

STRATIFICATION OF HEALTH-RELATED REFERENCE INTERVALS FOR ALT, GGT, AST, ALP, LD BY WAIST CIRCUMFERENCE: AN AID FOR WEIGHT REDUCTION?

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CLINICAL CHEMISTRY 2002, VOLUME 48, P. A38-A39

Obesity can lead to liver disease including fatty changes, fibrosis and increases in liver enzymes. While the magnitude of obesity is usually expressed as body mass index, BMI is not readily comprehended by patients or physicians. Waist circumference (WC) is correlated to BMI and as patients and physicians understand WC, we have correlated liver enzymes to WC in apparently health individuals. We used the enzyme results of subjects measured in the 3rd U.S. National Health and Nutrition Examination Survey. These data were abstracted from a National Center for Health Statistics CD-ROM (GPO 017-022-01388-6) with Microsoft Access and analyzed with Microsoft Excel. To determine health-associated reference intervals, we used the following exclusion criteria: pregnancy, breast-feeding, diastolic blood pressure >100 mm Hg, any smoking, any drinking of alcohol, recent treatment for anemia, creatinine exceeding 2.5 mg/dL, glucose exceeding 126 mg/dL birth control pill usage, recent surgery or hospitalization, or antibodies to hepatitis A or B. Reference interval plots were then generated for the remaining "healthy" 25 to 55 year old males or females. The 97.5, 95, 90, 50, 5 and 2.5 percentiles were plotted for subjects with the following WC intervals: 70.1 to 80 cm (91M, 114), 80.1 to 90 cm (265M, 142F), 90.1 to 100 cm (331M, 126F), 100.1 to 110 cm (173M, 83F), and greater than 110 cm (61M, 36F). The upper-reference limits are highly correlated to WC with increases of up to 2 to 3 fold for women for ALT, GGT and AST (see Table). The enzyme increases are small in the male. As the enzyme changes can indicated potentially reversible liver disease, these reference interval plots might be used by the physicians to motivate their obese patients with elevated enzymes to reduce their WC. Plots of these reference intervals will be available at <http://www.mylaboratoryquality.com>.

		ALT	GGT	AST	ALP	LD
Males	95P limit, U/L, WC = 70 to 80 cm	29.5	68.5	33.5	110.0	200.5
	% Increase in 95P limit with WC>110	76.3	26.6	16.4	18.2	6.2
Females	95P limit, U/L, WC = 70 to 80 cm	22.7	32.3	26.7	96.7	195.4
	% Increase in 95P limit with WC>110	294.3	291.3	220.2	48.9	31.2