Supplemental Table 1: Weighted multinomial logistic regression results comparing characteristics of group membership in low, moderate, or high biomarker distributions for nine select biomarkers of exposure to tobacco among 1) all dual users (n=792), 2) dual users as compared to exclusive e-cigarette users (n=1,039), and 3) dual users as compared to exclusive cigarette smokers (n=3,203)

		Low Exposure (Q1)	Dual Users *Average Exposure* (Q2+Q3)
Model 1	TNE-2 (n=784)	Younger Age (aPR: 0.96, 95% CI:0.94-0.97); Lower likelihood of being female than male (aPR:0.57, 95% CI:0.36-0.91); Greater likelihood of being non-white, non-Hispanic (aPR: 3.63, 95% CI: 1.75-7.49) or Hispanic (aPR: 3.49, 95% CI: 1.50-8.14) rather than White, non-Hispanic; Lower likelihood of using 375-600 CPM (aPR: 0.18, 95% CI: 0.07-0.45).	
	NNAL (n=781)	Younger age (aPR: 0.94, 95% CI: 0.91-0.97); lower likelihood of being female rather than male (aPR: 0.49, 95% CI: 0.28-0.84); greater likelihood of being Hispanic rather than White non-Hispanic (aPR: 2.96, 95% CI: 1.26-6.93); lower likelihood of smoking 182-360 CPM (aPR: 0.38, 95% CI: 0.16-0.86) and 375-600 CPM (aPR: 0.23, 95% CI: 0.10-0.54); greater likelihood of smoking some days rather than every day (aPR: 3.86, 95% CI: 1.64-9.02)	
	Lead (n=782)	Younger age (aPR: 0.94, 95% CI: 0.92-0.97); greater likelihood of using 2.5-7.5 e-cigarettes per month compared to 0.5-2 e-cigarettes per month (aPR: 2.26, 95% CI: 1.18-4.32)	Base referent
	Cadmium (n=782)	Younger age (aPR: 0.85, 95% CI: 0.81-0.88); lower likelihood of being female rather than male (aPR: 0.36, 95% CI: 0.19-0.67); lower likelihood of smoking more than 600 cigarettes per month compared to 1-180 cigarettes per month (aPR: 0.05, 95% CI: 0.002-0.70)	
	2-naphthol (n=783)	Younger age (aPR: 0.97, 95% CI: 0.94-0.99); lower likelihood of being female rather than male (aPR: 0.41, 95% CI: 0.25-0.67); lower likelihood of smoking 375-600 CPM (aPR: 0.39, 95% CI: 0.18-0.84) or over 600 cigarettes per month compared to 1-180 cigarettes per month (aPR: 0.08, 95% CI: 0.01-0.90)	

	1-hydroxypyrene (n=784)	Lower likelihood of being female rather than male (aPR: 0.45, 95% CI: 0.28-0.71); greater likelihood of smoking "some days" (aPR: 2.03, (%% CI:1.01-4.07), lower likelihood of smoking first cigarette 6-30 minutes rather than 60 minutes after waking (aPR: 0.37, 95% CI: 0.16-0.82)	
	Acrylonitrile (CYMA) (n=783)	Younger age (aPR: 0.95, 95% CI: 0.93-0.96); Hispanic compared to White, non-Hispanic (aPR: 4.05, 95% CI: 1.87-8.77); less likely to smoke 375-600 cigarettes per month compared to 1-180 cigarettes per month (aPR: 0.24, 95% CI: 0.09-0.62); greater likelihood of smoking some days rather than every day (aPR: 3.24, 95% CI: 1.36-7.68)	
	Acrolein (CEMA) (n=753)	Younger in age (aPR: 0.94, 95% CI: 0.92-0.96); lower likelihood of using 375-600 cigarettes per month compared to 1-180 cigarettes per month (aPR: 0.26, 95% CI: 0.11-0.60)	
	Acrylamide (AAMA) (n=778)	Younger in age (aPR: 0.96, 95% CI: 0.94-0.98); greater likelihood of smoking some days rather than every day (aPR: 4.38, 95% CI: 2.00-9.58)	
Model 2	TNE-2 (n=1,038)	Greater likelihood of using e-cigarettes some days rather than every day (aPR: 4.33, 95% CI: 1.83-10.21)	Older in age (aPR: 1.02, 95% CI: 1.004-1.0 likelihood of being non-White, non-H (aPR:0.25, 95% CI: 0.12-0.50) or Hispanic 95% CI: 0.13-0.64) compared to being W Hispanic, greater likelihood of using e-c some days rather than every day (aPR: 6. 3.12-14.63);
	NNAL (n=1,036)	Younger in age (aPR: 0.98, 95% CI: 0.95-0.99); greater likelihood of using e-cigarettes some days rather than every day (aPR: 3.17, 95% CI: 1.39-7.20)	Older in age (aPR: 1.03, 95% CI: 1.007-1.0 likelihood of being non-white, non-Hisp 0.41, 95% CI: 0.21-0.79) or Hispanic (a 95%CI: 0.16-0.76) than White, non-Hispa likelihood of using e-cigarettes some da than every day (aPR: 5.76, 95% CI: 2.5
	Lead (n=1,037)	Younger in age (aPR: 0.97, 95% CI: 0.94-0.99); greater likelihood of using e-cigarettes some days rather than every day (aPR: 3.87, 95% CI: 1.68-8.86)	Older in age (aPR: 1.03, 95% CI: 1.004-1.0 likelihood of being non-white, non-Hisp 0.32, 95% CI: 0.15-0.67), greater likeliho e-cigarettes some days rather than ever 5.77, 95% CI: 3.04-10.94)
	Cadmium (n=1,037)	Younger in age (aPR: 0.91, 95% CI: 0.89-0.94); greater likelihood of using e-cigarettes some days rather than every day (aPR: 2.99, 95% CI: 1.37-6.54)	Older in age (aPR: 1.02, 95% CI: 1.002-1. likelihood of being non-White, non-Hisp 0.30, 95% CI: 0.14-0.63), greater likeliho

			e-cigarettes some days rather than ever... 5.30, 95% CI: 2.38-11.83)
	2-Naphthol (n=1,038)	Lower likelihood of being female rather than male (aPR: 0.58, 95% CI: 0.3-0.99), greater likelihood of using e-cigarettes some days rather than every day (aPR: 4.08, 95% CI: 1.81-9.15)	Older in age (aPR: 1.02, 95% CI: 1.004-1.0... likelihood of being non-white, non-Hisp... 0.36, 95% CI: 0.18-0.70) or Hispanic (aPR... CI: 0.22-0.92), greater likelihood of u... cigarettes some days rather than every... 6.03, 95% CI: 2.80-12.94)
	1-hydroxypyrene (n=1,039)	Greater likelihood of using e-cigarettes some days rather than every day (aPR: 3.76, 95% CI: 1.75-8.09)	Older in age (aPR: 1.02, 95% CI: 1.004-1.0... likelihood of being non-White, non-Hisp... 0.39, 95% CI: 0.19-0.78); greater likeliho... e-cigarettes some days rather than ever... 4.76, 95% CI: 2.03-11.15)
	Acrylonitrile (CYMA) (n=1,038)	Younger in age (aPR: 0.98, 95% CI: 0.95-0.99); Greater likelihood of using e-cigarettes some days rather than every day (aPR: 3.59, 95% CI: 1.64-7.83.)	Older in age (aPR: 1.02, 95% CI: 1.005-1.0... likelihood of being non-White, non-Hisp... 0.36, 95% CI: 0.19-0.66), or Hispanic (aPR... CI: 0.15-0.69) than white, non-Hispanic... likelihood of using e-cigarettes some da... than every day (aPR: 5.51, 95% CI: 2.4...
	Acrolein (CEMA) (n=1,008)	Younger in age (aPR: 0.97, 95% CI: 0.94-0.99), Greater likelihood of using e-cigarettes some days rather than every day (aPR: 4.20, 95% CI: 1.87-9.37)	Older in age (aPR: 1.02, 95% CI: 1.004-1.0... likelihood of being non-White, non-Hisp... 0.41, 95% CI: 0.20-0.82), greater likeliho... e-cigarettes some days rather than ever... 5.30, 95% CI: 2.48-11.32)
	Acrylamide (AAMA) (n=1,033)	Greater likelihood of using e-cigarettes some days rather than every day (aPR: 4.81, 95% CI: 2.46-9.41)	Older in age (aPR: 1.03, 95% CI: 1.01-1.0... likelihood of being non-white, non-Hisp... 0.33, 95% CI: 0.16-0.63) or Hispanic (aPR... CI: 0.20-0.88), greater likelihood of u... cigarettes some days rather than every... 6.72, 95% CI: 3.27-13.81)
Model 3	TNE-2 (n=3,134)	Younger in age (aPR: 0.97, 95% CI: 0.95-0.98), greater likelihood of smoking some days rather than every day (aPR: 2.001, 95% CI: 1.15-3.52	Lower likelihood of being non-White, no... (aPR: 0.33, 95% CI: 0.21-0.50) or Hispanic... 95% CI: 0.20-0.74), greater likelihood o... some days rather than every day (aPR: 1.... 1.07-3.31), greater likelihood of smokin... cigarettes per month (aPR: 2.59, 95% CI:... or 375-600 cigarettes per month (aPR: 2... 1.42-4.22), greater likelihood of smok... cigarette 6-30 minutes after waking (aPR... CI: 1.01-2.89)
	NNAL (n=3,131)	Younger in age (aPR: 0.96, 95% CI: 0.95-0.98), lower likelihood of being non-White, non-Hispanic (aPR: 0.53, 95% CI: 0.31-0.89), greater likelihood of smoking some days rather than every day (aPR: 3.27, 95% CI: 1.68-6.33), lower likelihood of smoking more than 600 cigarettes per month compared to 1-180 cigarettes per month (aPR: 0.07, 95% CI: 0.004-0.94)	Lower likelihood of being non-White, no... (aPR: 0.54, 95% CI: 0.36-0.79) or Hispanic... 95% CI: 0.28-0.98), greater likelihood o... 180-360 cigarettes per month (aPR: 2.9... 1.69-5.20) or 375-600 cigarettes per mo... 2.62, 95% CI: 1.46-4.70) compared to sm... cigarettes per month

Lead (n=3,132)	Younger in age (aPR: 0.95, 95% CI: 0.93-0.96), greater likelihood of smoking 181-360 cigarettes per month (aPR: 1.73, 95% CI: 1.04-2.86) compared to 1-180 cigarettes per month	Lower likelihood of being non-white, no (aPR: 0.40, 95% CI: 0.25-0.63), greater lil smoking some days rather than every 3.08, 95% CI: 1.74-5.46), greater likeli smoking 182-360 cigarettes per month (95% CI: 1.30-4.06) or 375-600 cigarettes (aPR: 1.96, 95% CI: 1.14-3.36)
Cadmium (n=3,132)	Younger in age (aPR: 0.91, 95% CI: 0.89-0.93), greater likelihood of smoking some days rather than every day (aPR: 2.02, 95% CI: 1.16-3.52), lower likelihood of smoking more than 600 cigarettes per month (aPR: 0.13, 95% CI: 0.02-0.82)	Lower likelihood of being non-white, no (aPR: 0.38, 95% CI: 0.24-0.61), greater lil smoking some days rather than every 1.89, 95% CI: 1.03-3.46) greater likeli smoking 181-360 cigarettes per month (95% CI:1.29-4.03) or 375-600 cigarettes (aPR: 1.94, 95% CI: 1.12-3.37) than 1-180 per month
2-Naphthol (n=3,133)	Younger in age (aPR: 0.97, 95% CI: 0.95-0.98), greater likelihood of smoking some days rather than every day (aPR: 2.41, 95% CI: 1.29-4.49), lower likelihood of smoking more than 600 cigarettes per month (aPR: 0.09, 95% CI: 0.01-0.869)	Lower likelihood of being non-white, no (aPR: 0.47, 95% CI: 0.31-0.71), greater lil smoking 182-360 cigarettes per month (95% CI: 1.57-4.78) or 375-600 cigarettes (aPR: 2.31, 95% CI: 1.37-3.88)
1-hydroxypyrene (n=3,134)	Younger in age (aPR: 0.99, 95% CI: 0.97-0.998), lower likelihood of being non-White, non-Hispanic (aPR: 0.53, 95% CI: 0.30-0.93), greater likelihood of smoking some days rather than every day (aPR: 3.11, 95% CI: 1.64-5.90)	Greater likelihood of being female rather (aPR: 1.61, 95% CI 1.18-2.19), lower like being non-white, non-Hispanic (0.50, 95 0.76), greater likelihood of smoking 1 cigarettes per month (aPR: 1.76, 95% CI: or 375-600 cigarettes per month (aPR: 1. 1.09-3.04)
Acrylonitrile (CYMA) (n=3,133)	Younger in age (aPR: 0.96, 95% CI: 0.95-0.97), greater likelihood of smoking some days rather than every day (aPR: 2.97, 95% CI: 1.57-5.62)	Lower likelihood of being non-white, no (aPR: 0.47, 95% CI: 0.32-0.69) or Hispanic 95% CI: 0.28-0.94), greater likelihood o 182-360 cigarettes per month (aPR: 3.1 1.77-5.63) or 375-600 cigarettes per mo 2.64, 95% CI: 1.49-4.64) than 1-180 ciga month
Acrolein (CEMA) (n=3,103)	Younger in age (aPR: 0.95, 95% CI: 0.94-0.97), lower likelihood of being non-white, non-Hispanic (aPR: 0.50, 95% CI:0.26-0.93), greater likelihood of smoking some days rather than every day (aPR: 2.25, 95% CI: 1.15-4.39)	Lower likelihood of being non-white, no (aPR: 0.51, 95% CI: 0.32-0.79), greater lil smoking 182-600 cigarettes per month (95% CI: 1.39-4.46) or 375-600 cigarettes (aPR: 2.13, 95% CI: 1.22-3.71) compared cigarettes per month
Acrylamide (AAMA) (n=3,128)	Younger in age (aPR: 0.97, 95% CI: 0.95-0.98), greater likelihood of smoking some days rather than every day (aPR 4.17, 95% CI: 2.08-8.32), greater likelihood of smoking 182-360 cigarettes per month (aPR: 1.86, 95% CI: 1.10-3.12) than 1-180 cigarettes per month	Greater likelihood of being female rather (aPR: 1.41, 95% CI: 1.01-1.94), lower lik being non-white non-Hispanic (aPR: 0.4 0.29-0.66) than white non-Hispanic, likelihood of smoking 182-360 cigarettes (aPR: 2.01, 95% CI: 1.21-3.34) o 375-600 per month (aPR: 1.92. 95% CI: 1.18

Model summary reports statistically significant findings only (p-value<0.05).

Model 1 compares *low exposure* and *high exposure* dual users to *average exposure* dual users (base referent), adjusted for age cigarette use, time to first cigarette (categorical), time to first e-cigarette (categorical).

Model 2 compares *low exposure*, *average exposure*, and *high exposure* dual users to exclusive e-cigarette users (base referent)

Model 3 compares *low exposure*, *average exposure*, and *high exposure* dual users to exclusive cigarette smokers (base referent)