

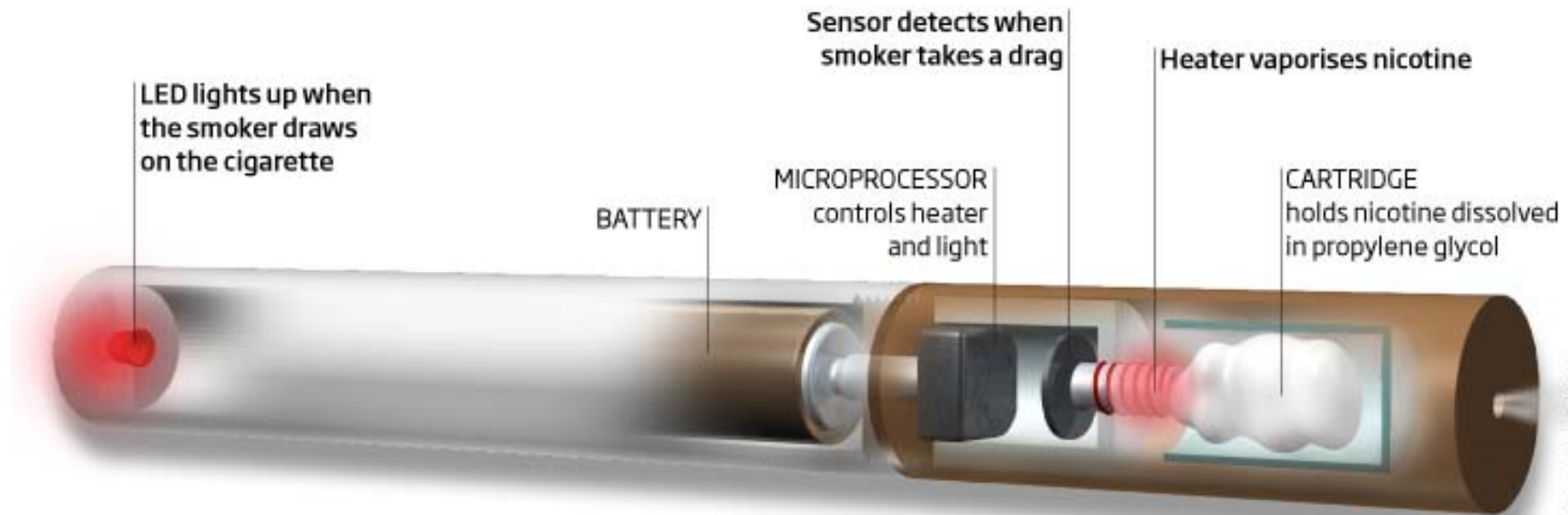
# Electronic cigarette: utilization, satisfaction and perceived efficacy

- **Jean-François ETTER, PhD**  
IMSP, Faculty of Medicine,  
University of Geneva, Switzerland
- **Chris BULLEN, PhD**  
Auckland, New Zealand
- ECTOH, Amsterdam
- March 28-30, 2011

# Competing interests

- No external funding for this study
- JFE:
  - Salary paid by University of Geneva
  - No receipt of study medications, funds, honoraria, hospitality, talks or other events from pharmaceutical industry in last 4 years
- CB:
  - Salary paid by University of Auckland
  - Has undertaken research supported by Nicovum (Sweden) and by Health New Zealand,
  - Research products supplied by Ruyan (manufacturer) and by a NZ-based e-cigarette retailer

# Electronic cigarette



# Background

- Electronic cigarettes contain no tobacco, emit no smoke
- Vapor from battery-powered atomizer from a cartridge
- Cartridge
  - humectant
  - nicotine, other medications
  - flavors (tobacco, mint, fruit, chocolate)
- Popular:
  - Google searches increased 5000% in past 2 years
  - 9% of UK smokers report having used e-cig
- Few research reports
- E-cig may decrease craving for tobacco

# Objectives

- Describe e-cigarette users
- Assess
  - how and why they used this product
  - satisfaction with the product
  - perceived effects
  - cotinine in saliva

# Methods

- Internet survey
- In 2010
- Links to survey on:
  - discussion forums on e-cigarettes
  - sites selling e-cigarettes
  - a smoking cessation website (Stop-Tabac.ch)
- Saliva vials in subsample,  
analysis of cotinine by gas chromatography

# Results

- N = 3587
- Age: 41 years (median)
- Men: 61%
- Former smokers: 70%
  
- Learned about the survey on:
  - e-cig websites, forums: 81 %
  - stop-tabac.ch: 2 %
  - Google: 2 %
  - other sites 15 %
  
- Cotinine: N=30  
15% of 196 vials sent out

# Daily e-cig users

	Daily e-cig users
N	2896
Men	65%
Former smokers: - had quit smoking for (median)	77% 3.5 months
Current smokers: - tobacco cig./day <u>now</u>	13
- tobacco cig./day <u>before</u> used e-cig	25
- currently trying to quit smoking	71%
- sure they could quit smoking if they tried	17%

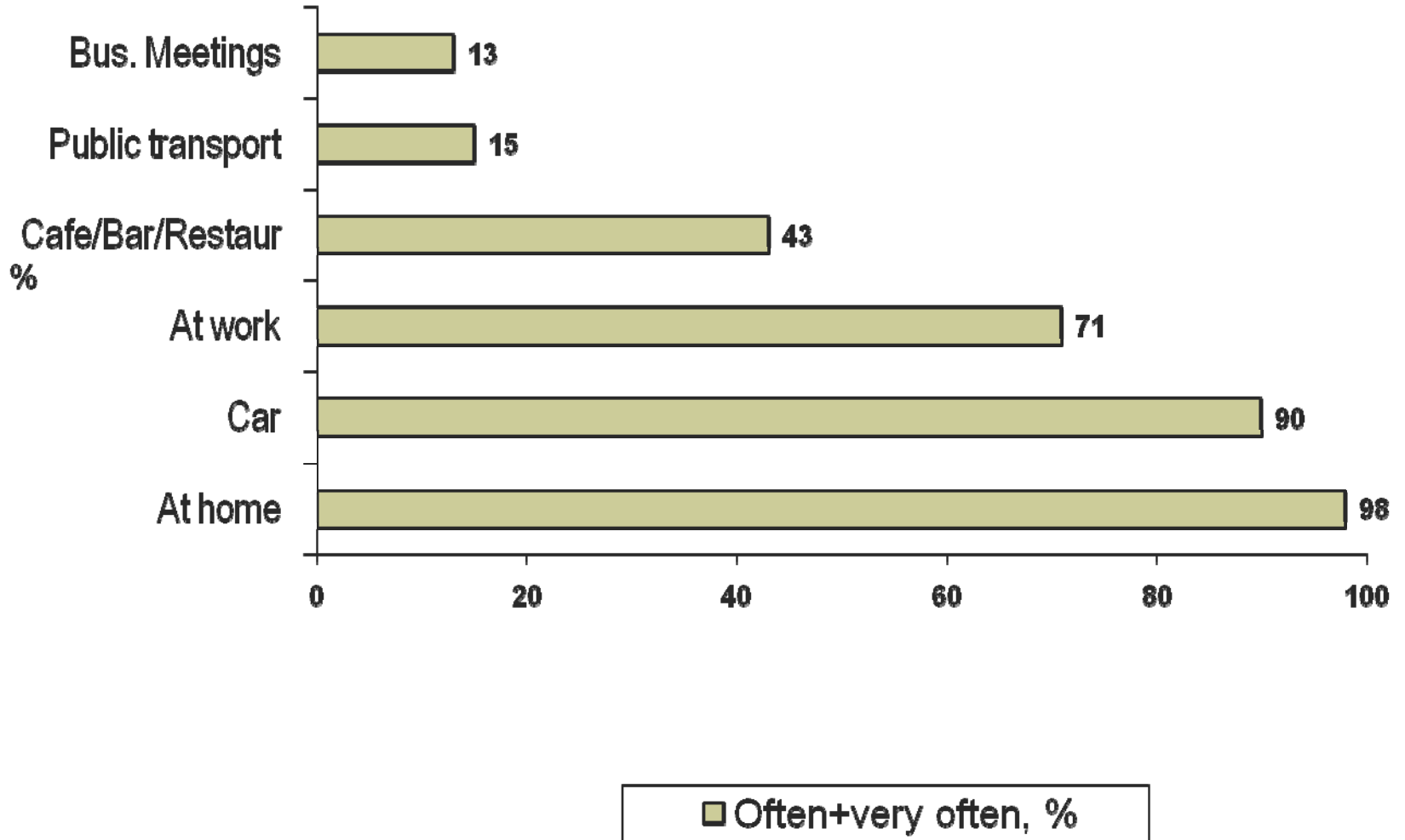
# Daily users: utilization

	Daily e-cig users
Puffs / day	120
Duration of current episode of use - in former smokers	3 months 5 months
Had been using e-cigs for $\geq 1$ year	15%
Used nicotine-containing e-cig	97%
E-liquid: nicotine concentration (similar across all brands)	18 mg/ml
Bought e-cig on Internet	96%
Monthly spending for e-cig	33 USD
Used e-cigs to inhale other substances than e-liquid sold for this purpose : vitamins, flavors, cannabis (n=5), alcohol (n=1)	0.9%

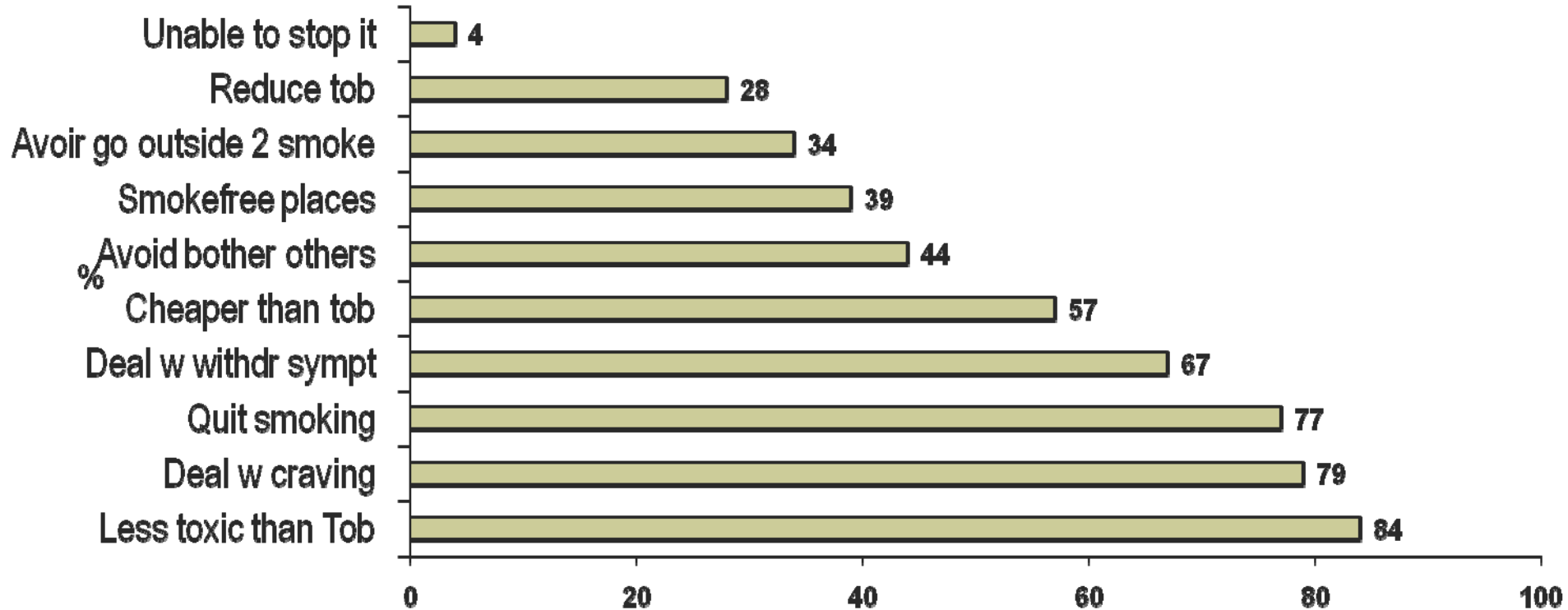
# Cotinine

	E-cig users who sent saliva sample
N	30
Daily e-cig users	97%
Use of tobacco or NRT in past 48h	0
Puffs on e-cig per day (median)	200
Cotinine level, median 25 <sup>th</sup> and 75 <sup>th</sup> percentiles	322 ng/ml 138 / 546 ng/ml
<i>(In literature: NRT users, ex-smokers: 100-250 ng/ml)</i>	
Correlation between cotinine and puffs/day on e-cig	r=0.39 (15% of variance explained, p=0.034)

# Where do you use the e-cigarette ?

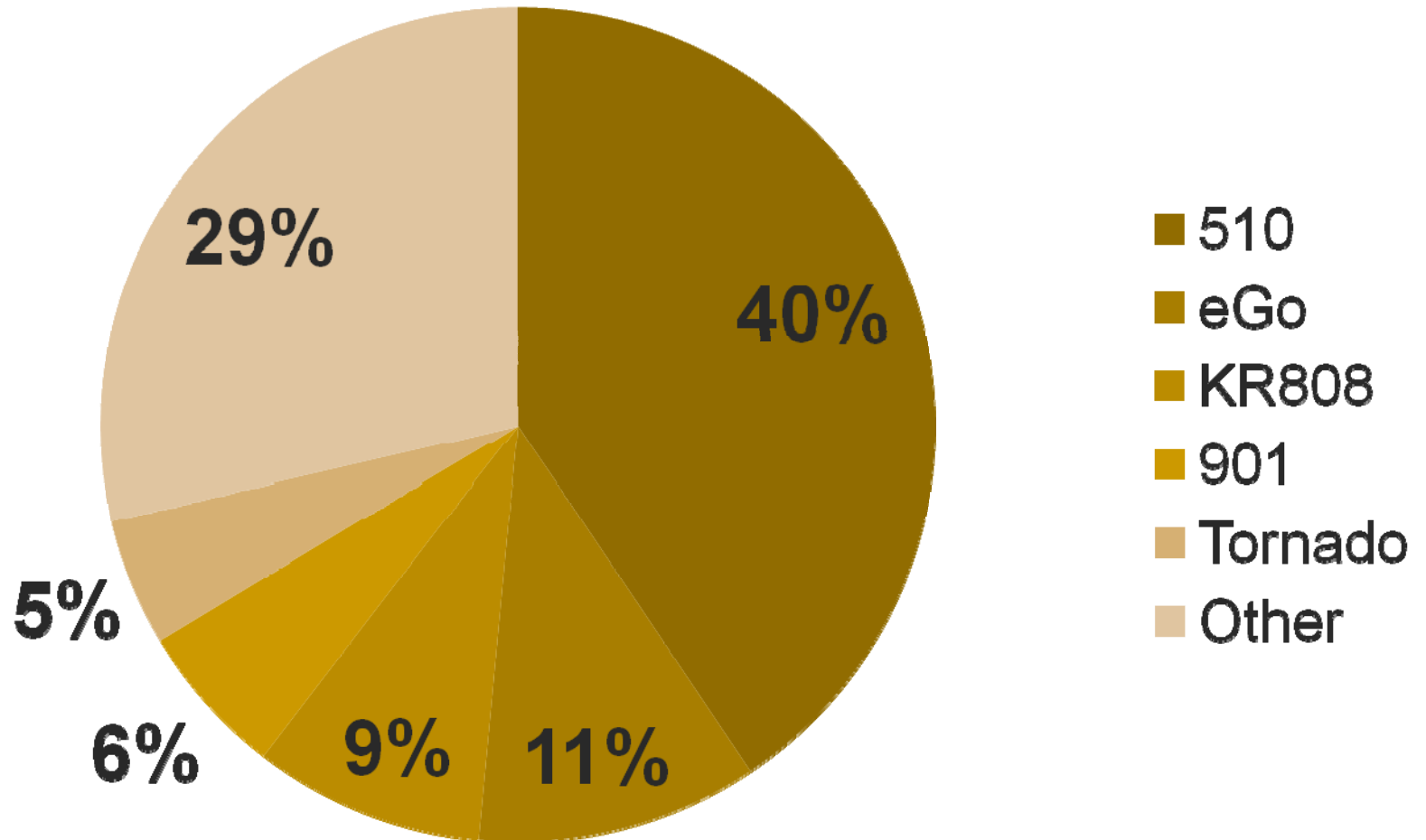


# Reasons for use

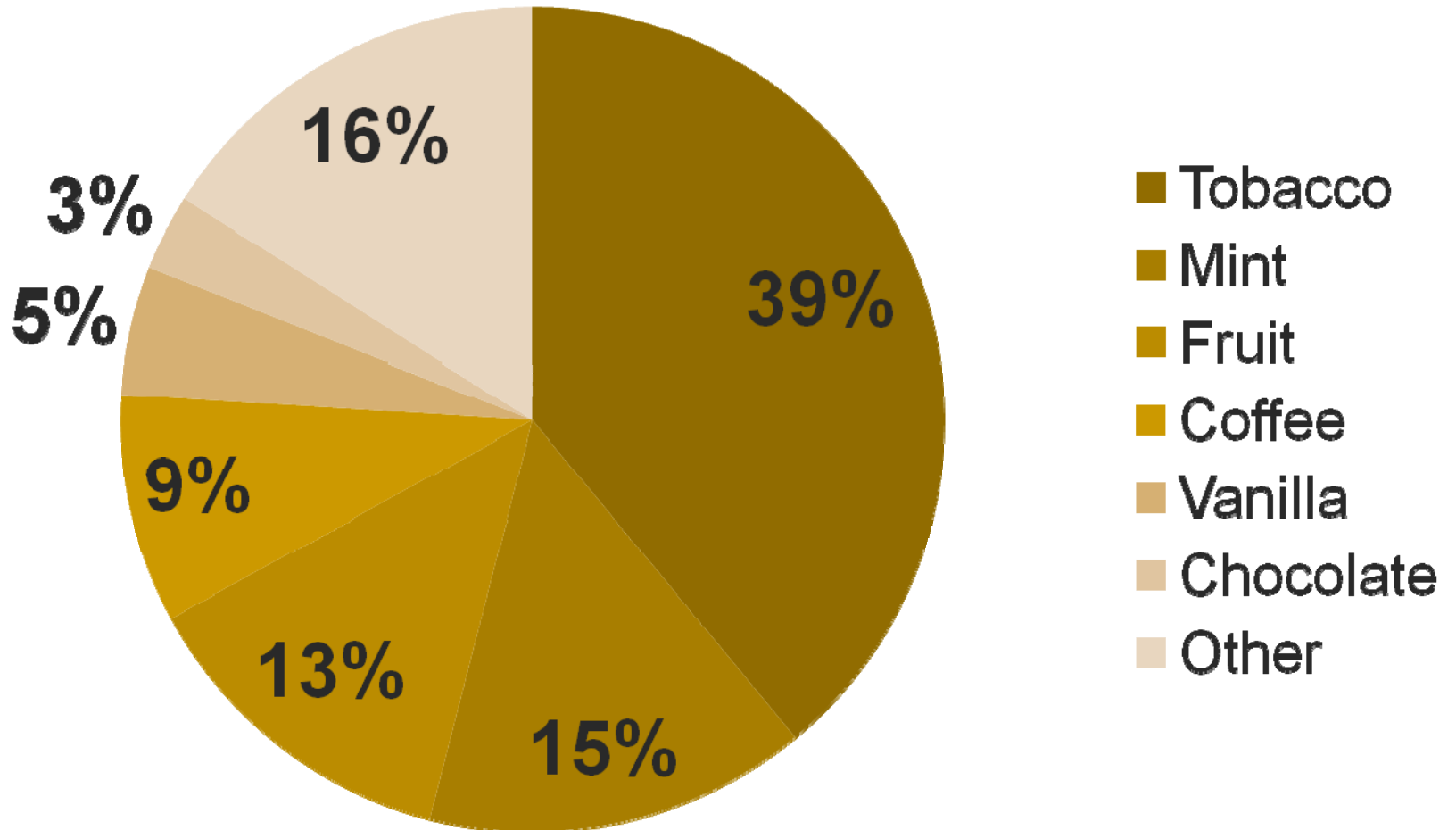


Agree %

Utilization: models used most



Utilization: flavors used most



# Users of e-cig containing vs. not containing nicotine

	E-cig containing nicotine	E-cig without nicotine	P-value
N	2850	112	
Men	65%	47%	<0.001
Daily users of e-cig	97%	85%	<0.001
Minutes to first e-cig of the day	20	30	<0.001
Puffs / day	120	100	0.01
Use e-cig to deal with craving for tobacco	80%	62%	<0.001
Use to deal with tob withdrawal symptoms	68%	41%	<0.001
Former smokers:			
- did e-cig help you quit? (yes)	91%	62%	<0.001
- fears that will relapse if stopped e-cig	64%	27%	<0.001

# Discussion

- “Real world” users
- Reasons for use: less toxic, quit smoking, craving
- Cheaper than tobacco (33 vs 150-200 USD / month)
- E-cigs are used mainly by former smokers, like NRT
- Long duration of use : 3 months
- Intensive use (120 puffs/day), same as for cigarettes (10 puffs/cig)
- Subsample of heavy users (200 puffs/day): high levels of cotinine
- Only 3% used non-nicotine e-cigs: nicotine = important ingredient

## Discussion (cont'd)

- Nicotine concentration: 18 mg/ml, similar across brands / models
- Refill bottles (20 ml): lethal dose of nicotine in pleasant flavor
- Perceived effect on
  - smoking cessation, reduction
  - craving, withdrawal
- Study limitations:
  - self-selected sample
  - enrolled on online discussion forum, e-cig websites
  - results might not be generalizable
  - technology evolves rapidly: new models

# Conclusion

- E-cig were used mainly by former smokers, much as NRT, as an aid to quit smoking, avoid relapse, deal with craving
- E-cig were perceived as efficacious, useful, satisfactory
- Almost all users preferred nicotine-containing e-cigs
- E-cig provide high amounts of nicotine (as reflected by cotinine)
- Efficacy ?
- Safety ?