



THE ONTARIO
TOBACCO
RESEARCH
UNIT

UNITÉ
DE RECHERCHE
SUR LE TABAC
DE L'ONTARIO

Generating knowledge for public health

E-Cigarettes: Policymaking in the Dark

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RECIG: RESEARCH ON E-CIGARETTES

**AN ONTARIO MINISTRY OF HEALTH &
LONG-TERM CARE, HEALTH SYSTEM
RESEARCH FUND STUDY**

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Expert Panel

- Thomas Eissenberg, Virginia Commonwealth University (Chair)
- Linda Bauld, University of Stirling
- Mirjana Djordjevic, National Cancer Institute
- Maciej Goniewicz, Roswell Park Cancer Institute
- Alan Shihadeh, American University of Beirut

Research Questions

1. Determine the prevalence of e-cigarette use, especially among youth
2. Determine the health effects of e-cigarette use
3. Determine the effectiveness of e-cigarettes as a cessation aid
4. Determine the relationship between e-cigarette use and uptake of tobacco smoking

RECIG Studies

- Comprehensive, realist-informed knowledge synthesis
- Analysis of data from existing surveys
- Longitudinal panel of adult smokers and recent smokers (19 years and over)
- Surveys and in-depth interviews with youth and young adults (15-29 years of age)

RECIG Studies (cont'd)

- Social media analysis of e-cigarette message exposure, reach and content
- Randomized clinical trial comparing smoking cessation effectiveness of e-cigarettes and nicotine replacement therapy products
- Biomarker study of e-cigarette users to measure concentrations of nicotine and other chemicals



International, multidisciplinary Expert Panel

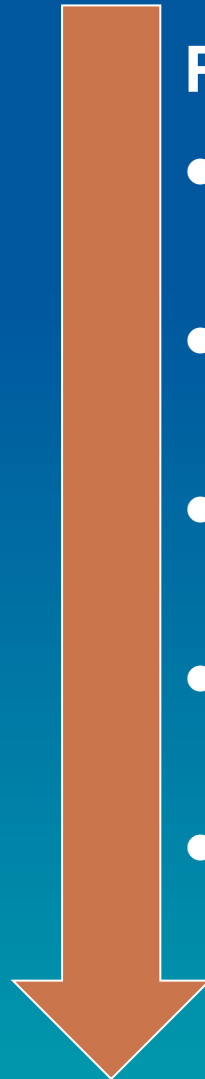
RESEARCH POLICY TIMELINES

Research

- 2010 – ECIG Issue Identified
- Fall 2013 Targeted Research Call
- Fall 2014 Research Begins
- Winter 2016 Results

Policy

- 20XX Internal Gov't policy work
- Summer 2014 Ontario Election
- Fall 2014 Bill 45 Introduced
- Summer 2015 Bill 45 adopted
- Winter 2016 Implemented



HEALTH EFFECTS

Bottom Line

Evidence of potential health effects is sufficient to suggest that anybody who is not a current smoker of tobacco cigarettes should not vape electronic cigarettes

Health Effects Challenge

No standards for acceptable levels of toxicants
in vapours ingested into the lungs

Nuanced Findings

Range of devices that vary widely in liquids, cartridges, heating mechanisms.

Many potential effects not yet studied

Some e-cigarettes can deliver as much nicotine in 10 puffs as a regular cigarette

For youth, nicotine can affect brain development

Effects of frequent long-term exposure not known



Constituents: In e-liquids and vapor

- Carbonyls, tobacco specific nitrosamines (TSNAs), and impurities were frequently detected in e-liquids at low levels
- Low levels of carbonyls, VOCs, TSNAs, metals, impurities, and particulate matter have been found in e-cigarette vapor.

Passive Exposure

- E-cigarette use may result in low levels of passive exposure to nicotine, organic compounds, metals, and particulate matter
- Particulate matter high in indoor vaping by a large number of people
- Lower than cigarettes, but not zero

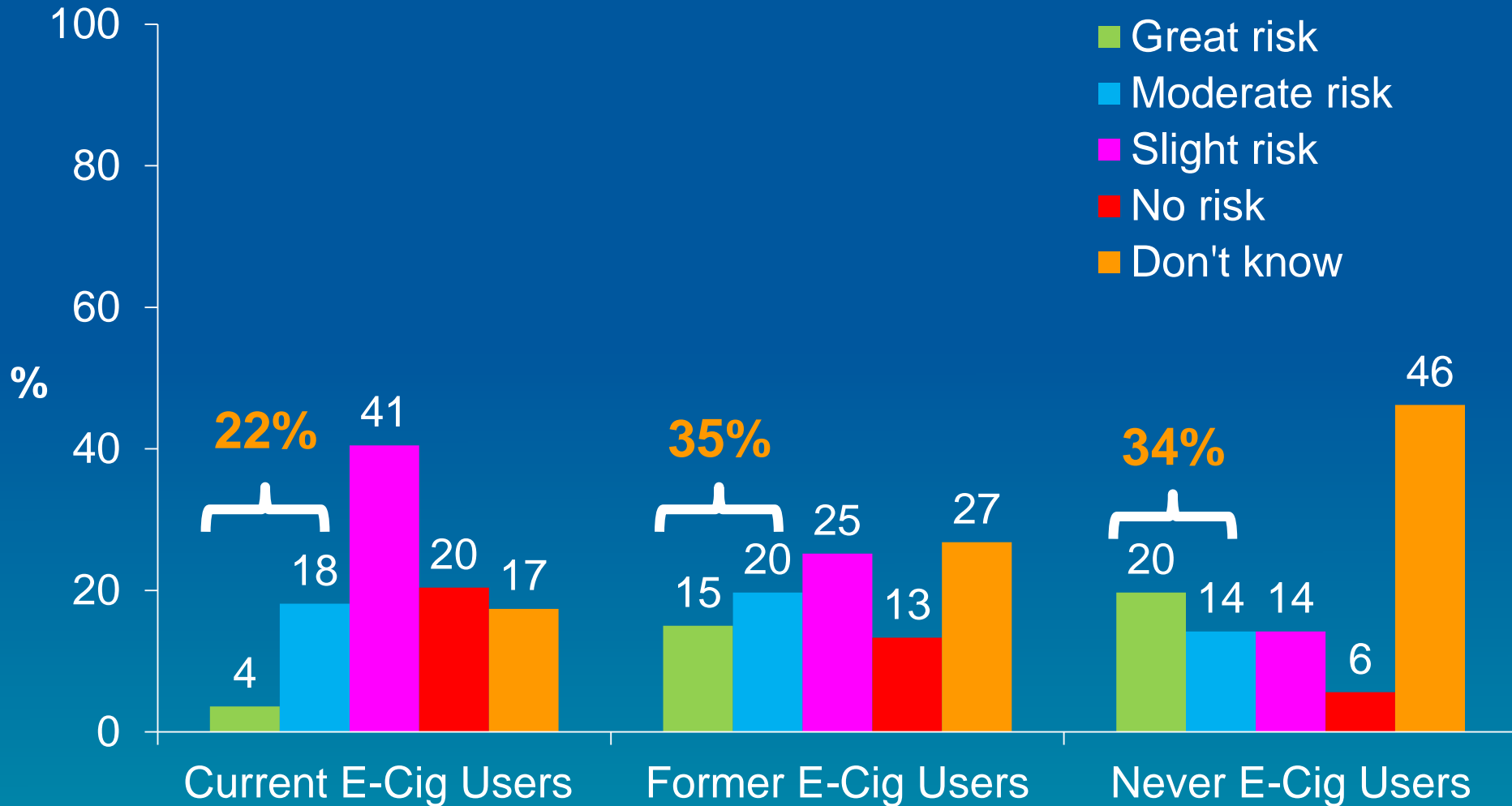
Cytotoxicity: From e-liquids and vapor

- Exposure to e-liquids and vapors result in varying levels of cytotoxicity
- E-cigarette vapor may be less cytotoxic compared to cigarette smoke
- Nicotine content and flavorings added to e-liquids may contribute to the negative effects on cell viability
- Increasing battery output voltage may also contribute to increased cytotoxicity

Health Effect: Respiratory Effects

- Some **respiratory** effects were reported, but there was a large variability in results
- *Vardavas et al* (2012) reported a 16% decrease in FENO after using e-cigarettes for 5 minutes ($p=0.005$)
 - **Significant increase in overall peripheral airway resistance ($p=0.024$)**
- *Flouris et al* (2013) found no significant differences in FENO after active e-cigarette use ($p>0.001$)
 - **Neither brief active e-cigarette use nor 1h passive e-cigarette exposure significantly affected the lung function ($p>0.001$)**

Adults: Perceived Risks



Risk of Using E-Cigarettes Daily

EFFECTIVENESS AS A CESSATION AID

ARE E-CIGARETTES EFFECTIVE CESSATION AIDS?



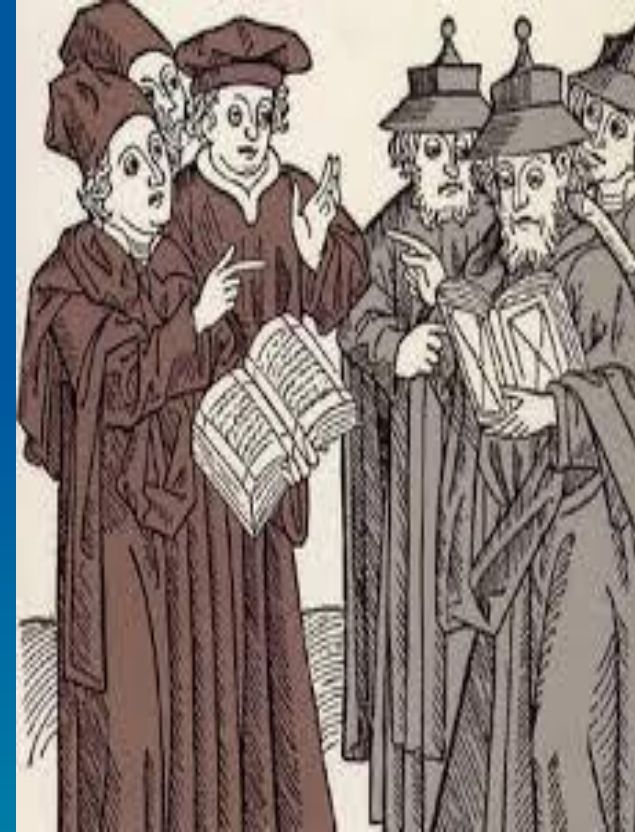
Conclusively:
The evidence to date is inconclusive!

E-Cigarettes for Cessation: State of Knowledge

Respected scholars diverge in drawing conclusions from same studies

Most agree: insufficient high quality studies

Emerging evidence suggests that the answer is nuanced



Nuanced Cessation Aid Findings

Some smokers using certain kinds of e-cigarettes in certain ways may quit smoking.

Some smokers may become dual users which may or may not lead to cessation

By far, most smokers who try, do not become vapers and do not quit

When do they work for cessation?

Some studies (including our own) suggest:

- Daily vaping
- Nicotine e-cigarettes
- Vaping in order to quit smoking

GRADE

Grading of Recommendations Assessment, Development and Evaluation (GRADE) to assess the overall quality of evidence



GRADE RESULTS

- The state of the evidence about the effectiveness of e-cigarettes as a smoking cessation aid is currently assessed as very low to low, due primarily to methodological weaknesses of current studies
- Evidence of a positive association between e-cigarette use and smoking reduction is slightly better but also weak as indicated by a GRADE assessment of low to moderate

Ontario Adult Longitudinal

The vast majority of smokers who tried quitting with e-cigarettes, vaped only a few times and did not quit smoking.

Adult-Longitudinal 30-Day Quit Rates

Intention to Treat ITT Analysis

30-Day Quit Rates

Daily vapers:	12%
Non-daily vapers:	4%
Former vapers:	3%
Never vapers:	4%

Adult-Longitudinal Discussion

CAUTION

12% quit rate among daily vapers represents only 9 out of 37 baseline smokers.

Of these 9:

- 2 continued to smoke cigars

- 2 continued to use smokeless

- 1 continued to use waterpipe

Should e-cigarettes be promoted as a cessation aid?

YES

- Less harm than tobacco
- Could work for some as well or better than alternatives
- Potentially huge reach

NO

- Could aid tobacco maintenance
- Continues nicotine dependence
- Unknown long-term health effects
- Normalizes vaping & smoking
- Can't have huge reach without encouraging uptake by non-smokers

E-CIGARETTE USE IN ONTARIO

Ontario Population Survey Data

Adults (CAMH-M) (age 18+)

Ever tried: 13%

Past 30-day use: 3% (343,000 inds)

Students (OSDUHS) (grades 7-12)

Ever tried: 23%

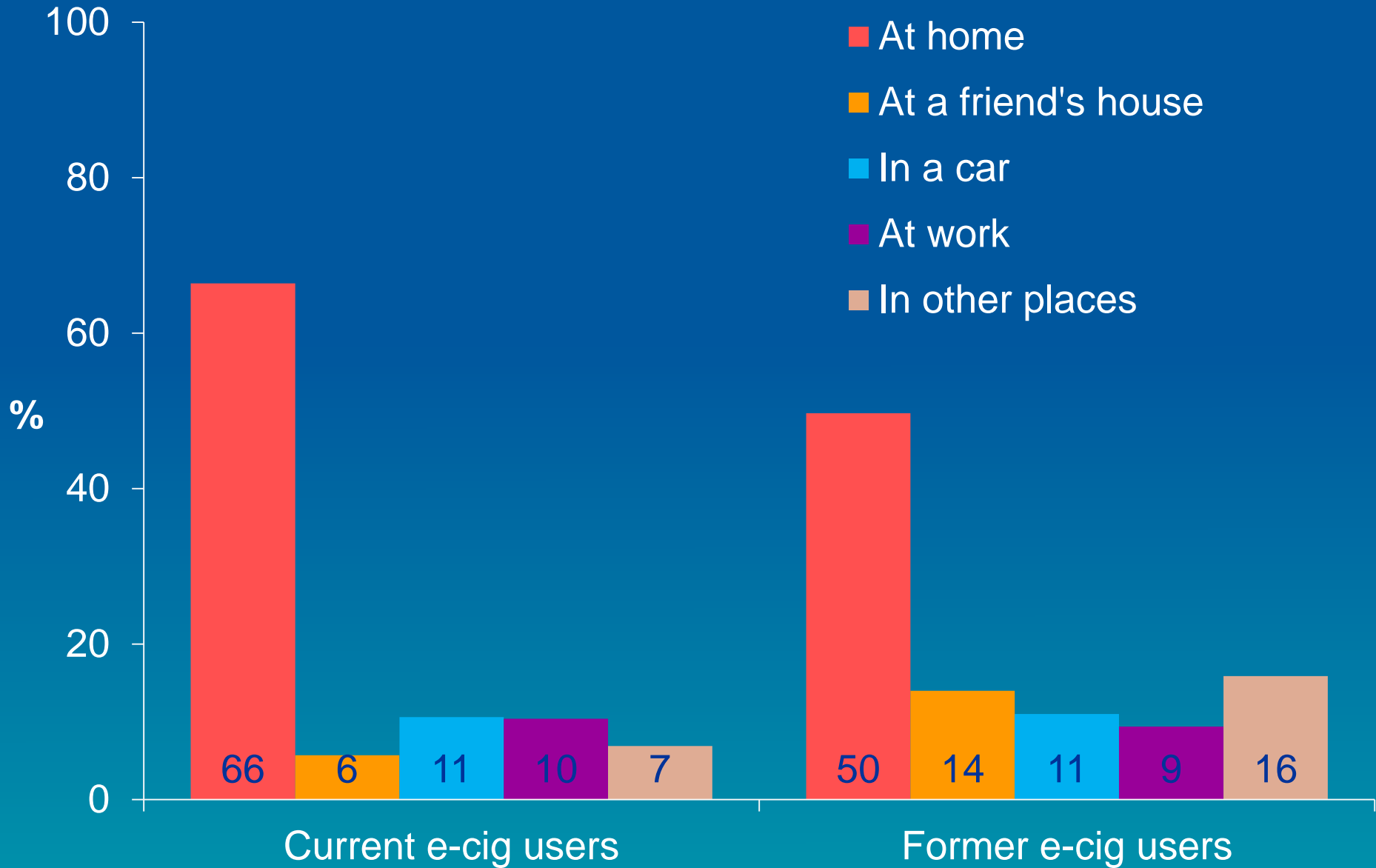
Past year use: 19%

**SELECT PATTERNS OF USE
FINDINGS FROM A PANEL OF
ADULT SMOKERS**

Among all ever users of e-cigarettes

- Majority: <10 vape sessions on the day they last used e-cigarettes
- Each vape session usually lasting for 1-5 minutes (81%);
- <10 puffs on each vape session on average (84%)
- <50 puffs per day (80% smoking (79%) and curiosity (59%)) (Table 3).

Adults: Places of Using the Last E-Cigarette



Adults: Source of the Last E-Cigarette

	Current Users	Former Users
At a vape shop or lounge	54%	13%*
At a convenience store or small grocery store	15%	30%*
On the internet	11%	11%
At a gas station	4%	7%*
At a pharmacy	1%	5%*
At a supermarket	0.2%	2%*
Other (e.g., from friends, free samples, etc.)	14%	32%*

Policy Options

Policy Option	Status
Regulate to decrease safety and health risks	
Regulate to assure nicotine delivery	
Ban all or most flavours	
Restrict to adults	X
Regulate promotion	X
Restrict to current smokers	
Ban vaping in public places	X
Complete ban on sale / use	

Take Home Messages



- Non-smokers should not vape
- Low levels of toxicants with unknown long-term health effects
- Vaping is likely far less harmful than smoking
- Some smokers using certain kinds of e-cigarettes in certain ways may quit smoking
- Until now, not panacea for helping smokers quit

What next?

Regulatory policy could do more to:

1. Prevent non-smokers (primarily youth) from initiating
2. Make e-cigarettes less harmful for smokers
3. Make e-cigarettes more effective cessation aids