

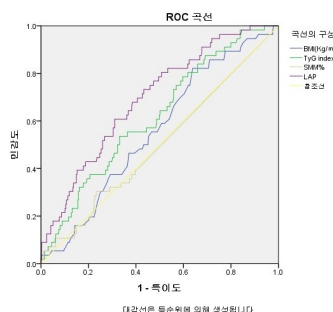
## Biomarkers predicting for the incidence of metabolic syndrome

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Metabolic syndrome (MS) is known as a pre-disease state and leads to increased risk of diabetes, cardiovascular disease. Therefore, prediction as well as prevention of metabolic syndrome is a new important issue. For estimation of MS, several indices have been introduced as surrogates such as triglyceride-glucose index (TyG index), lipid accumulation product (LAP), relative skeletal muscle mass (SMM%), and BMI etc. Here, we attempted to compare the validity of these indices in retrospective cohort of a single center. 527 subjects who undergone same health check-up in both 2008 and 2015 at single health promotion center, were reviewed retrospectively. TyG index was calculated as  $\ln[\text{fasting plasma glucose (mg/dL)} \times \text{triglyceride (TG, mg/dL)/2}]$ , LAP as  $\{\text{waist circumference (cm)} - 65(\text{female : 58})\} \times \text{TG(mM)}$ , and SMM% as skeletal muscle mass (kg) / body weight (kg) from bio-electrical impedance analysis. Metabolic syndrome (MS) was defined on the modified NCEP-ATP III criteria. MS group which developed MS after 7 years included 75 subjects (14 %; mean age  $54.97 \pm 9.98$ ). Regarding to the risk of MS, odds ratio (OR) of LAP was 1.018, and SMM% was 0.917 in multivariate logistic regression analysis. However TyG index did not show the significance. In conclusion, increased LAP, BMI and decreased SMM% were associated with the risk of metabolic syndrome, while only LAP showed significance. These results suggest that LAP could be used as novel surrogate marker for the development of metabolic syndrome. Odds ratio and 95% confidence intervals of each parameters with development of metabolic syndrome B COEFFICIENT ODDS RATIO(95% CI) P SMM% -0.0099 0.917 (0.218 - 3.848) 0.9053 LAP\* 0.4166 1.018 (1.006 - 1.030) 0.0023 TYG INDEX -0.0992 0.694 (0.270 - 1.783) 0.4476 BMI 0.0618 1.039 (0.937 - 1.151) 0.4720

Area under the ROC curve (AUC) for parameters in the identifications of Metabolic syndrome PARAMETER AUC P VALUE 95% CI BMI 0.558 0.164 0.483 - 0.633 TYG INDEX 0.619 0.004 0.544 - 0.695 SMM% 0.500 0.995 0.417 - 0.583 LAP 0.694 0.000 0.623 - 0.764



## Red blood cell distribution width is associated with carotid atherosclerosis in type 2 diabetes

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**Objectives:** Red blood cell distribution width (RDW) is a measure of the size variability of circulating erythrocytes, recent studies have shown that increased RDW levels are independent predictors of overall and cardiovascular disease in the general and high risk populations. CVD is one of the most common causes of mortality in patients with type 2 diabetes, and carotid atherosclerosis determined by intima media thickness (IMT) is used to predict CVD risk and related outcomes. However, no study has investigated the association between RDW and IMT in type 2 diabetic patients. Therefore, we aimed to investigate the relationship between RDW and subclinical atherosclerosis in patients with type 2 diabetes. **Methods:** We analyzed the data of 469 patients with type 2 diabetes from Seoul, Korea. We excluded subjects with a history of cardiovascular or cerebrovascular disease. Anthropometric and various biochemical profiles including RDW were measured. B-mode ultrasound measurement of carotid intima-media thickness (C-IMT) was used to evaluate subclinical atherosclerosis. Carotid atherosclerosis was defined as C-IMT  $\geq 1.0$  mm, as assessed by B-mode ultrasound. **Results:** The subjects were stratified into 3 groups according to RDW values. Compared with subjects in the lowest tertile of RDW, those in the highest tertile were older, more likely to be smokers, had higher SBP and BMI, longer duration of diabetes, and higher prevalence of hypertension. The C-IMT values for the first, second and third RDW tertiles were  $0.74 \pm 0.12$  mm,  $0.77 \pm 0.13$  mm, and  $0.79 \pm 0.14$  mm, respectively and showed the increasing trend across the RDW tertiles (P for trend  $< 0.01$ ). In multiple linear regression analysis, RDW was independently associated with C-IMT. After adjusting for age and sex, the OR for carotid atherosclerosis in the highest tertile of RDW was significantly increased compared to that of the lowest tertile. These relationships remained significant after further adjustments for other risk factors (OR (95% CI), 1.35 (1.01-2.23), 2.04 (1.06-3.94), P for trend  $< 0.05$ ). **Conclusions:** This study showed that RDW is independently associated with subclinical atherosclerosis in type 2 diabetes.