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Testosterone and sex hormone-binding globulin predict the metabolic syndrome and diabetes in middle-aged men.

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Abstract: **OBJECTIVE:** In men, hypoandrogenism is associated with features of the metabolic syndrome, but the role of sex hormones in the pathogenesis of the metabolic syndrome and diabetes is not well understood. We assessed the association of low levels of testosterone and sex hormone-binding globulin (SHBG) with the development of the metabolic syndrome and diabetes in men. **RESEARCH DESIGN AND METHODS:** Concentrations of SHBG and total and calculated free testosterone and factors related to insulin resistance were determined at baseline in 702 middle-aged Finnish men participating in a population-based cohort study. These men had neither diabetes nor the metabolic syndrome. **RESULTS:** After 11 years of follow-up, 147 men had developed the metabolic syndrome (National Cholesterol Education Program criteria) and 57 men diabetes. Men with total testosterone, calculated free testosterone, and SHBG levels in the lower fourth had a severalfold increased risk of developing the metabolic syndrome (odds ratio [OR] 2.3, 95% CI 1.5-3.4; 1.7, 1.2-2.5; and 2.8, 1.9-4.1, respectively) and diabetes (2.3, 1.3-4.1; 1.7, 0.9-3.0; and 4.3, 2.4-7.7, respectively) after adjustment for age. Adjustment for potential confounders such as cardiovascular disease, smoking, alcohol intake, and socioeconomic status did not alter the associations. Factors related to insulin resistance attenuated the associations, but they remained significant, except for free testosterone. **CONCLUSIONS:** Low total testosterone and SHBG levels independently predict development of the metabolic syndrome and diabetes in middle-aged men. Thus, hypoandrogenism is an early marker for disturbances in insulin and glucose metabolism that may progress to the metabolic syndrome or frank diabetes and may contribute to their pathogenesis