

**EXPOSURE TO METALS IN ELECTRONIC NICOTINE DELIVERY SYSTEM (ENDS) USERS IN THE PATH STUDY 2013-2014**

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**Background**

- Evaluating safety of ENDS requires comprehensive measures of toxic chemicals
- ENDS are highly engineered products containing and emitting metals
- Few studies have evaluated the potential of ENDS as a source of toxic metal exposure
- This study evaluated metal body burden by ENDS use status

**Methods**

- We used the Population Assessment of Tobacco and Health (PATH) Study Wave 1 data from 11,487 adults to compare urinary metal concentrations of Beryllium (Be), Cadmium (Cd), Cobalt (Co), Manganese (Mn), Lead (Pb), Strontium (Sr), Thallium (Tl), and Uranium (U) between (1) Dual (cigarette+ENDS) users (2) Cigarette only users, (3) ENDS only users, and (4) Nonusers

**ENDS users expose themselves to toxic chemicals such as Cadmium and Uranium.**



**Results**

**Ratios of geometric mean (GMR)\* of urine metal concentrations by tobacco use status**

Metals	Group	GMR	(95%CI)	
Be	Dual	1.33	1.17	1.57
	Cig	1.29	1.18	1.41
	ENDS	0.98	0.84	1.14
Cd	Dual	1.43	1.23	1.67
	Cig	1.61	1.46	1.78
	ENDS	<b>1.29</b>	<b>1.10</b>	<b>1.51</b>
Co	Dual	1.08	0.97	1.20
	Cig	1.05	0.98	1.12
	ENDS	1.09	0.97	1.23
Mn	Dual	1.26	1.10	1.45
	Cig	1.22	1.12	1.33
	ENDS	1.00	0.86	1.17
Pb	Dual	1.50	1.33	1.69
	Cig	1.32	1.22	1.42
	ENDS	0.96	0.81	1.14
Sr	Dual	1.19	1.01	1.38
	Cig	1.09	0.98	1.21
	ENDS	1.10	0.95	1.28
Tl	Dual	1.07	0.97	1.16
	Cig	1.08	1.01	1.15
	ENDS	0.97	0.85	1.10
U	Dual	1.66	1.37	2.00
	Cig	1.42	1.24	1.64
	ENDS	<b>1.22</b>	<b>1.06</b>	<b>1.41</b>

\* Reference: Non-users

\*Adjusted for age, sex, race, region, SHS at home and work, number of SHS hours in past seven days, and past cigarette use

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