

Examining Racial/Ethnic Differences in Lipoprotein (a) levels

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BACKGROUND

- Lipoprotein (a) [Lp(a)] is an independent risk marker for cardiovascular disease in Non-Hispanic Whites.^{1,2}
- Chinese and Asian Indians are the two largest Asian subgroups in the U.S.
- Studies of neonates in Singapore revealed lower Lp(a) levels in ethnic Chinese than Asian Indians.³
- Previous studies have also shown higher levels of Lp(a) in Asian Indians compared to NHW adults⁴ and Chinese⁵, but there is little information comparing Lp(a) distributions among NHW, Asian Indians and Chinese adults in the United States.
- There are racial/ethnic variations in the concentrations of Lp(a), but important racial/ethnic subgroups at risk for cardiovascular disease have not yet been compared in North America, especially among Asian subgroups.⁴

OBJECTIVE

To determine whether Lipoprotein (a) levels differ significantly among Non-Hispanic White (NHW), Asian Indian (AI) and Chinese adults living in California.

METHODS

Setting: The Palo Alto Medical Foundation is an outpatient, multi-specialty series of clinics in the San Francisco Bay Area with over 300 physicians, serving more than 400,000 active patients, with a broad racial/ethnic distribution: 32% of patients are Asian, with significant cohorts of Asian Indians and Chinese (12% and 11%, respectively).

Eligibility criteria:

- Active patients (one clinic visit between 2006 and 2008; labs could be drawn between 2001-2008)
- Age 18 years or older at time Lp(a) was drawn
- Lipoprotein (a) measurement (normal < 75 nm/L)
- Non-Hispanic White, Asian Indian and Chinese subjects were identified by self report (40%) or name analysis (60%)⁶

Lp(a) methods: Lp(a) levels were measured using a Quest immunoturbidometric assay shown to be independent of apolipoprotein (a) size

Study method: Cross-sectional analysis to examine Lp(a) distributions stratified by race/ethnicity and gender

Statistical Analysis:

- Lp(a) values were highly skewed, and non-parametric methods were used to compare the distribution of Lp(a) levels.
- Data were analyzed for normality by Shapiro-Wilk normality test. Due to the non-normality of the data, distributions by race/ethnicity were compared using the Kruskal-Wallis test and the Brown-Mood median test.
- Differences in proportions were evaluated using the Chi-square test.
- Significance was assessed at the $p < 0.0001$ level for differences in Lp(a) median and distribution. Significance was assessed at the $p < 0.0001$ level for Chi-square tests.

RESULTS

DEMOGRAPHICS	MALE			FEMALE		
	Non-Hispanic White	Asian Indian	Chinese	Non-Hispanic White	Asian Indian	Chinese
N	1825	293	137	1261	113	83
Age (years)	51.8	41.6 [†]	47.7	54.1	43 [‡]	50.4
Median Lipoprotein (a) (nmol/L)	38	41	24 [†]	46	59	32
% with Lp(a) ≥ 75 (nmol/L)	22.8	26.1	14.8	30.1	35.9	19.4
Total Cholesterol (mg/dL)	196 (40)	186 (37)	192 (45)	213 (42)	187 (31)	218 (39)
LDL cholesterol (mg/dL)	119 (35)	120 (32)	115 (39)	123 (36)	111 (29)	130 (36)
HDL cholesterol (mg/dL)	51 (14)	44 (10)	56 (12)	66 (19)	54 (14)	65 (16)
Triglycerides (mg/dL)	131 (81)	160 (102)	155 (109)	115 (72)	113 (55)	120 (66)
Proportion with Type 2 Diabetes Mellitus	4.1	6.1	3.3	3.6	8.3	6.1
Median Lp(a) in those with Type 2 Diabetes Mellitus	26	57	36	60.5	60.5	21

All data expressed as mean (standard deviation) unless otherwise noted. [†]Kruskal-Wallis $p < 0.0001$, Brown-Mood $p < 0.0001$ for significant difference between this value and that of the other two racial/ethnic groups. [‡]Kruskal-Wallis $p < 0.0001$, Brown-Mood $p < 0.0001$ for significant difference between this value and that of Asian Indians.

Lp(a) distributions differ significantly among NHW, AI and Chinese

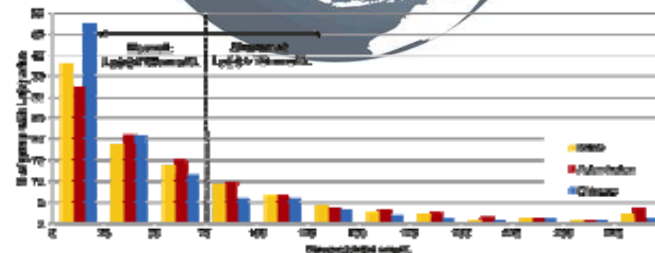


Figure 1: Lipoprotein (a) distribution in Non-Hispanic Whites (NHW), Asian Indians (AI) and Chinese. $p < 0.0001$ (Kruskal-Wallis) for difference in Lp(a) medians across all groups; $p < 0.0001$ (Brown-Mood) for difference in medians between AI and Chinese; $p = 0.0001$ for difference in medians between NHW and Chinese; $p = 0.0193$ for difference in medians between NHW and AI.

RESULTS

Lp (a) levels differ significantly in men but not women

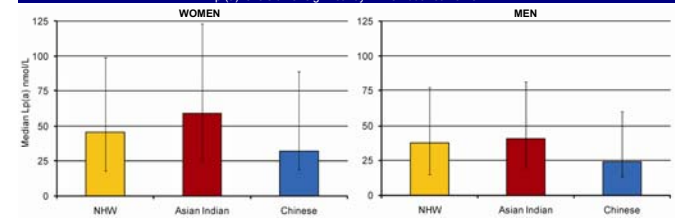


Figure 2: Median Lipoprotein (a) levels in Women (left) and Men (right) with Interquartile range (25th and 75th percentile). In women, medians were not significantly different when comparing all three groups ($p = 0.29$, Kruskal-Wallis). In men, median Lp(a) levels differed significantly among all three groups ($p < 0.0001$). Median Lp(a) in Chinese was significantly different from Asian Indians and NHW ($p < 0.0001$); median Lp(a) levels in AI and NHW did not differ significantly ($p = 0.0219$).

Asian Indian men and women had the highest prevalence of Type 2 diabetes, and highest median Lp(a) values when compared to the other two race/ethnic groups, despite younger age.

- Lp(a) levels were not significantly correlated with other traditional lipid risk markers including cholesterol, LDL, HDL, triglycerides.
- Lp(a) levels were not significantly correlated with age or body mass index.

CONCLUSION

- The distribution of Lp(a) levels differs significantly in Non-Hispanic White, Asian Indian and Chinese men
- There was no significant difference in Lp(a) distribution among women
- Lp(a) levels were higher in AI and Chinese men with Type 2 diabetes mellitus (T2DM) than those without T2DM; Lp(a) levels were similar or lower in women with T2DM in each race/ethnic group
- Further studies should strive to disaggregate these race/ethnic groups and stratify by gender when examining Lp(a) among Asians.
- Future research should investigate whether Lp(a) levels predict cardiovascular events beyond traditional risk factors in these race/ethnic groups, stratifying by T2DM status and gender

REFERENCES

- Danesh J, Collins R, Peto R. Lipoprotein (a) and coronary heart disease: meta-analysis of prospective studies. *Circulation*. 2000;102:1082-1085.
- Guyton JR, Dahlen GH, Patsch W, Kautz J, Gotto AM. Relationship of Plasma lipoprotein Lp(a) Levels to Race and to Apolipoprotein B. *Arteriosclerosis*. 1985;5:265-272.
- Low PS, Heng CK, Saha N, Tay JS. Racial variation of cord plasma lipoprotein(a) levels in relation to coronary risk level: a study of three ethnic groups in Singapore. *Pediatr Res*. 1996;40:718-722.
- Anand SS, Enas EA, Pogue J, Haffner S, Pearson T, Yusuf S. Elevated Lipoprotein (a) levels in South Asians in North America. *Metabolism*. 1998;47:182-184.
- Anand SS, Yusuf S, Vuksan V, Devanarajan S, Teo KK, Montague PA, Keeman L, Yi C, Lonn E, Gerstein H, Hegele RA, McQueen M. Differences in risk factors, atherosclerosis, and cardiovascular disease between ethnic groups in Canada: the Study of Health Assessment and Risk in Ethnic groups (SHARE). *Lancet*. 2000;356:279-84.
- Lauderdale, D.S. and B. Kestenbaum. 2000. Asian American Ethnic Identification by Surname. *Population Research and Policy Review*. 2000;19:283-300.