

## *Poster Display*

### *Humans: Non-Diabetic Subject*

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**Increasing stiffness of the arterial wall was related to augmented insulin resistance.**

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**Background and Aims:** Arterial stiffness is one of the predictors of cardiovascular event. Recently a new method was developed to measure arterial stiffness, which was expressed as arterial stiffness index (ASI), by computerized oscillometry at the upper arm. As this procedure is a convenient means of measuring arterial stiffness, we tried to evaluate the relationships between ASI and other coronary risk factors, such as serum cholesterol levels or HOMA-IR, in a large amount of subjects enrolled in the health check program.

**Materials and Methods:** Subjects were 2764 males and 327 females, aged 34 to 68 years old (42±6 years old). They were studied while fasting in the morning. Blood pressure and body mass index were measured. Blood samples were taken to measure the serum levels of blood sugar, insulin, total cholesterol, HDL-cholesterol, and triglycerides. Insulin resistance was assessed by the homeostasis model (HOMA-IR). ASI was measured using CardioVision MS-2000 (IMPD, Las Vegas, NV, USA). A pressure sensor in CardioVision measured small volumetric changes of the cuff wound around the upper arm using the oscillometric method as the cuff pressure was gradually reduced. The highly elastic arteries produce narrow oscillometric peaks, whereas the stiff arteries reveal rounded oscillometric curves. CardioVision calculates an ASI as the pressure width (mmHg x 10) of the oscillometric curve at 80% of the mean arterial pressure. Normal value of ASI was under 70.

**Results:** Subjects were divided into two groups; N group included 2900 subjects who represented normal ASI, and H group included other 191 subjects who's ASI was over 71. HOMA-IR in H group was significantly higher than that in N group (2.0±1.4 vs 1.6±0.8, p<0.01). Among the explanatory variates, pulse pressure, serum total cholesterol levels and HOMA-IR were significantly related to ASI in multiple regression analysis.

**Conclusion:** These data suggest that insulin resistance could be an important predictable factor to worsen the arterial stiffness.

*Poster Display*  
*Macrovascular Disease*

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**Arterial stiffness in diabetic patients. A trial of new arterial sclerosis evaluation by Cardio Vision with computerized oscillometric method.**

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**Background and Aims:** Since type 2 diabetes is associated with high incidence and mortality of cardiovascular disease, it is the most important, to point out the risk factors earlier. Recently, arterial stiffness has been proposed as an index of cardiovascular risk. So we evaluated the stiffness of brachial artery in patients with type 2 diabetes, and compared with healthy control. Furthermore, we investigated influence of hypertension in diabetes.

**Subjects and Methods:** 232 patients (male;141, female; 91, average age; 63 +/- 11 years old) with type 2 diabetes, underwent evaluation of brachial artery stiffness by Cardio Vision (IMDP Corporation in USA), which uses computerized oscillometry. This system calculates an Arterial Stiffness Index (ASI) equal to 10 times the width of the oscillometric curve at 80% of the peak height. All diabetic patients were divided into two groups; one group with normotension (DNT), another group with hypertension (DHT). We also measured ASI in 262 apparently healthy individuals (male;137, female;125, mean age;46 +/- 9 years old), and the patients with only hypertension (male;15, female;9, mean age; 61 +/- 9 years old), who were underwent a medical examination at a joint study institution. We used one way analysis of variance to test for overall differences among the groups, and Student's paired t-test for comparison of differences between DNT and DHT.

**Results:** ASI of the whole diabetic patients was significantly higher than in patients with hypertension alone, and in apparently healthy subjects (89 +/- 94 vs 75 +/- 79 vs 41 +/- 11, p<0.01 ). Among the diabetic patients, ASI of DHT group was significantly higher than that of DNT group (114 +/- 113 vs 59 +/- 49, p<0.01). ASI of diabetic patients was significantly correlated with age (r=0.343, p<0.01) and pulse pressure (r=0.373, p<0.01). But we could not find any correlation between ASI and blood examination, involving plasma glucose and glycohemoglobin, in patients with diabetes.

**Conclusion:** In patients with type 2 diabetes, arterial stiffness measured by Cardio Vision was significantly higher than that in non-diabetic persons. Furthermore, when hypertension merges in diabetes, arterial stiffness was significantly enhanced. Many important evidences obtained by various method, showed clearly that diabetes with hypertension is one of the highest risk for cardiovascular disease. A consideration of our data will indicate that the measurement of ASI is useful for detecting cardiovascular risk of the patient with type 2 diabetes.

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**Examination of correlation of ASI and other indexes to evaluate arteriosclerosis in patients with Type 2 diabetes.**

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**Background and Aims:** Because cardiovascular disease is the most important cause of morbidity and mortality in patients with type 2 diabetes, special attention should be given to the presence or development of arteriosclerosis. Though many procedures, invasive or non-invasive, have proposed, it is difficult even now, that only single method can evaluate to arteriosclerosis precisely. Recently, new device which can evaluate arterial stiffness by computerized oscillometry, is developed (Cardio Vision MS-2000, IMDP Corporation, USA). This device displays an index of arterial stiffness called ASI (Arterial Stiffness Index). The purpose of this study was to estimate whether there is the correlation between ASI and other arteriosclerosis evaluation methods.

**Materials and Methods:** 282 subjects with type 2 diabetes (male/female; 173/109, average age; 62 +/- 11 years old, average duration; 9.1 +/- 7.9 years, average body mass index (BMI); 23.3 +/- 3.3 kg/m<sup>2</sup>, and average glycohemoglobin; 7.7 +/- 2.0 %) underwent evaluation of arteriosclerosis by means of ASI, pulse wave velocity (PWV), carotid artery echo and second derivation of photoplethysmogram (SDPG). ASI was repeated three times in one time of examination in order to restrain dispersion. The hb(heart-brachial) - PWV and ba(brachial-ankle) - PWV were used as index of PWV, and max-IMT(intima-media thickness) and plaque score (PS; total summation of height of plaque in observation range) were used as index of carotid artery echo, and b/a and d/a were used as index of SDPTG. We carried out each measurement inspection in the as much as possible one day, or in the day that is possibly close each other.

**Results:** Compared with ASI and PWV, ASI was significantly correlated with ba-PWV ( $r=0.422$ ;  $p<0.001$ ), but significant correlation between ASI and hb-PWV, was not found. ASI was significantly correlated with max-IMT ( $r=0.221$ ;  $p<0.001$ ) and PS ( $r=0.232$ ;  $p<0.001$ ). Compared with ASI and SDPG, ASI was significantly correlated with b/a ( $r=0.196$ ;  $p<0.001$ ), but no significant correlation was observed between ASI and d/a.

**Conclusion:** ASI measured by Cardio Vision was significantly correlated with other arterial sclerosis evaluation indexes. These findings suggest that ASI is associated with not only morphologic, but also functional changes caused by arteriosclerosis, in patients with type 2 diabetes.