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THE RELATIONSHIP BETWEEN THYROID DYSFUNCTION AND ADVANCED LIPOPROTEIN CHOLESTEROL SUBFRACTIONS IN A CONTEMPORARY SAMPLE OF US ADULTS: THE VERY LARGE DATABASE OF LIPIDS THYROID SUB-STUDY

Poster Contributions

Hall C

Saturday, March 29, 2014, 10:00 a.m.-10:45 a.m.

Session Title: Prevention: Lipids and Risk Factors

Abstract Category: 20. Prevention: Clinical

Presentation Number: 1112-140

Authors: *John W. McEvoy, Seth Martin, Michael Blaha, Parag Joshi, Sean Manning, Roger Blumenthal, Steven Jones, Johns Hopkins University, Baltimore, MD, USA***Background:** Thyroid dysfunction influences lipid metabolism. We aim to further describe lipoprotein cholesterol phenotypes associated with changes in TSH (thyroid stimulating hormone) and free T4 (FT4).**Methods:** Our sample consists of 117,012 US adults aged ≥ 18 years who had clinically driven synchronous testing of TSH, FT4, and lipoprotein cholesterol subfractions by Vertical Auto Profile ultracentrifugation from 2009 to 2011. We compared lipid subfractions based on biochemical thyroid status (hyperthyroid [TSH ≤ 0.01 mIU/L], subclinical hyperthyroid [TSH 0.01 to 5.1 mIU/L with FT4 ≥ 0.7], and hypothyroid [TSH > 5.1 mIU/L with FT4 < 0.7]).**Results:** Approximately 3.5% of the sample had subclinical hypothyroidism (4,085 adults). Compared to euthyroid adults, these individuals had higher total cholesterol (TC), LDL-C, triglycerides and non-HDL-C (Table). In addition, VLDL-C, IDL-C, and remnant lipoproteins were higher in this group. In contrast, HDL-C and Lipoprotein(a) cholesterol [Lp(a)-C] were similar to euthyroid adults. Analogous results were found in the hypothyroid group. With respect to the hyperthyroid spectrum, we found these associations to be inverted.**Conclusions:** . Herein, we describe a lipid phenotype in hypothyroid states which is notable for elevated LDL-C, triglycerides, VLDL-C and remnants, without clear changes in HDL-C or Lp(a)-C. An inverse phenotype was found in hyperthyroidism, suggesting a direct contribution of thyroid status to lipoprotein cholesterol metabolism.

TABLE*

	All	Hyperthyroid TSH ≤ 5.1 & FT4 < 0.7	Subclinical hyperthyroid TSH > 5.1 & FT4 ≥ 0.7	Euthyroid TSH 0.3 to 5.1	Subclinical hypothyroid TSH 0.01 to < 0.3	Hyperthyroid TSH < 0.01
	N = 117,012	N = 417 (0.36%)	N = 4,085 (3.49%)	N = 108,264 (92.52%)	N = 3,857 (3.30%)	N = 389 (0.33%)
Age	56 (16)	58 (16)	60 (16)	55 (16)	60 (15)	58 (14)
Sex*						
Women	57.03%	68.36%	63.52%	55.88%	78.37%	86.61%
Men	42.97%	31.64%	36.48%	44.12%	21.63%	13.39%
TC	197 (44)	225 (53)	204 (49)	197 (44)	193 (43)	188 (42)
HDL-C	53 (17)	53 (17)	52 (17)	53 (17)	55 (17)	56 (15)
HDL ₂ -C	14 (7)	14 (7)	13 (7)	13 (7)	14 (7)	14 (6)
HDL ₃ -C	39 (10)	39 (10)	38 (11)	39 (10)	41 (10)	42 (10)
Lp(a)-C	6 (4-10)	6 (4-10)	6 (4-10)	6 (4-10)	7 (5-10)	6 (4-10)
LDL-C	96 (34)	113 (40)	101 (36)	96 (34)	92 (33)	90 (32)
LDL-C (Friedewald)	114 (40)	136 (47)	120 (44)	114 (40)	111 (37)	107 (36)
LDL-C (Direct)†	118 (37)	141 (44)	124 (41)	118 (37)	114 (36)	109 (35)
VLDL-C	22 (18-29)	27 (20-35)	24 (19-32)	22 (18-29)	21 (17-28)	20 (17-26)
VLDL ₂ -C	13 (10-16)	15 (12-19)	14 (11-17)	13 (10-16)	12 (10-15)	12 (10-14)
IDL-C	13 (9-18)	18 (13-25)	14 (10-20)	13 (9-18)	12 (9-17)	11 (8-14)
RLP-C	26 (20-34)	33 (25-44)	28 (22-38)	26 (20-34)	25 (19-32)	23 (18-28)
TG	120 (84-175)	144 (99-210)	134 (93-196)	120 (84-175)	114 (82-163)	106 (78-148)
Non-HDL-C	144 (43)	172 (52)	152 (47)	144 (43)	138 (40)	132 (38)
TG/HDL-C	2.38 (1.45-4.00)	2.72 (1.74-4.98)	2.70 (1.63-4.58)	2.37 (1.45-4.00)	2.16 (1.36-3.50)	1.98 (1.28-3.05)

TSH=Thyroid Stimulating Hormone (in mIU/L), FT4=Free T4 (in ng/dL), TC= Total Cholesterol, HDL=High Density Lipoprotein, LDL= Low Density Lipoprotein, LDL-C= directly measured "real" LDL-C, Lp(a)= Lipoprotein(a), VLDL=Very Low Density Lipoprotein, IDL=Intermediate Density Lipoprotein, RLP=Remnant Lipoprotein Cholesterol (RLP=VLDL3-C +IDL-C), TG=Triglycerides

*Values are mean (SD), median (25th-75th), or proportion (%). Due to the sample size, all p values are < 0.001 . P values are for trend between all groups using one-way ANOVA, Kruskal-Wallis testing, or Chi-square, as appropriate.

†Available in 115,520 adults.

‡Direct LDL-C = LDL₂-C + IDL-C + Lp(a)-C, all cholesterol measurements in mg/dL.