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# 1. ARTERIAL STIFFNESS IN MASKED HYPERTENSION AND TRUE HYPERTENSION

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## 8. EXAGGERATED BLOOD PRESSURE RESPONSE TO EXERCISE IS ASSOCIATED WITH ARTERIAL STIFFENING IN PRE-HYPERTENSIVE PATIENTS

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**Background:** Individuals with a systolic BP of 120 to 139 mmHg or a diastolic BP of 80 to 89 mmHg should be considered as pre-hypertensive. However limited evidence exists on whether the early drug intervention is needed according to identification of other cardiovascular risk factors except diabetes. Aortic pulse wave velocity (PWV) as an index of aortic stiffening is known recently as a new predictor for future cardiovascular events. We examined the relation between PWV and blood pressure response during exercise in the patients with pre-hypertension, because exaggerated blood pressure response during exercise even in asymptomatic normotensive individuals is associated with other established cardiovascular risk factors.

**Methods:** 96 consecutive patients with pre-hypertension were monitored during symptom-limited incremental exercise testing with treadmill. Cuff blood pressure was measured every minute during exercise testing with automatic indirect manometer.

**Results:** Although there were no significant differences in diastolic blood pressure at rest and at the peak exercise between the patients with high PWV ( $\geq 15\%$  higher than age-matched average value,  $n=39$ ) and those with low PWV ( $<15\%$  than average value,  $n=57$ ), the former reached a higher systolic blood pressure at peak exercise ( $194.7 \pm 28.7$  versus  $170.0 \pm 25.3$  mmHg,  $P=0.021$ ). However, there were no differences in the age, sex, total cholesterol, and glucose between two groups.

**Conclusion:** We found that those with high PWV had significantly higher systolic blood pressure response during exercise than those without high PWV among the patients with pre-hypertension. This suggests strongly that a high PWV in pre-hypertension is associated with greater likelihood of developing hypertensive complications and may be an important factor in early evaluation of pre-hypertension related to target organ damage.

## 9. NORMAL VALUE OF COMMON CAROTID INTIMA-MEDIA THICKNESS IN KOREAN GENERAL POPULATION

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**Background:** Carotid intima-media thickness (CIMT) is a surrogate marker of cardiovascular disease (CVD). CIMT values  $\geq 75$ th percentile of normal subjects are considered high and indicative of increased CVD risk. It is a rare data about normal CIMT values in Asian subjects without conventional CVD risk factors, coronary artery disease and cerebrovascular disease. So, we evaluate the normal CIMT values in a community cohort and the relationship between CVD risk factors and CIMT.

**Methods:** We measured CIMT with B-mode ultrasound (Vivid 7, GE Healthcare) in 1,759 subjects aged 40-70 years from ARIRANG study. The normal healthy subject was defined as 1) whom without history of cerebrovascular disease, coronary artery disease, congestive heart failure, dyslipidemia and diabetes mellitus, 2) who was not smoking, 3) whose body mass index  $<25$  kg/m<sup>2</sup>, 4) whose fasting blood glucose and 2-hour postprandial glucose level were  $<126$  mg/dl and  $<200$  mg/dl, respectively, 5) whose total cholesterol level was  $<220$  mg/dl, 6) whose systolic blood pressure and diastolic blood pressure was  $<140/90$  mmHg.

**Results:** In 1759 subjects, there were 335 of normal healthy subjects (male: 81, female: 254). Mean CIMT and 75% CIMT values showed in table. The mean CIMT values were significantly increased with age (male  $p$  trend = 0.002; female  $p$  trend  $<0.001$ ). Mean CIMT showed significantly correlated with age ( $r = 0.52$ ,  $p < 0.001$ ), abdominal circumference ( $r = 0.26$ ,  $p < 0.001$ ), systolic blood pressure ( $r = 0.18$ ,  $p = 0.001$ ), triglyceride ( $r = 0.12$ ,  $p = 0.037$ ) and Framingham's risk score ( $r = 0.156$ ,  $p = 0.000$ ). Table Mean CIMT and 75% CIMT value (mm) Male ( $n=81$ ) Female ( $n=254$ ) Age Mean IMT 75% Mean IMT 75% 40~49 0.546  $\pm$  0.071 0.602  $\pm$  0.073 0.520 50~59 0.566  $\pm$  0.133 0.610 0.535  $\pm$  0.105 0.572 60~70 0.654  $\pm$  0.129 0.710 0.632  $\pm$  0.115 0.687.

**Conclusion:** We defined the normal CIMT values of healthy subjects more strict criteria than other studies and the relationships between risk factors of atherosclerosis and CIMT. Our data suggested that the normal CIMT value of a Korean community cohort is thinner than previously published data from western countries.

## 10. OXIDATIVE STRESS AND ARTERIAL STIFFNESS IN STRENGTH- AND ENDURANCE-TRAINED ATHLETES

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**Background:** Endurance exercise training decreases arterial stiffness, whereas high-intensity strength exercise training increases arterial stiffness. However, the mechanisms underlying the different adaptations to these two types of exercise training are unclear. Oxidative stress induces vasoconstriction and endothelial dysfunction. Recently, plasma advanced oxidation protein products (AOPP), a new marker of oxidative stress, level has been reported to be positively associated with arterial stiffness in healthy subjects. We hypothesized that AOPP participates in the adaptation of arterial stiffness in different types of exercise training. The purpose of this study was to investigate plasma AOPP concentration and arterial stiffness in strength- and endurance-trained athletes.

**Methods:** Young male strength-trained athletes (shot put, hammer, or javelin throwers;  $n=12$ ; SA), endurance-trained athletes (long- or middle-distance runners;  $n=10$ ; EA), and sedentary control human ( $n=12$ ; C) participated in this study. We measured maximal handgrip strength, maximal oxygen uptake, aortic pulse wave velocity (APWV), which is an index of arterial stiffness, and plasma AOPP concentration.

**Results:** Maximal handgrip strength was significantly greater in SA compared with C and EA. Maximal oxygen uptake was significantly greater in EA compared with C and SA. APWV was significantly higher in SA compared with C and EA. Plasma AOPP concentration was significantly higher in SA compared with in EA. The relationships of plasma AOPP concentrations to maximal handgrip strength (i.e., muscle strength) and maximal oxygen uptake (i.e., aerobic capacity) were linear (AOPP and muscle strength:  $r=0.42$ , AOPP and aerobic capacity:  $r = -0.46$ ).

**Conclusion:** The present study suggests that oxidative stress may participate in the mechanism underlying different adaptations of arterial stiffness in strength- and endurance-trained athletes. Key words: arterial stiffness; oxidative stress; endurance exercise training; strength exercise training

# Poster Presentation

## 1. ARTERIAL STIFFNESS IN MASKED HYPERTENSION AND TRUE HYPERTENSION

Young-Soo Lee, Kee Sik Kim, Myung Jun Seung, Jung Hyun Kim, So-Yeon Kim, Jin-Bae Lee, Jae-Kean Ryu, Ji-Yong Choi, Kee-Sik Kim, Sung-Gug Chang.  
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**Background:** Masked hypertension (MH) has been drawing attention recently because this condition is often seen in untreated and treated individuals and is associated with target organ damage and a poor cardiovascular prognosis. Arterial stiffness is associated with organ damage in patients with primary hypertension. The aim of this study was to evaluate pulse wave velocity (PWV) in MH and true hypertension (TH).

**Methods:** We enrolled 146 patients (mean age  $47.9 \pm 13.9$  yrs, male 78 (53.4%)), who was recently diagnosed as hypertension. MH was defined as office normotension (systolic blood pressure (SBP)  $<140$  mmHg or diastolic blood pressure (DBP)  $<90$  mmHg) and ambulatory hypertension (daytime average SBP  $\geq 135$  mmHg or DBP  $\geq 85$  mmHg), and TH was defined as office hypertension (SBP  $\geq 140$  mmHg or DBP  $\geq 90$  mmHg) and ambulatory hypertension. We compared carotid-femoral, carotid-radial PWV and femoral-ankle PWV (cf/cr/ faPWV), left ventricular mass index (LVMI) and left atrial volume index (LAVI) among normal control, MH and TH.

**Results:** The MH group was the oldest. The crPWV, cfPWV and faPWV in TH and MH were significantly more increased compared it in normal control ( $p < 0.0001$ ). Also, the LVMI in MH was significantly higher compared to it in normal control ( $145.8 \pm 35.8$  mg vs  $121.5 \pm 14.5$  mg, respectively) ( $p < 0.05$ ).

**Conclusion:** The masked hypertension might be decreased arterial stiffness, which was similar to true hypertension. However, further larger study might be needed.