressure measuring method?

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**Objectives:** The use of automatic blood pressure measuring devices with oscillometric method is popular in home and clinics. Although the protocol for evaluating the accuracy of devices was known, subject of validation was not real user who has cardiovascular risk factor. In this study, we try to verify the BP measured with automatic oscillometric device with invasively measured intra-atrial blood pressure especially in older and multiple cardiovascular risk