Risks of using common reference intervals for Mexican American, non-Hispanic Black and non-Hispanic White populations

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Many laboratorians realize that the normal range (health-associated reference interval) of certain clinical chemistry tests varies significantly by race. In addition to pathologic change, these differences can arise from socioeconomic and / or genetic variation. Because clinical laboratories usually do not collect race information, the reference intervals used by most US laboratories cannot accurately represent all of its patient customers. We have compared reference intervals for US Mexican Americans (MA), nonHispanic Blacks (NHB) and nonHispanic Whites (NHW) which were derived from the 3rd U.S. National Health and Nutrition Examination Survey (graphical reference interval summaries stratified by age, sex and race are available at http://www.mylaboratoryquality.com).

When evaluating male and female 2.5 percentile (P) and 97.5P reference intervals, the following analytes demonstrated multiple statistically significant differences ($p<0.01$) between MA and NHB or MA and NHW or NHB and NHW: creatinine, triglycerides, total protein, iron, albumin, phosphate, urea nitrogen, ALT and AST. To illustrate, the male NHB 97.5P for total protein averages 3.9 percent higher than that of the male NHW ($p<0.01$). Albumins are 5.0 percent higher in female NHB than in female NHW ($p<0.01$). Because the US upper reference limit for total protein usually represents that of the NHW, many NHB are probably unnecessarily worked up for hyperproteinemia. Another example is ALT, with the female NHB ALT 97.5P limit being 53 percent and 46 percent less than that of the MA and NHW respectively. Male NHB have ALT, which are 27 percent and 10 percent less than MA and NHW. US ALT reference intervals have been gradually broadening due to increasing rates of obesity and resulting metabolic syndrome. This broadening may be due to the incorporation of overweight MA and NHW into reference interval estimations. This broadened common reference interval decreases the sensitivity to detect occult liver disease in NHB. It is incumbent on the clinical laboratory to provide more meaningful reference intervals for its patients. Otherwise, many of the improvement processes external to the interpretation phase are rendered ineffective.