

Serum ALT and γ -GTP as predicting biomarkers for insulin resistance and related risks for metabolic diseases in middle-aged Japanese men

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Elevated circulating alanine aminotransferase (ALT) and γ -glutamyltranspeptidase (γ -GTP) activities, and accumulation of visceral fat have been reported to increase the risk for metabolic diseases such as diabetes in healthy and preclinical subjects. In the present study, we examined the associations between these hepatic enzymes and visceral and subcutaneous fat area, and those between these hepatic enzymes and the circulating cytokines which have been demonstrated to be related to insulin sensitivity (adiponectin) and inflammation (IL-6 and IL-1 β). We conducted two cross-sectional studies of 310-315 Japanese men aged 40-69 years who participated in health check-up and who were without obvious cardiovascular diseases.

Spearman's correlation coefficient analysis of clinical parameters and visceral and subcutaneous fat area in subjects who underwent CT scan showed that both ALT and γ -GTP were positively associated with visceral fat area, and with subcutaneous fat area as well. However, multiple linear regression analysis revealed that ALT and γ -GTP were the strongest explanatory variables for increased visceral fat area, whereas neither ALT nor γ -GTP was a significant explanatory variable for increased subcutaneous fat area. These results suggest that accumulation of visceral fat and resulting insulin resistance may be predictable by ALT and γ -GTP activity in serum.

In another study, Spearman's correlation coefficient analysis between serum ALT and γ -GTP activities and serum cytokines showed that ALT was negatively associated with adiponectin, but not with IL-6 nor IL-1 β , and that γ -GTP was closely associated with IL-6 and IL-1 β . Stepwise multiple linear regression analysis indicated that adiponectin was a strong (negative) explanatory factor for ALT activity, and that γ -GTP was a strong (positive) explanatory factor for IL-6 and IL-1 β . The results in this study suggest that circulating ALT activity is a marker for insulin resistance, while the circulating γ -GTP is a marker for inflammation, presumably caused by hyperglycemia and/or production of reactive oxygen species.