

# **Apparent Needs & Possible Solutions**

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**Senior Forensic Advisor to the Deputy Attorney General**

NIST MDI Tox Workshop

Sept 14, 2016

Gaithersburg, MD

# Picture of Opioid Crisis

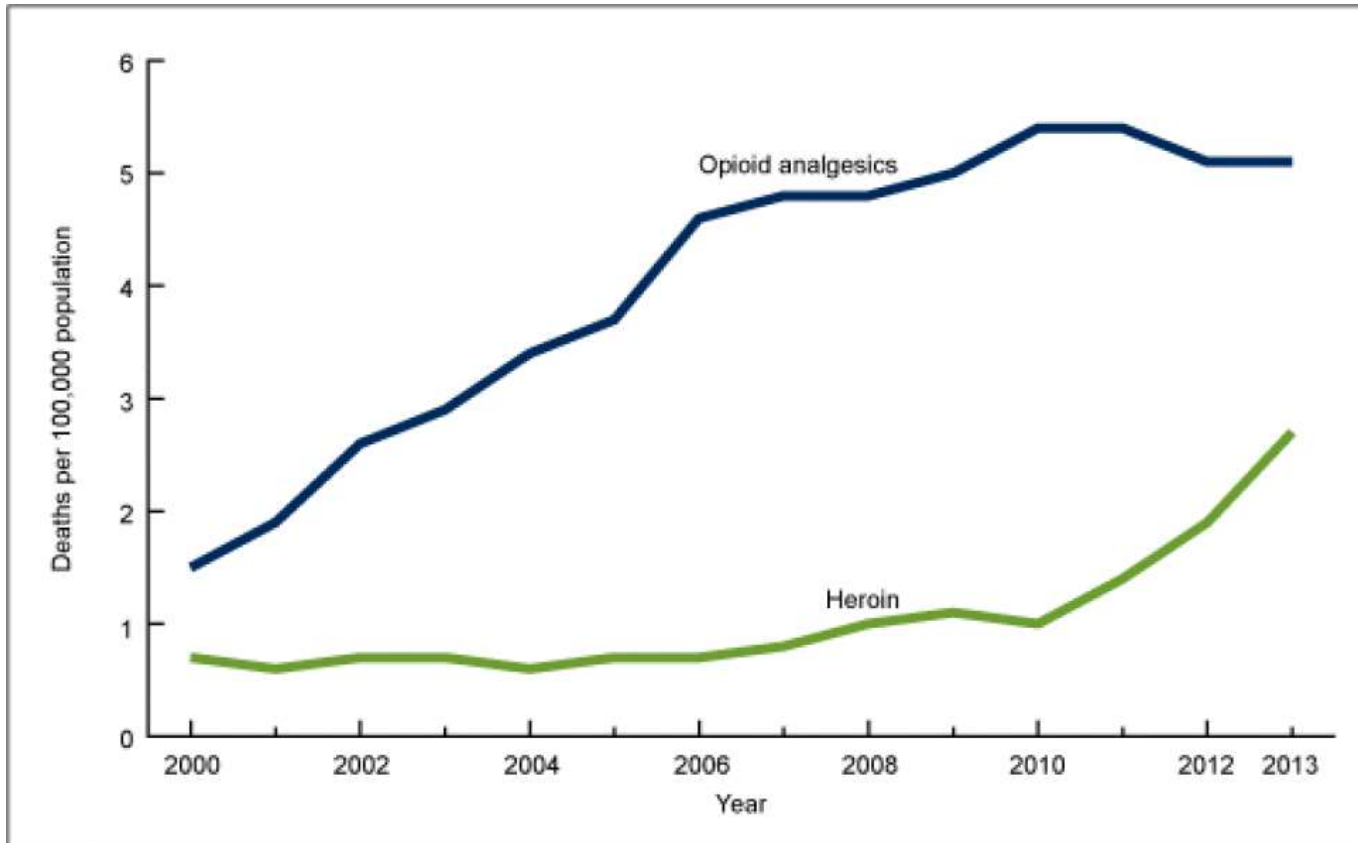


East Liverpool, Ohio  
car with WV plates  
Sept 13, 2016

**Rhonda Pasek (left), 50, and 47-year-old James Acord (right), who were disgracefully pictured passed out in a car after allegedly overdosing on heroin as a toddler sat in the backseat 'almost definitely' would have died, police have said**

<http://www.dailymail.co.uk/news/article-3786346/Parents-Ohio-photo-passed-car-taking-heroin-definitely-died-police-say.html#ixzz4KBi1BDnI>

# Opioid Drug Crisis



Age-adjusted rates for drug-poisoning deaths, by type of drug:  
United States, 2000-2013  
COURTESY CDC

L. Cook, The Heroin Epidemic in 9 Graphs, U.S. News & World Report, Aug 19, 2015;  
<http://www.usnews.com/news/blogs/data-mine/2015/08/19/the-heroin-epidemic-in-9-graphs>

# Surveillance Data

- **Police, DEA reports of drug seizures**
- **Police, DEA investigation reports**
- **Reports of drug prices**

# DATA

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- **Police, DEA investigation reports**
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- **Community Surveys**
- **Poison Control Center calls**

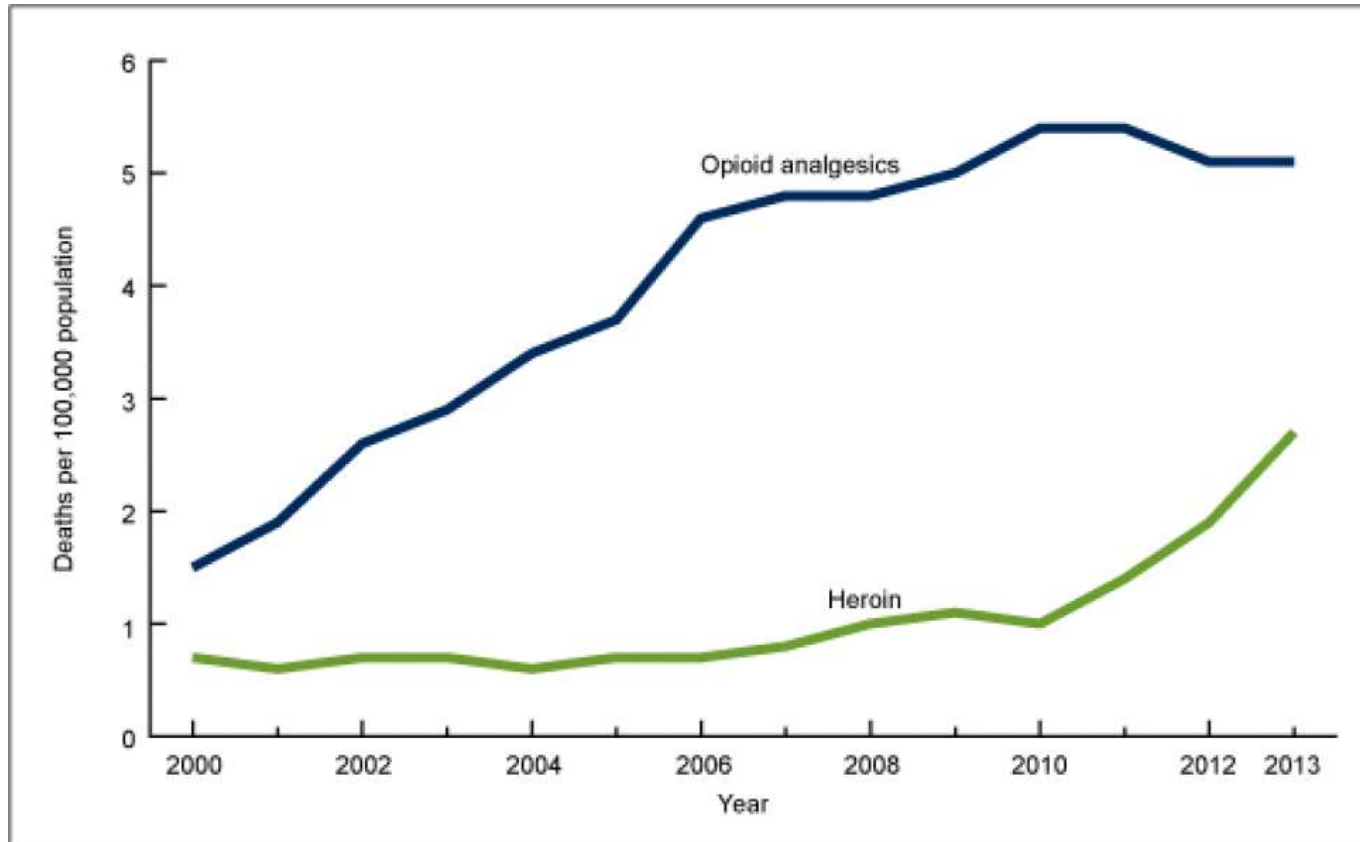
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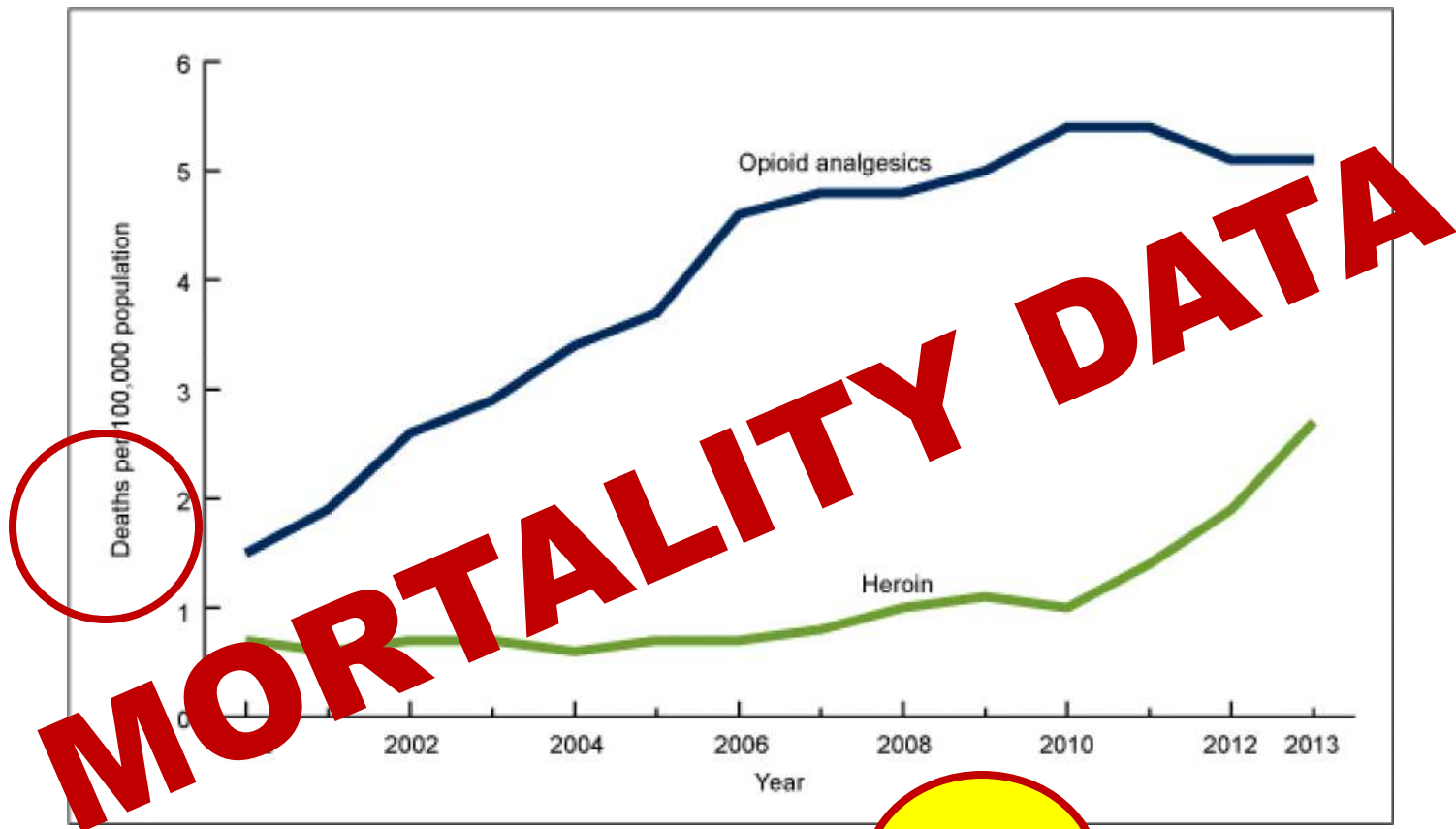


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# Opioid Drug Crisis



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# The Crisis is Defined by the Number of Deaths

Remarks by the President in Panel Discussion at the National  
Prescription Drug Abuse and Heroin Summit,  
March 29, 2016, Atlanta, Georgia

DR. GUPTA: Mr. President, I'm going to start with you.  
...Why this particular topic for you, sir?

THE PRESIDENT: Because it's important, and it's costing lives, and it's devastating communities. ... My job is to promote the safety, the health, the prosperity of the American people. ...You mentioned the number 28,000. I's important to recognize that today we are seeing more people killed because of opioid overdose than traffic accidents.

# Death Certificate Data is Problematic

- ❖ May not attribute the death to drugs
- ❖ May not name the drugs
- ❖ Limited information content
- ❖ And it is secondary information



ORIGINAL ARTICLE

*a*FP

An Underestimation of Heroin Deaths Due to the Use of “Acute Opiate Intoxication” on Death Certificates

James R. Gill, Gregory A. Vincent, Allison Toriello, Lewis S. Nelson

# DATA

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- **Medical Examiner/Coroner offices**

# Death Investigation

- Drug Overdoses

but also...

- Drug-involved Accidents
- Homicides from Drug Trafficking

and

- General Population Drug Use

**& detailed information on each case**

# Death Investigation

**ME/C have:**

- **legal authority, “police power”, & societal mandate to investigate deaths**

**Forensic Pathologists have:**

- **the medical license to conduct autopsies and make medical diagnoses**

**Autopsies permit:**

- **adequate specimen collection**
- **distribution studies**

# Death Investigation

- ❖ 2,400 ME/C offices
- ❖ Investigate 500,000 deaths
- ❖ Toxicology is important to MDI

**State & Local Issue**

# Death Investigation

- ❖ **Death may not be reported**
- ❖ **Drugs may not be suspected**
  - ➔ **Death is not investigated**
- ❖ **Drugs may not be suspected**
  - ➔ **Toxicology not tested**

**57 yo obese diabetic  
with heart failure  
died at home in bed**





# Prescription of Long-Acting Opioids and Mortality in Patients With Chronic Noncancer Pain

Wayne A. Ray, PhD; Cecilia P. Chung, MD, MPH; Katherine T. Murray, MD; Kathi Hall, BS; C. Michael Stein, MB, ChB

**CONCLUSIONS AND RELEVANCE** Prescription of long-acting opioids for chronic noncancer pain, compared with anticonvulsants or cyclic antidepressants, was associated with a significantly increased risk of all-cause mortality, including deaths from causes other than overdose, with a modest absolute risk difference. These findings should be considered when evaluating harms and benefits of treatment.

JAMA 2016; 315(22):2415-2423

**Alternative Explanation:**

**We're missing cases of overdoses!!**

**In the News!!**

## States' Shortage of Forensic Pathologists Delays Autopsies

Nation faces scant supply of medical examiners, particularly in rural areas

### County flies in pathologists as overdose deaths surge

<http://www.democratandchronicle.com/story/deaths-surge/85837274/>

Rochester County Democrat & Chronicle

Facing a glaring shortage of pathologists an County Medical Examiner's office is urgent unusual temporary help — contractors who autopsies.

Three of the four slots for forensic patholog in court — are vacant. The county paid a ha year so it could keep up with the soaring cas

Overdose deaths stressing limits of medical examiner, coroner offices



### Drug overdose deaths overwhelm US medical examiners, coroners

Written by Brooke Murphy | June 27, 2016

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**in** Share

A spike in drug overdose deaths in the United States has overwhelmed medical examiners and coroners and created a shortage of places to store bodies awaiting autopsy and toxicology procedures, reports *The Boston Globe*.

# Toxicology

- ❖ Not just toxicology drug screen
- ❖ Forensic toxicology testing
- ❖ Capable of new drug testing

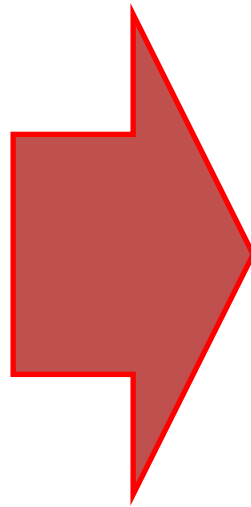
- 
- Not hospital toxicology
  - Not drug chemistry

# **Postmortem Forensic Toxicology**

- **Medical Examiner Offices**
- **Crime Laboratories**
- **Private Laboratories**

# No Longer Single Common Drug

- Barbiturate
  - Amphetamine
  - Morphine
- or
- Cocaine



- B 25I NBOMe
  - U47700
  - Mitragynine
- and
- Etizolam

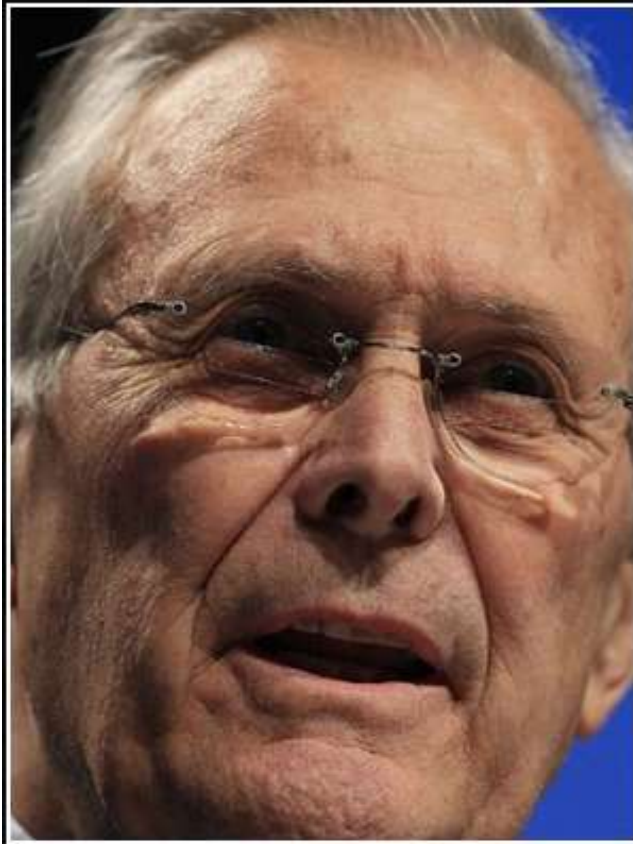
**Now Multiple Drugs including  
Novel Psychoactive Substances**

# Designer Drugs

- ❖ **Synthetic Cannabinoids**
- ❖ **Cathinones**
- ❖ **Fentanyl Derivatives**
- ❖ **Opiates**
- ❖ **Benzos**
- ❖ **etc.**



~ 100 NPS introduced in 2014



There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we know we don't know. But there are also unknown unknowns. There are things we don't know we don't know.

— *Donald Rumsfeld* —

# New Drugs

- ❖ **Need awareness of new drugs**
- ❖ **Need validated protocols (~\$30K/ea)**
- ❖ **Need new drug reference samples**
- ❖ **Need requisite instrumentation**
- ❖ **Need expertise for new instrumentation**
- ❖ **Need research on interpretation:  
pharmacology & cognitive effects**



# Instrumentation

not just GC- MS anymore

## SEPARATIONS

- SFC
- 2D LC
- Flip-Flop
- CE

## MASS SPECTROMETRY

- LC-MS/MS
- HRMS
- Q-TOF
- Orbitrap

# Interpretation

- ❖ Interpretation is not just a level
- ❖ Postmortem Redistribution?
- ❖ Postmortem Metabolism?
- ❖ Pharmacokinetic considerations
- ❖ Pharmacogenomic considerations
- ❖ Naïve user v. Tolerant user?
- ❖ Hysteresis phenomena?
- ❖ Medical Considerations



**Requires Medicolegal Investigation**

# Information

❖ **The information must be shared**

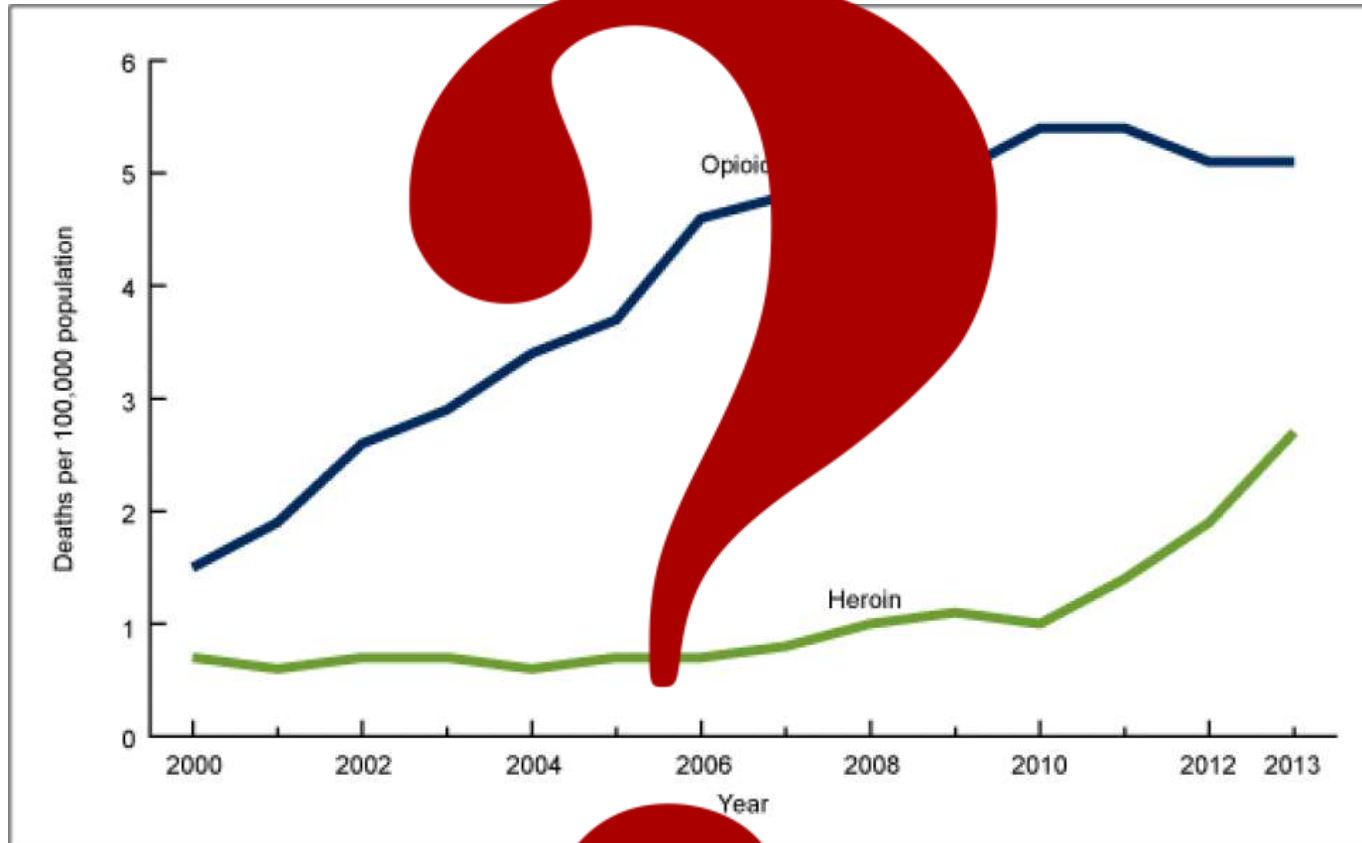
STRENGTHENING THE MEDICOLEGAL-  
DEATH-INVESTIGATION SYSTEM:  
IMPROVING DATA SYSTEMS

Executive Office of the President  
National Science and Technology Council



September 2016

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# **MDI-Tox appears unable to keep up**

- ❖ **Existing Opioid Crisis Response has yet to recognize MDI-Tox component!**
  - **No \$\$ has gone to ME/Cs or For Tox Labs**

# No Situs for Coordination within the Federal Government

**Orphaned !!**

- ❖ **Virtually no  
fed FP/For Tox**
- ❖ **AFMES**
- ❖ **FBI tox**



# **NCFS Recommendation for a National Office of Medicolegal Death Investigation**

**Considerations might include:**

**ONDCP**

**DOJ**

**CDC**

# Considerations/Possible Solutions

- ❖ **Formula Grants (Coverdell)**
- ❖ **Underserved Area Grants**
- ❖ **Competitive Research Grants**
- ❖ **Instrumentation/Automation Grants**
- ❖ **Reference Drug & Drug Metabolite Program**
- ❖ **Student Loan Forgiveness**
- ❖ **Postdoctoral Research Positions**
- ❖ **FMG Facilitation**
- ❖ **Outsourcing Grants**
- ❖ **Information Sharing Network**





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