



**National Institute  
on Drug Abuse**

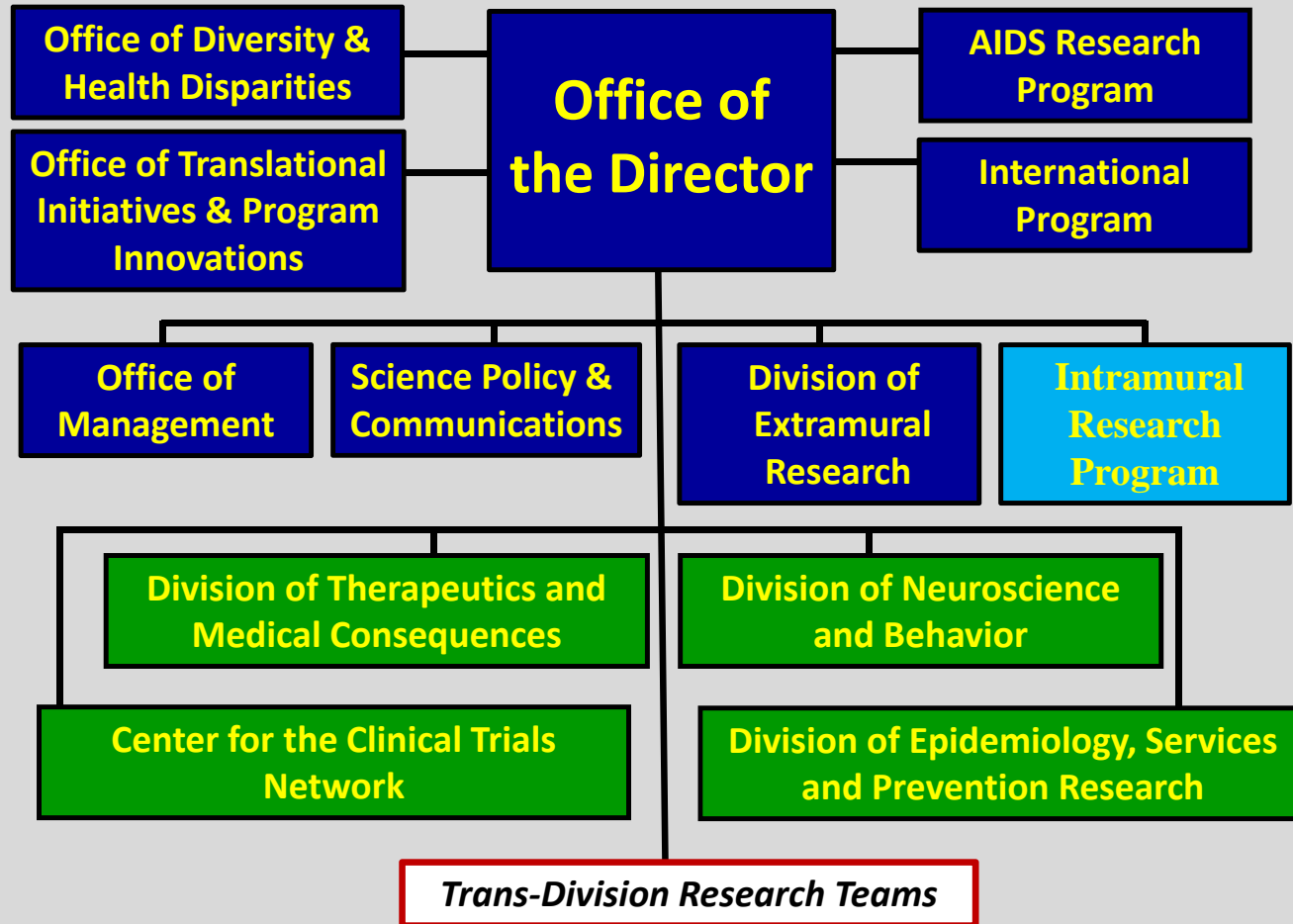
*The Science of Drug Abuse & Addiction*

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**No disclosures**

# NIDA Organizational Chart



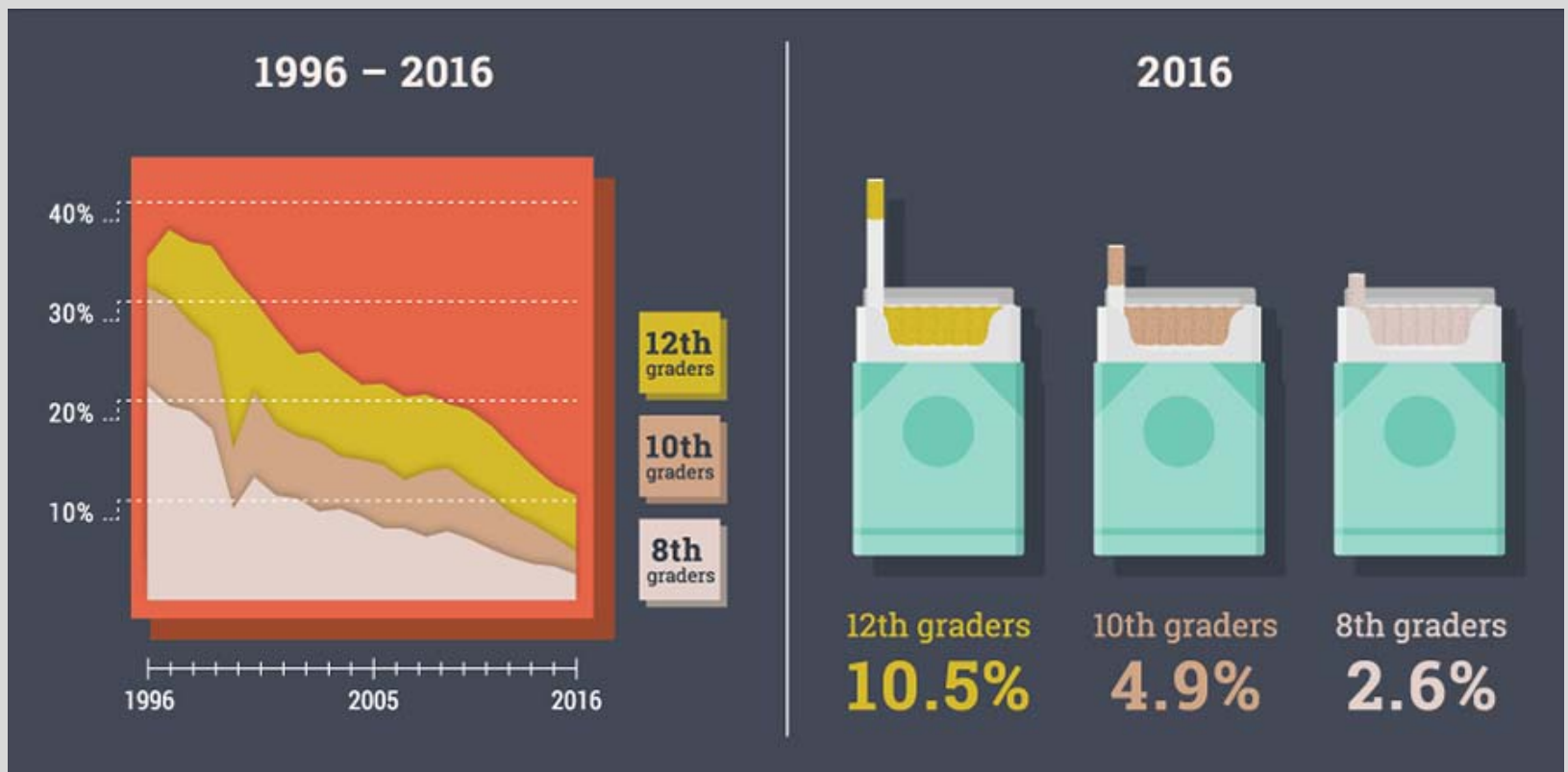


1. **Basic Science:** Identify the biological, environmental, behavioral, and social causes and consequences of drug use and addiction across the lifespan.
2. **Prevention:** Develop new and improved strategies to prevent drug use and its consequences.
3. **Treatment:** Develop new and improved treatments to help people with substance use disorders achieve and maintain a meaningful and sustained recovery.
4. **Public Health:** Increase the public health impact of NIDA research and programs.

# 2016 Monitoring the Future Study Key Findings- Prevalence (2015 to 2016)

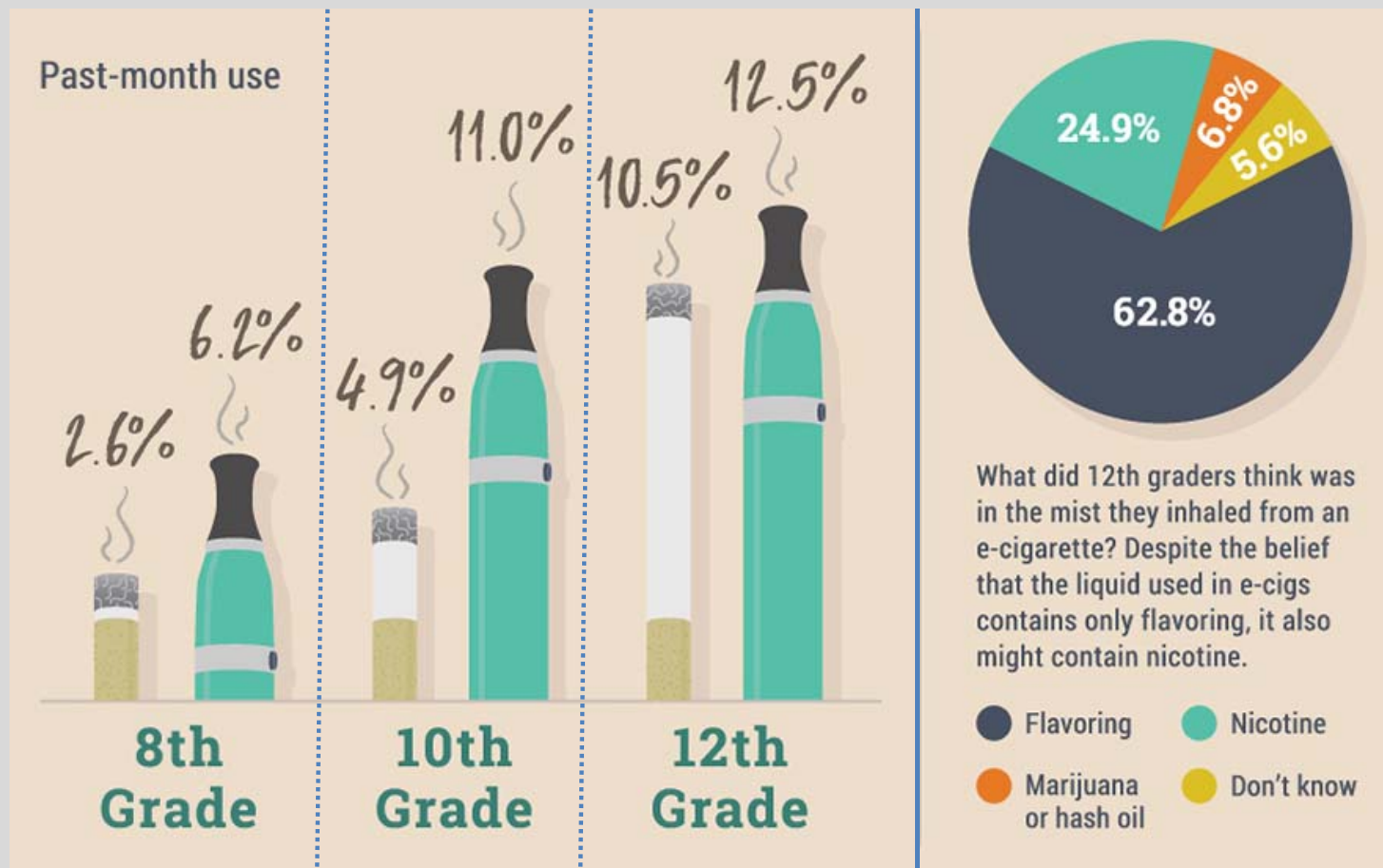
	8th	10th	12th		8th	10th	12th
Any Illicit	-						
Lifetime	-						
Past Year	-						
Past Month	-						
Any Illicit inc Inhalants							
Lifetime	-						
Past Year	-						
Past Month	-						
Any Illicit o/t Marijuana							
Lifetime	-						
Past Month	-						
Marijuana							
Lifetime	-						
Past Year	-						
Past Month	-						
Daily	-						
Inhalants							
Lifetime	-						
Past Year	-						
Cocaine							
Lifetime							
Past Year							
Past Month							

# Steady Decline in Past Month Cigarette Use



National Institute on Drug Abuse

# Teens more likely to use e-cigarettes than combusted cigarettes



## Adult E-cigarette Use

- Population Assessment of Tobacco and Health (PATH)
  - Longitudinal, comprehensive effort documenting tobacco use
  - 45,971 adults and youths, 12 years of age or older
- Current use - daily or some days (weighted percentages)

	18-24 yo	≥25 yo
Cigarette	19.6%	17.9%
E-cigarette	8.9%	5.0%

- Based on US population numbers (Census bureau)
  - About 37 million use cigarettes daily
  - About 3 million use e-cigarettes daily

# Questions About E-cigarettes

How safe are they? Are they addictive?

Are they a gateway to smoking?

Do they have a role for harm reduction and cessation?

What are the issues for vulnerable populations: youth, mental illness, pregnancy?

## How to answer these questions?

- Often requires preclinical and clinical studies.
- Need devices with known aerosol / delivery characteristics.
- Clinical studies often need FDA review, requiring a detailed data package describing the device.
- Uncertain availability of a commercial device thru a study.

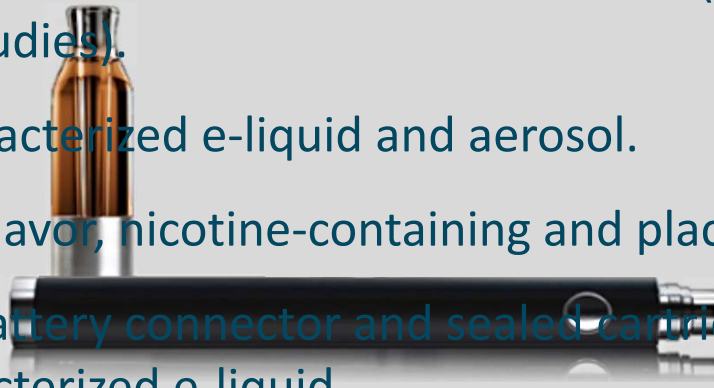


## How is NIDA facilitating e-cigarette research?

- In 2014, NIDA issued a contract solicitation (SBIR) to develop a Standardized Research E-Cigarette (SREC) with an associated data package.
- Four companies received Phase 1 contracts, NJOY LLC will be the first to complete Phase 2.
- Devices and refills will be available by 4Q 2017.
- NJOY will sell the SREC directly to researchers together with permission to reference the data package for FDA submissions.

## Key features of the SREC

- E-liquids made under GMP-like conditions (to allow use in clinical studies).
- Fully characterized e-liquid and aerosol.
- Tobacco flavor, nicotine-containing and placebo e-liquids.
- Unique battery connector and sealed cartridges limit use to the characterized e-liquid.
- Reproducible aerosol delivery from start to end of cartridge & battery charge.
- Demonstrated nicotine delivery (pharmacokinetics).



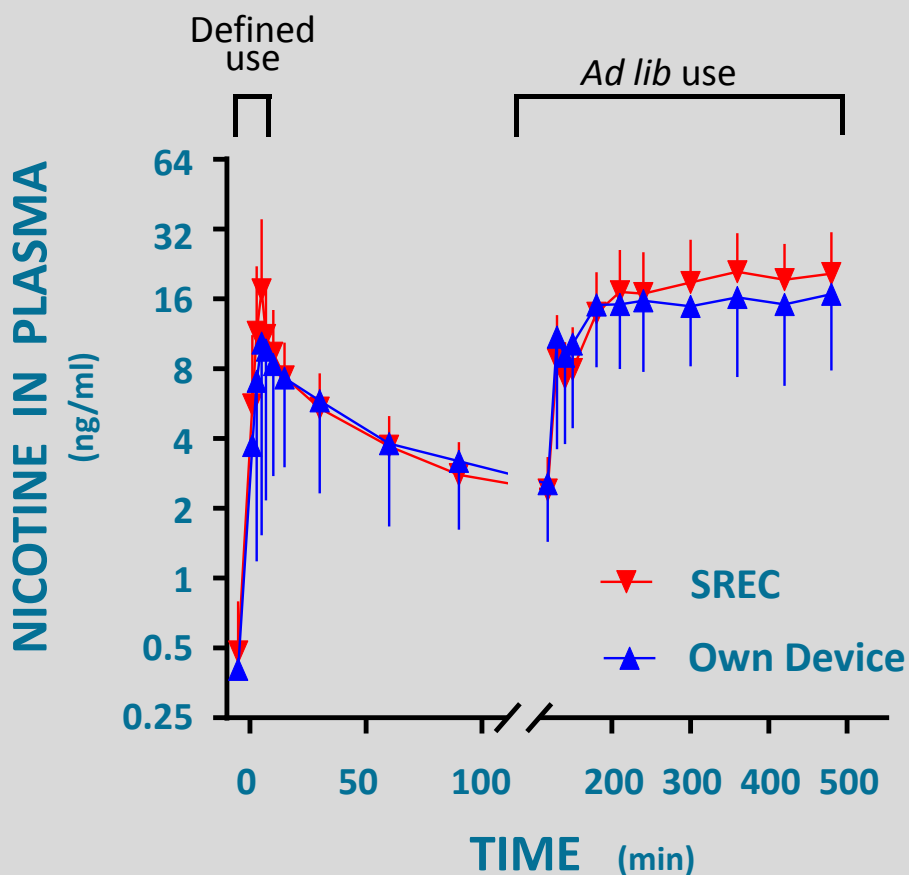
# Technical Characteristics

	SREC <sup>1</sup>	COMMERCIAL <sup>2</sup>
<b>E-LIQUID</b>		
Puffs (3 s) per Cartridge	> 350	Variable
Nicotine Concentration	15 mg/mL	7-21 mg/mL
<b>AEROSOL CHARACTERISTICS (per 10 puffs)</b>		
Nicotine	1 mg	0.3 – 3 mg
Formaldehyde	1 µg	0.6 - 5 µg
Acetaldehyde	0.9 µg	0.4 – 21 µg
Acrolein	0.2 µg	? – 1.4 µg

1. <https://www.drugabuse.gov/funding/supplemental-information-nida-e-cig>
2. 2016 El-Hellani et al, Nicotine and Carbonyl Emissions From Popular Electronic Cigarette Products: Correlation to Liquid Composition and Design Characteristics. Nic Tob Res

# Nicotine Pharmacokinetic Profile

(mean ± SD)



Cmax		
	Own Device	SREC
Mean (ng/ml)	11.08	17.68
Variance	72.71	306.69
Observations	14	14
P(T<=t) two-tail	0.21	

Tmax		
	Own Device	SREC
Mean (ng/ml)	9.07	5.71
Variance	42.69	0.99
Observations	14	14
P(T<=t) two-tail	0.06	

# Overall Research Direction

## Harm Reduction is the current focus

- These studies with tobacco products are reviewed by the FDA Center for Tobacco Products (CTP).
  - We expect a complete SREC Product Master File will support the device's use as an Investigational Tobacco Product.

## Smoking/Nicotine Cessation studies are a future goal

- This is a therapeutic indication, regulated by the FDA Center for Drug Evaluation and Research (CDER).
  - Investigational New Drugs require evidence of safety in animals prior to “First in Human” studies.