Equations to estimate visceral adipose tissue volume by a single-slice method

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ABSTRACT
Although it is common to assess visceral adipose tissue (VAT) by CT and MRI with a single slice at the umbilicus or the fourth and fifth lumbar vertebrae (L4-L5), recent studies reported that this single-slice method for determining an individual's VAT may be inaccurate. Therefore, VAT accumulation should be based on total volume and determined with multiple slices rather than by cross-sectional area. However, obtaining multiple slices is burdensome for both subjects and analysts and lacks versatility despite its accuracy. The purpose of this study was to develop a new equation model for predicting VAT volume while maintaining the measurement accuracy of the multiple-slice method. We analyzed data from 214 Japanese male adults (48.5±9.3 years) and developed multiple, stepwise, linear regressions with VAT volume as a dependent variable and age, BMI, waist circumference and VAT areas (the standard L4-L5 measurement site 0 cm, +5 cm, +10 cm) as independent variables. From these results, we determined the best prediction equation for VAT volume as follows: VAT volume = (30.4×BMI) + (17.9×VAT area at L4-L5+10 cm) - 501.5. The model explained 93.1% of VAT variance and the predicted VAT volume significantly correlated with the measured VAT volume (r=0.97). This study developed a new VAT assessment method with a high level of accuracy. The method is significantly less burdensome in measurement and analysis than the multiple-slice method. Researchers can use this equation when they require an accurate evaluation of VAT accumulation. However, they should bear in mind that this equation was derived from data acquired from middle-aged, overweight and obese male subjects.