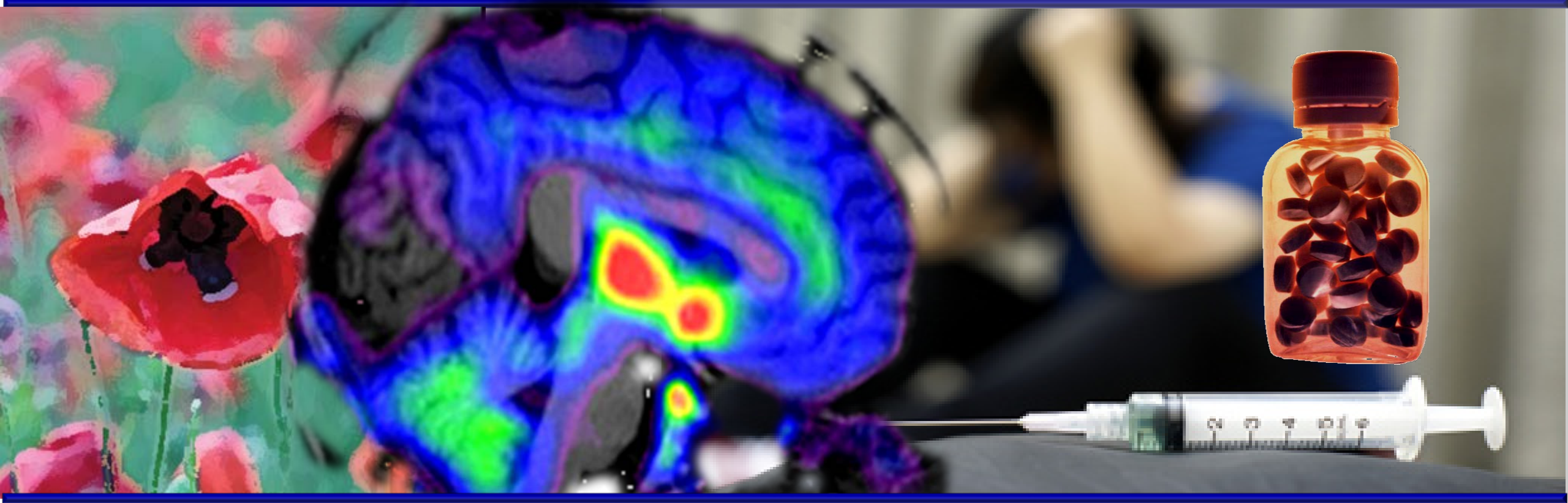


NIH's Efforts to Reduce the Opioid Epidemic



Nora D. Volkow, M.D.
Director

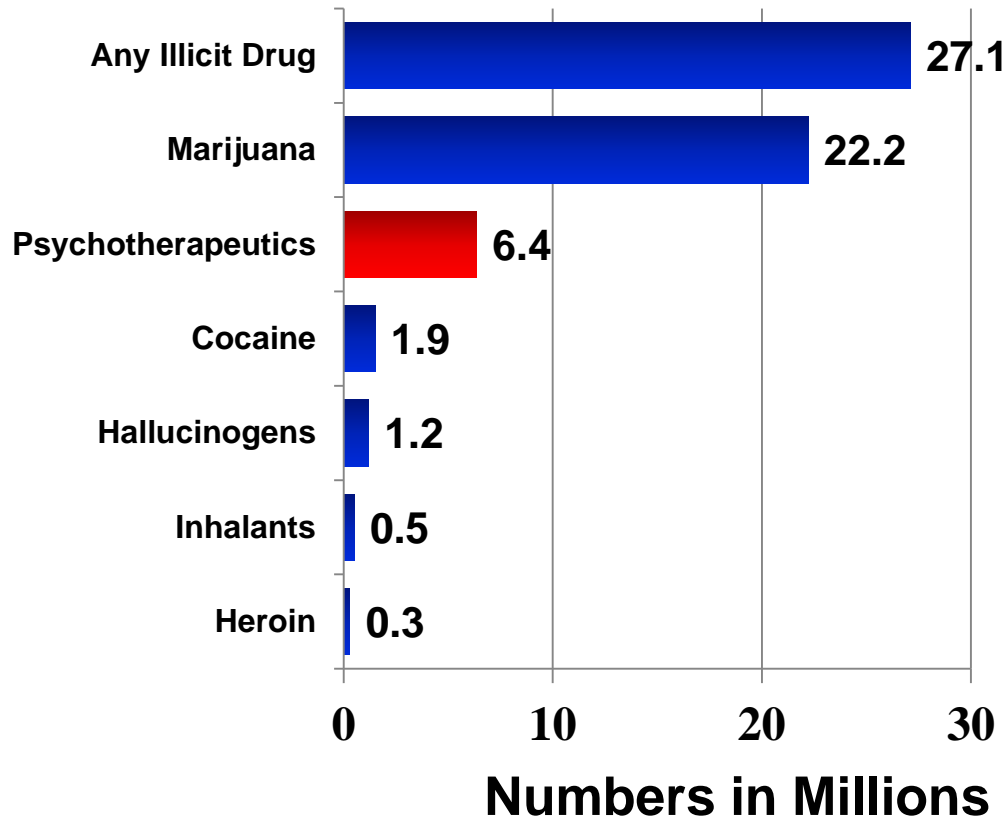
**National Institute
on Drug Abuse**



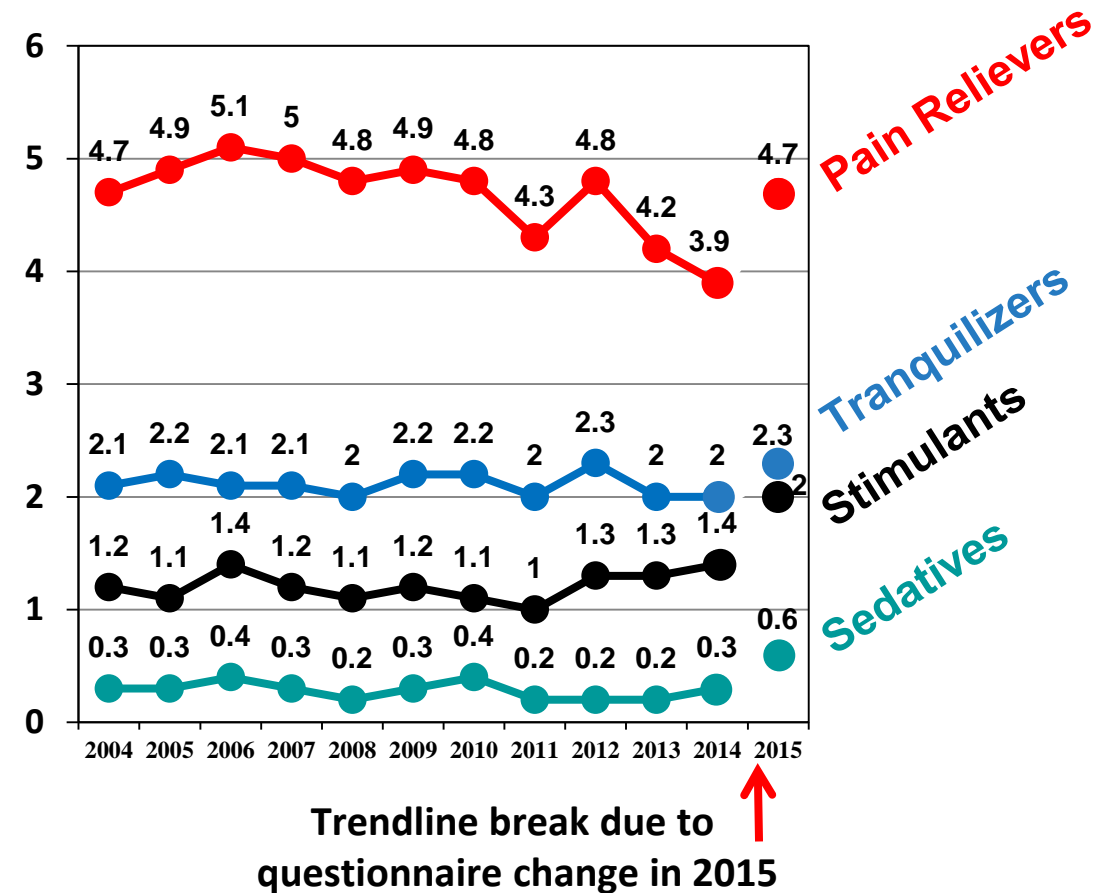
@NIDAnews

Prescription Drug Misuse/Abuse is a Major Problem in the US

Current Drug Use Rates in Persons Ages 12+



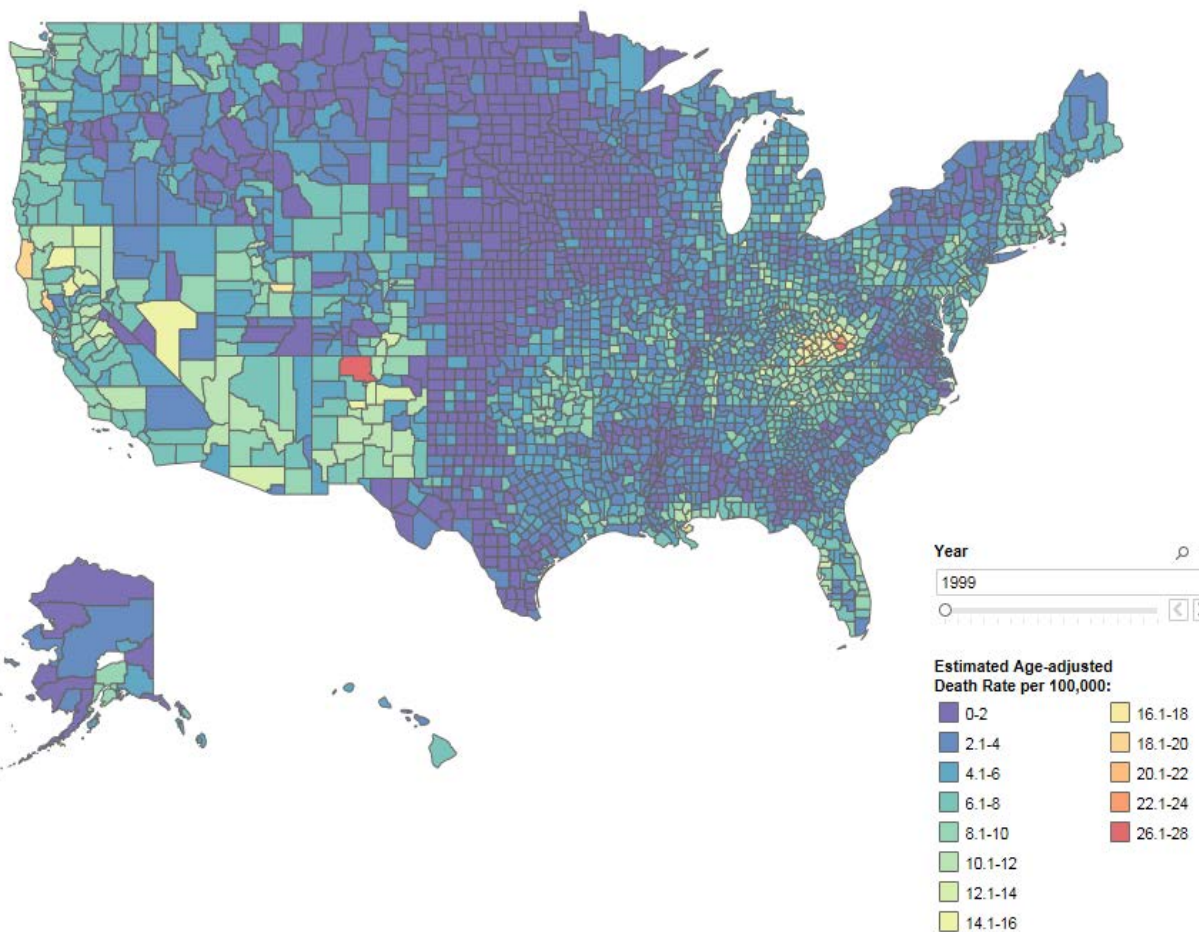
Past Year Nonmedical Use of Psychotherapeutic Drugs Persons Ages 12+



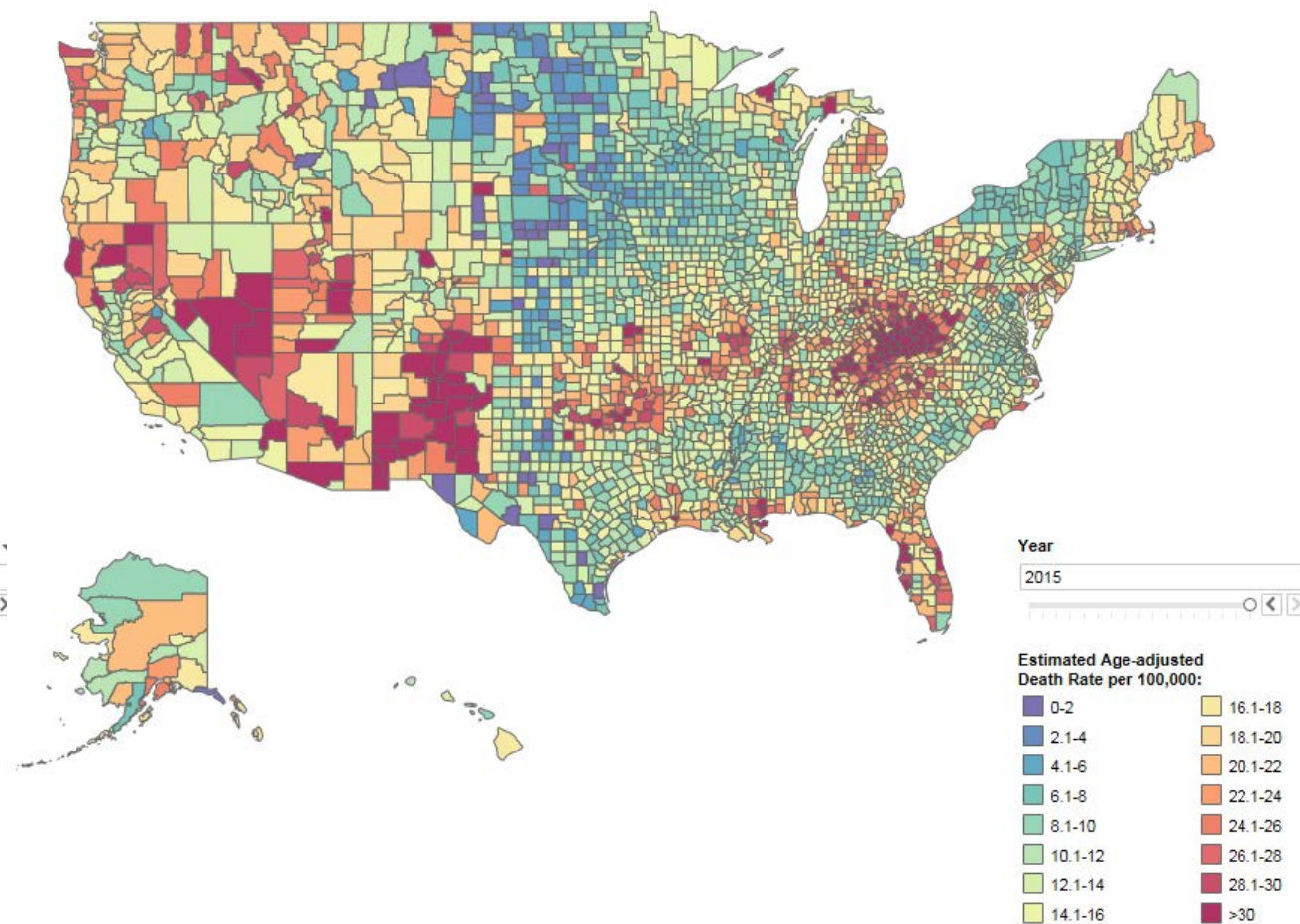
Source: SAMHSA, 2015 National Survey on Drug Use and Health, 2016.

Overdose Death Rates

1999

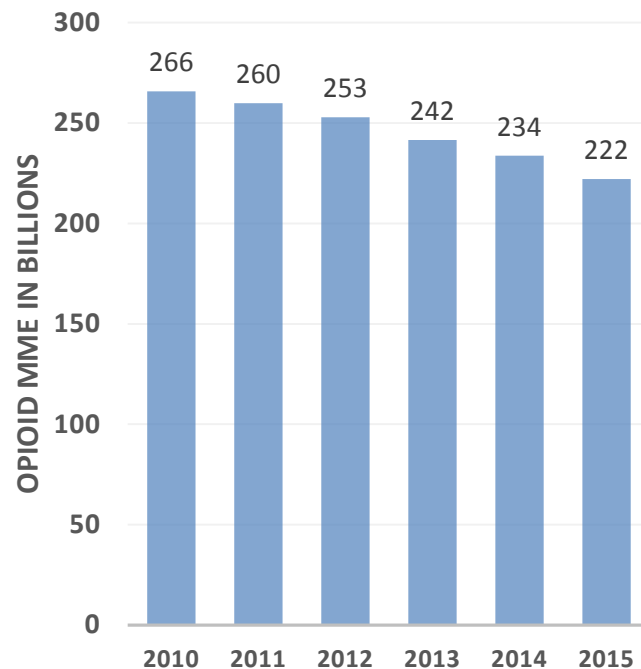


2015



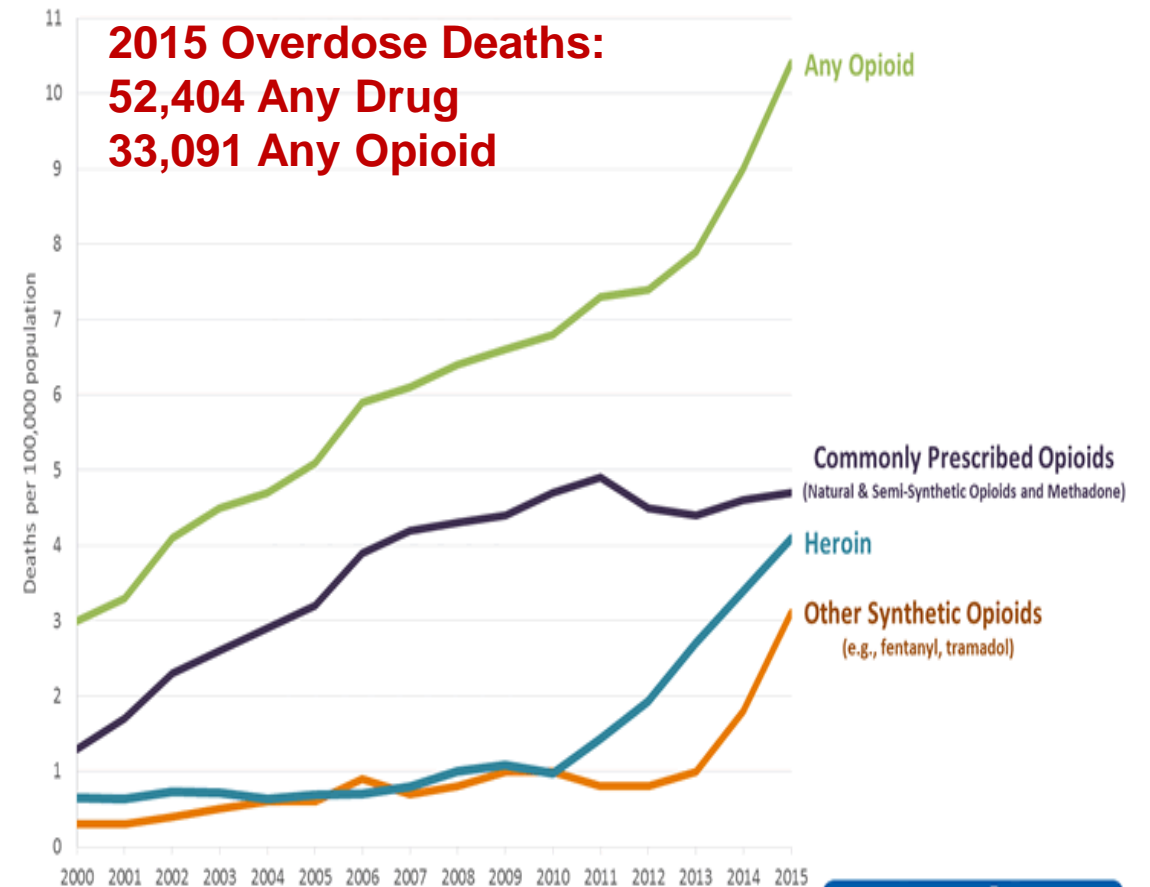
Opioid **Prescriptions** have started to **Decrease** but Opioids **Fatalities** are still **Increasing**

Opioid morphine milligram equivalents (MME) dispensed fell by over 15% from 2010-2015



Source: IMS Health, U.S. Outpatient Retail Setting

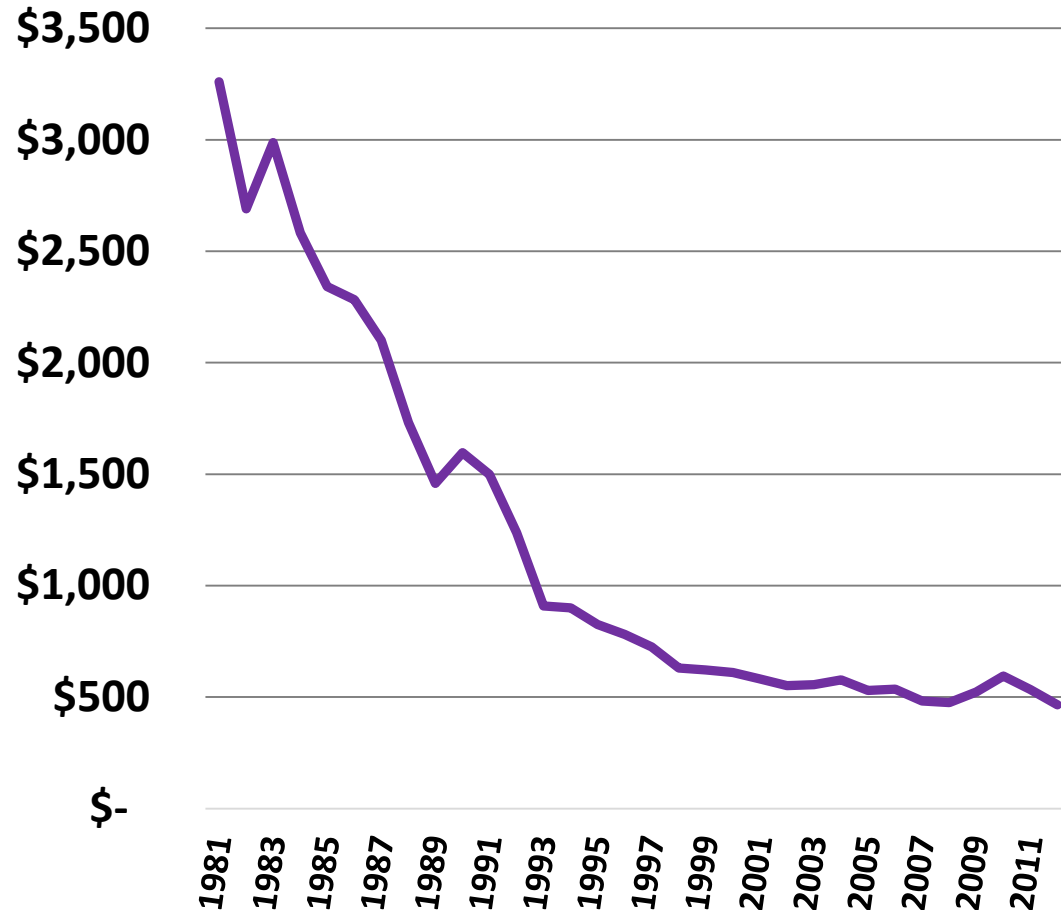
Opioid OD Deaths US, 2000-2015



SOURCE: CDC/NCHS, National Vital Statistics System, Mortality. CDC WONDER, Atlanta, GA: US Department of Health and Human Services, CDC; 2016. <https://wonder.cdc.gov/>.

Heroin Price Has Decreased in Recent Years

"Retail" Price Per PureGram

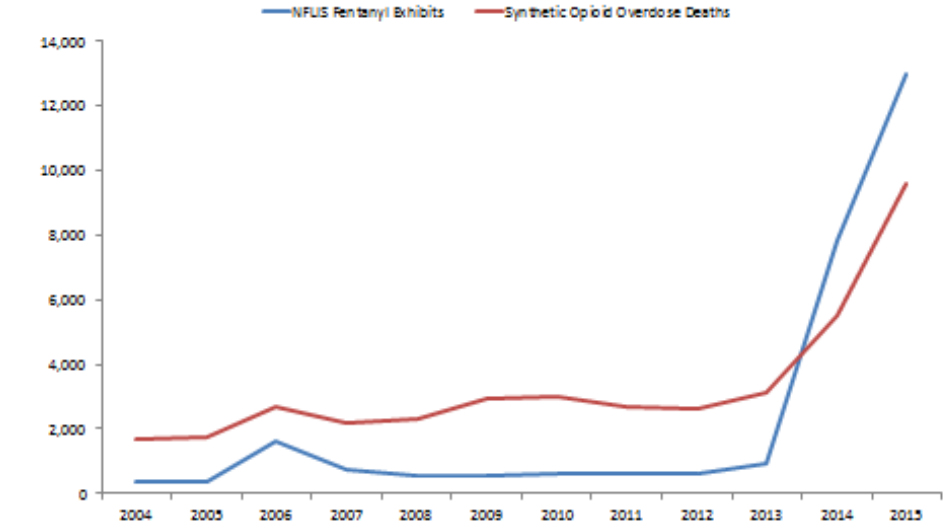


National Drug Control Strategy--Data Supplement 2014.
https://www.whitehouse.gov/sites/default/files/ondcp/policy-and-research/ndcs_data_supplement_2014.pdf

Emerging **Illicit Synthetic Opioids**



Synthetic opioid deaths closely linked to illicit fentanyl supply



Source: DEA and CDC NVSS 2017.

- Increasing reports of fentanyl laced-heroin and prescription pills
- Other synthetic opioids emerging i.e., Carfentanil

NIH OPIOID RESEARCH INITIATIVE

Using Research to End the Opioid Crisis

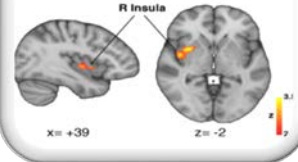
PAIN MANAGEMENT

Safe, more effective strategies

Non-Pharmacological
Treatments (e.g. TMS)



Biomarkers for Pain



Vaccines or Antibodies
Against Opioids or
Pain Producing
Chemicals

Non-Opioid
Analgesics



Respiratory
Stimulation
Devices

OPIOID ADDICTION TREATMENT

New and innovative
medications and
technologies

OVERDOSE REVERSAL

Interventions to reduce
mortality and link to
treatment

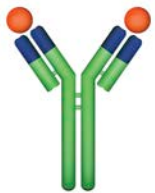
Safe, More Effective Strategies for Pain Management



Non-Opioid Analgesics
Cannabinoids;
Inflammatory mediators;
Ion channel blockers



Targeted Opioid Analgesics
with reduced potential for
addiction and overdose

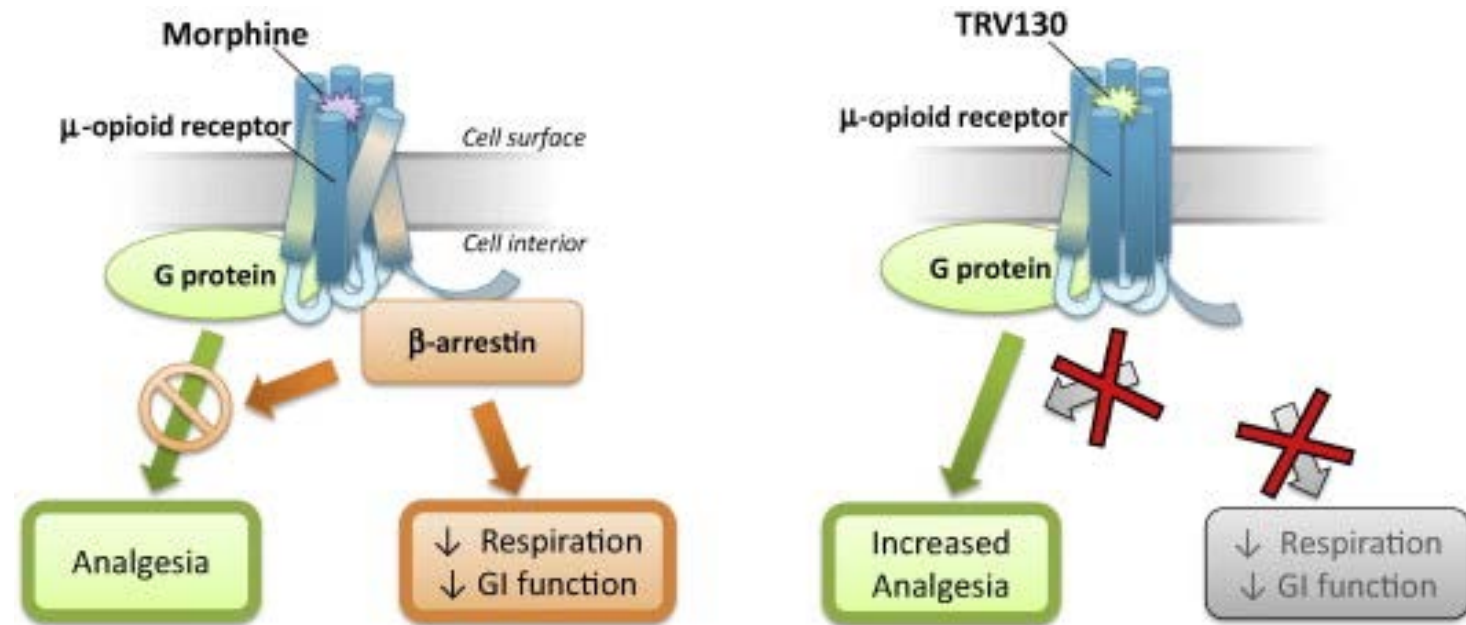


Biologics
e.g. antibodies that bind to
pain producing cytokines



Non-pharmacological treatment
Neural stimulation;
Surgical interventions;
Meditation

Biased Mu-Opioid Receptor Ligands: New Generation Of Pain Therapeutics



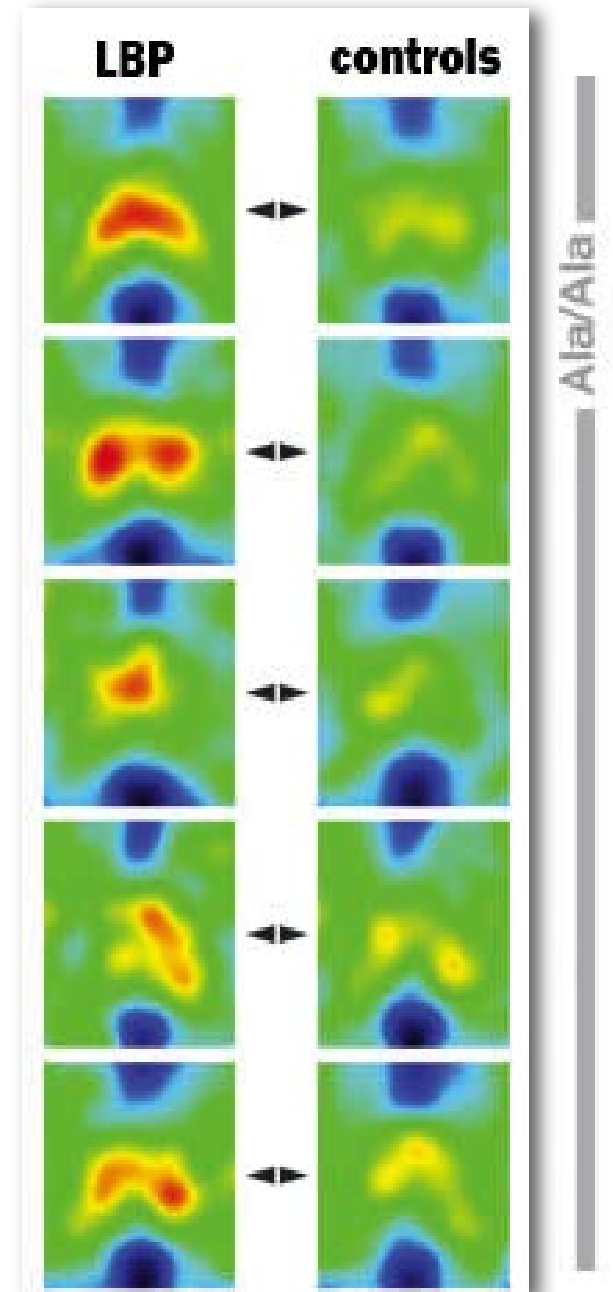
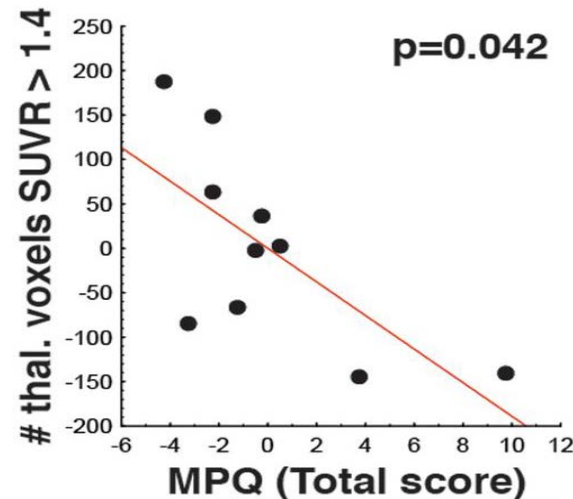
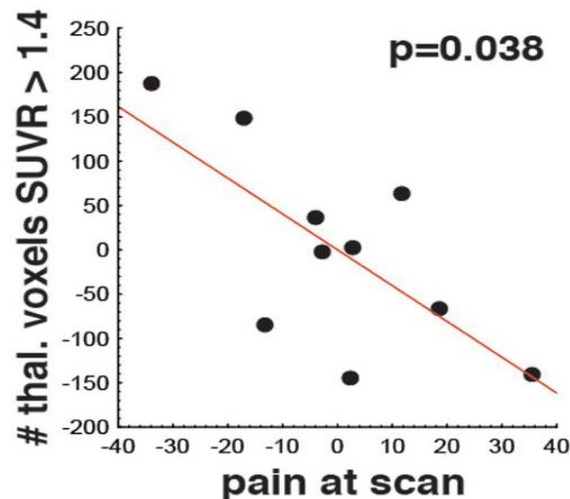
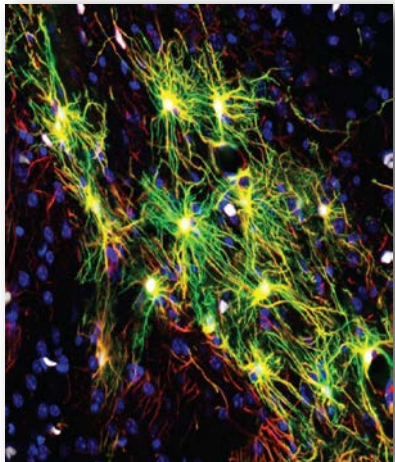
Soergel DG et al., Pain 2014; 155(9):1829–1835.

Knowledge of Pain Pathways –

New Biomarkers for Pain?

New study assess glial role in human pain

- Patients with low back pain (LBP) versus controls
 - Uses PET to detect levels of glial protein (TSPO)
 - Demonstrates role of glial activation in human pain
 - Possible biomarker
 - May suggest new treatments for chronic pain



Loggia et al., Brain 2015;138.

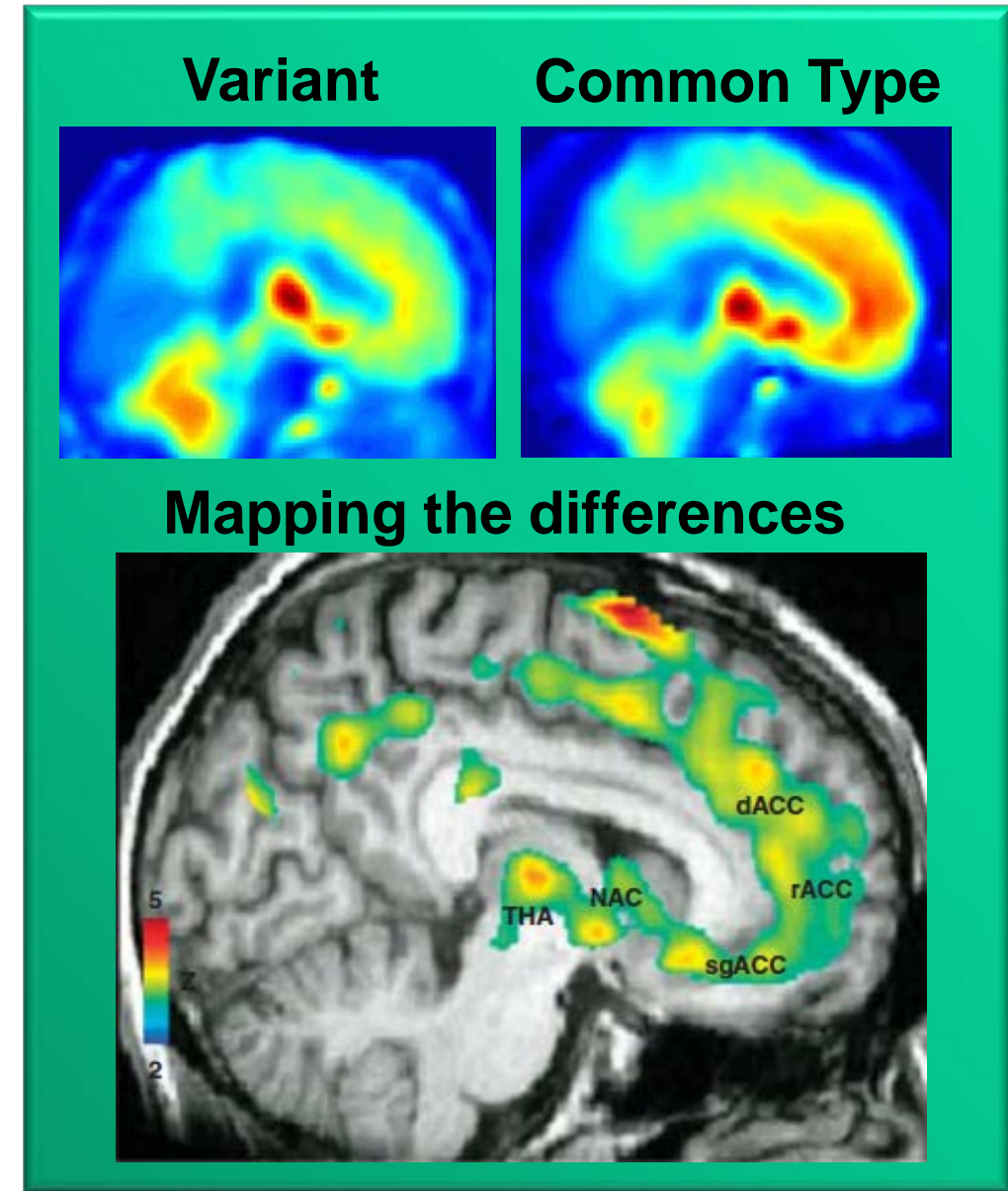
Limiting Abuse by Predicting Addiction

- *OPRM1* encodes for the target of opioids
- Can variants predict likelihood of addiction?
- *OPRM1* variant
 - Affects receptor levels in brain
 - Associated with increased risk for addiction, overdose severity

Hancock et al., Biol Psychiatry 2015; 78.

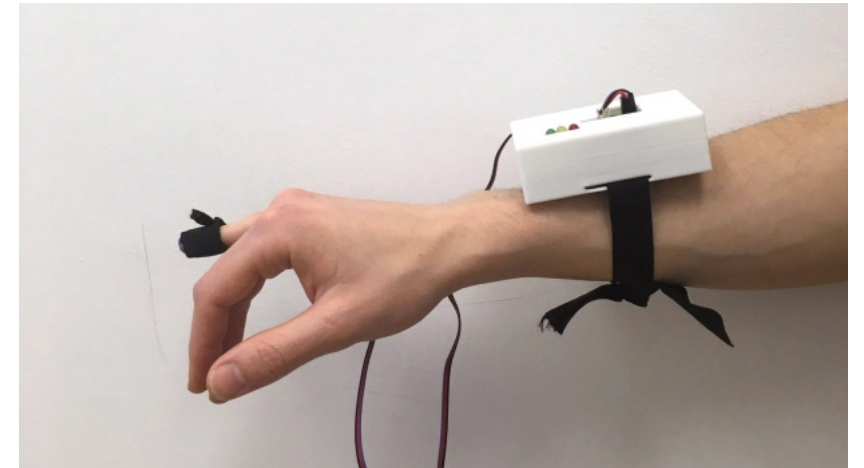
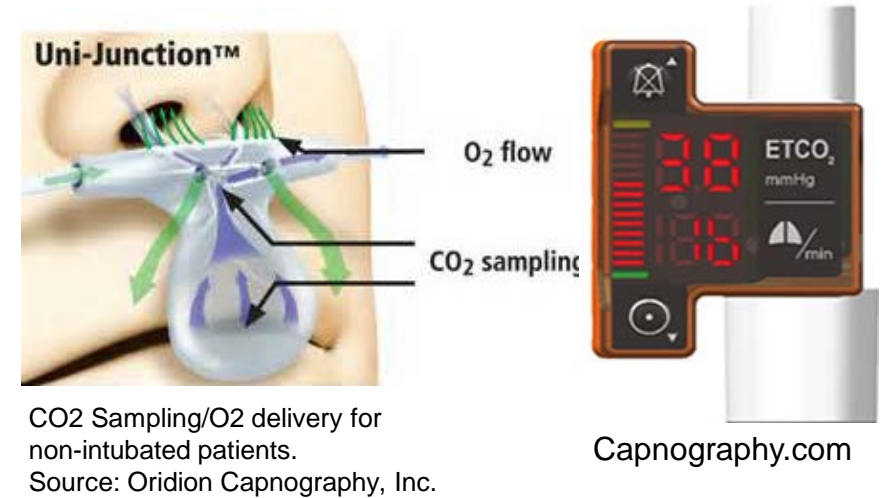
Manini et al., J Med Toxicol 2013; 9.

Peciña et al., Neuropsychopharmacology 2015; 40.



Overdose Treatment: Saving Lives for Future Recovery

- New stronger, longer acting formulations to address more potent opioids (e.g. fentanyl)
- Stimulation devices to prevent respiratory depression
- Overdose detection and alert technologies
- Post-overdose interventions to ensure engagement in treatment

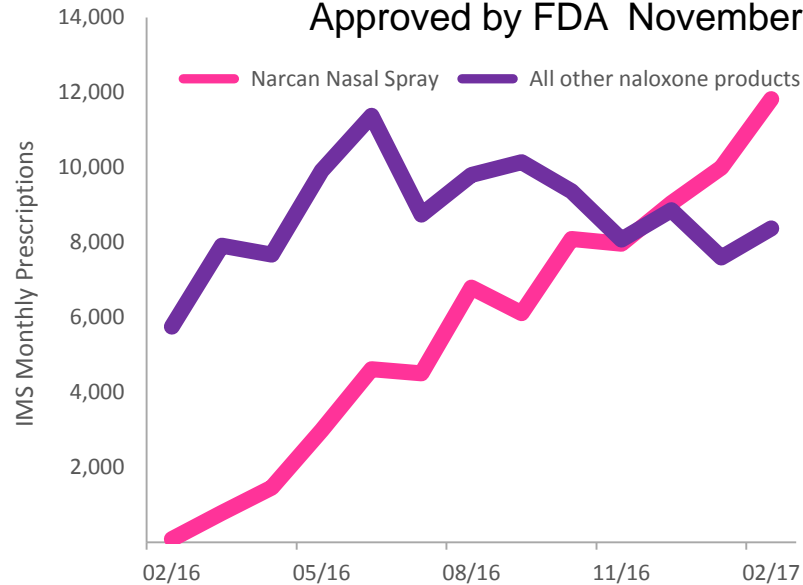


An early prototype of a device students at the University of British Columbia have created to detect drug overdoses.
(THE CANADIAN PRESS/HO-Courtesy of Sampath Satti)



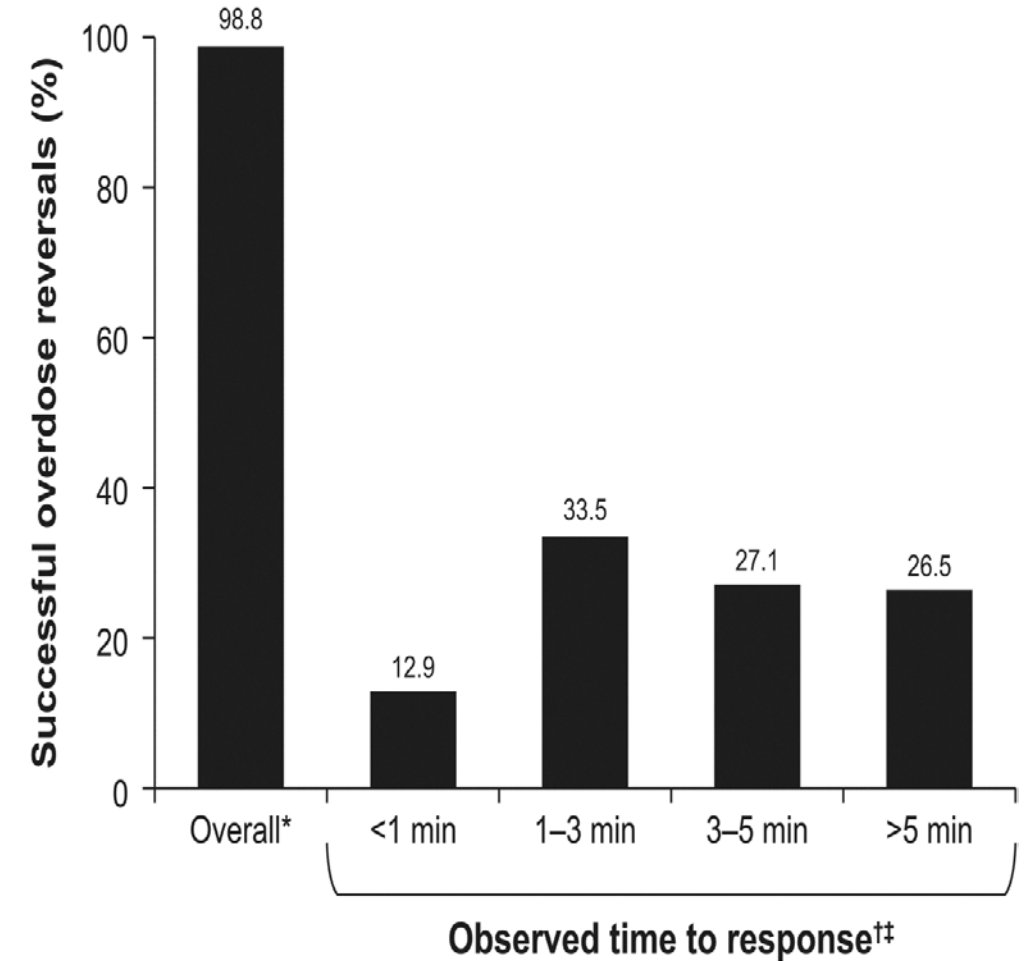
User Friendly Naloxone

NARCAN® Nasal Spray device-- \$37.50 per 4mg
Approved by FDA November 2015

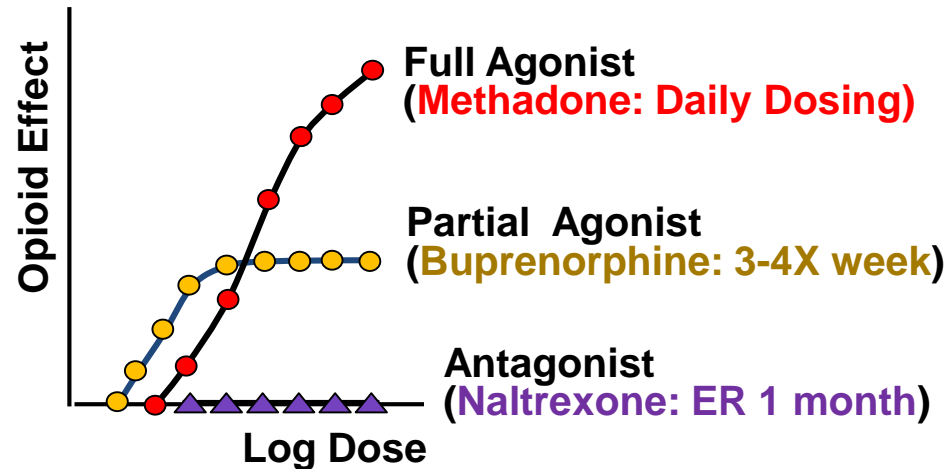
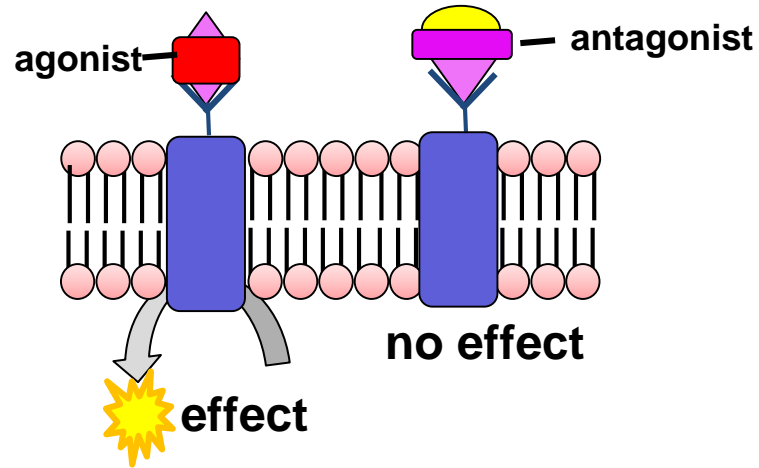


- Naloxone Px increased 3.5X in past year
- NARCAN® Nasal Spray is the most prescribed naloxone
- 900,000 NARCAN® Nasal Spray doses distributed since launch in 2/16

Opioid Overdose Reversal By Narcan® Nasal Spray



Medications Assisted Therapies for OUD



DECREASES:

- Opioid use
- Opioid-related OD deaths
- Criminal activity
- Infectious disease transmission

And INCREASES

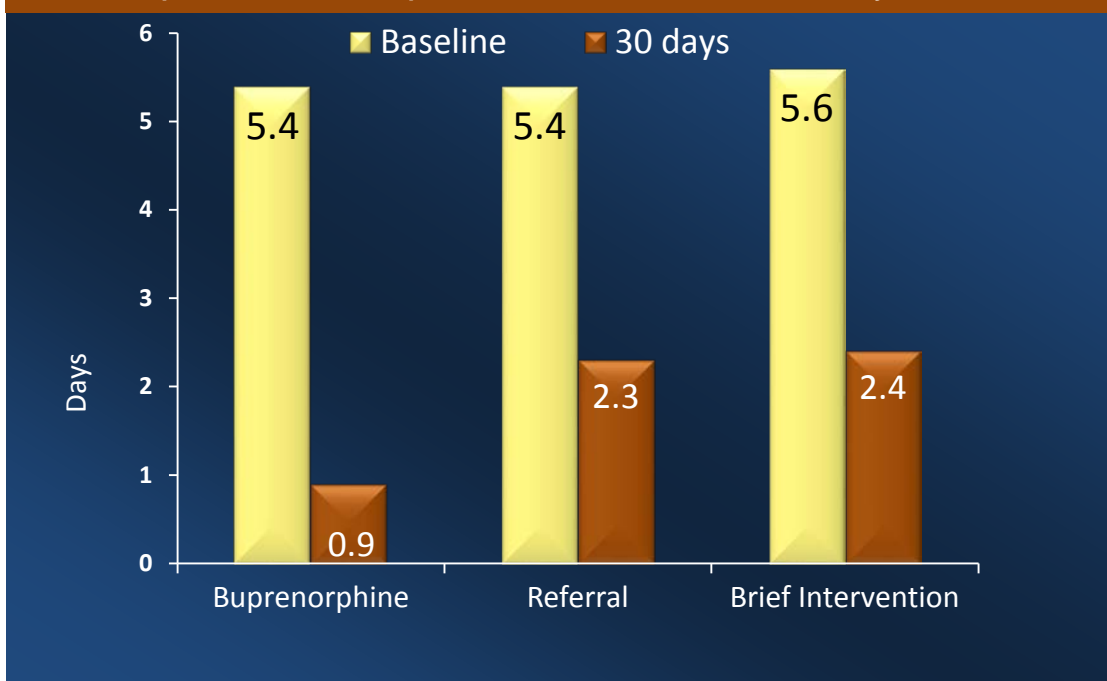
- Social functioning
- Retention in treatment
- Outcomes in NAS

MAT is highly underutilized

Emergency Department-Initiated Buprenorphine

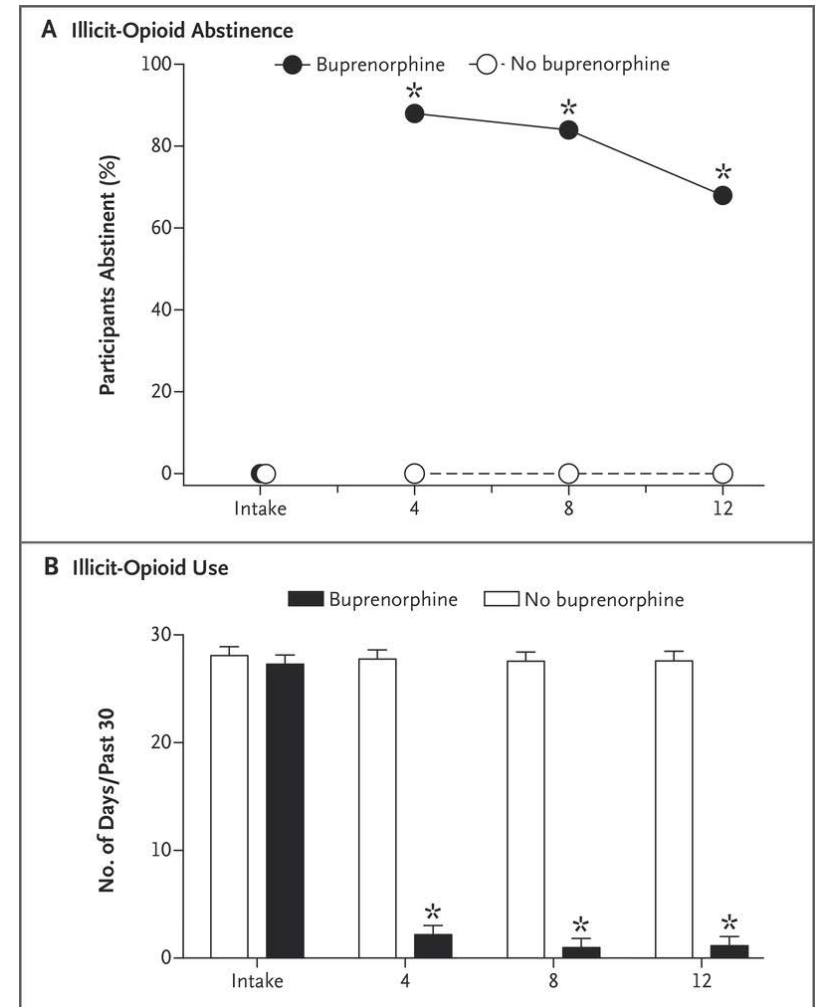
- Reduced self-reported, illicit opioid use
- Increased engagement in addiction treatment
- Decreased use of inpatient addiction treatment services

Self-Reported Illicit Opioid Use in the Past 7 Days



D'Onofrio G et al., JAMA April 28, 2015.

Abstinence from Illicit Opioids over 12 Weeks with Interim Buprenorphine



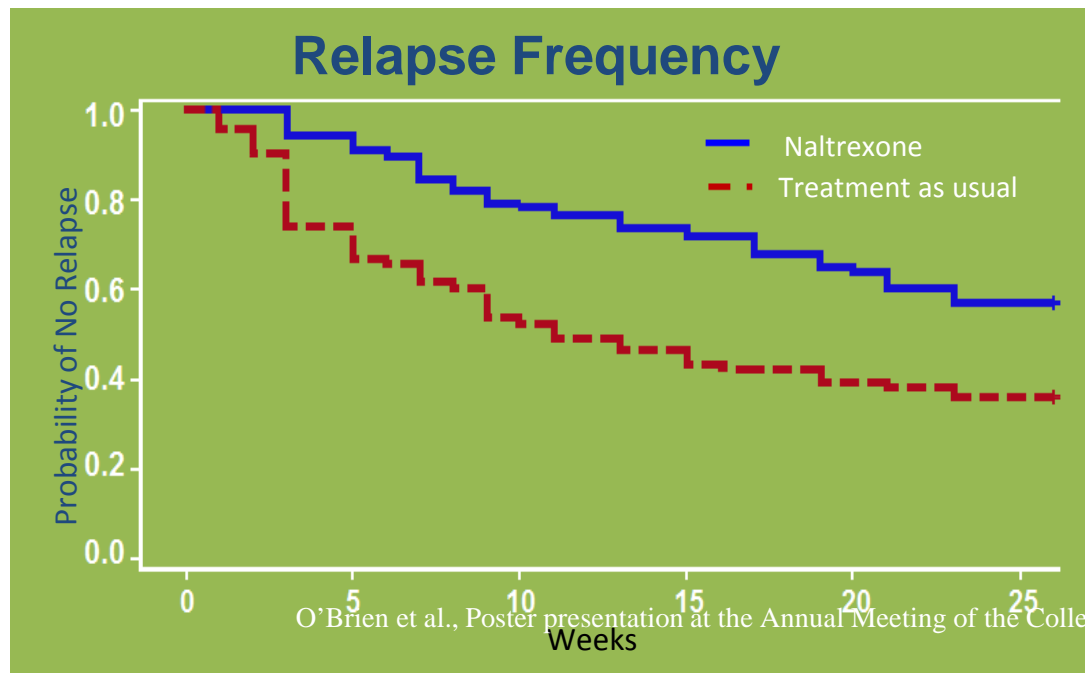
Sigmon SC et al. N Engl J Med 2016.

Improving Treatments for Addiction:



Naltrexone Trial in CJ Populations

- *Participants:* parolees/probationers with opioid addiction – all *volunteers* – received either
 - Monthly injections of extended release naltrexone for 6 months
 - Community treatment, including methadone or Suboxone (encouraged)



Overdoses in 78 weeks:

Control: 7

Naltrexone: 0

Lee et al. NEJM March 31, 2016.

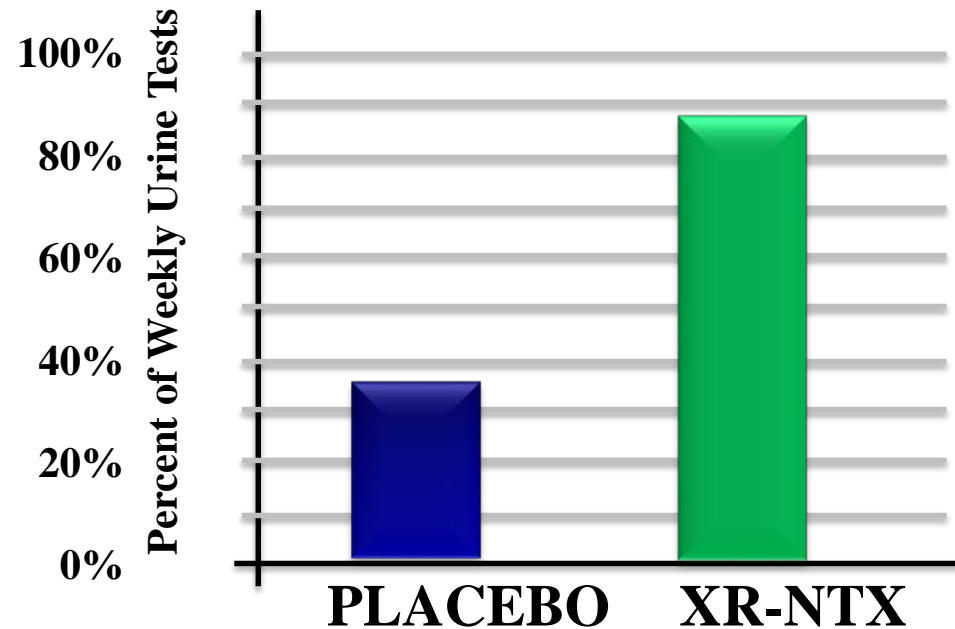
Extended Release Formulations

PROBUPHINE®



IM Injection q 4 weeks for 24 weeks

Median % Opioid-Negative Urines

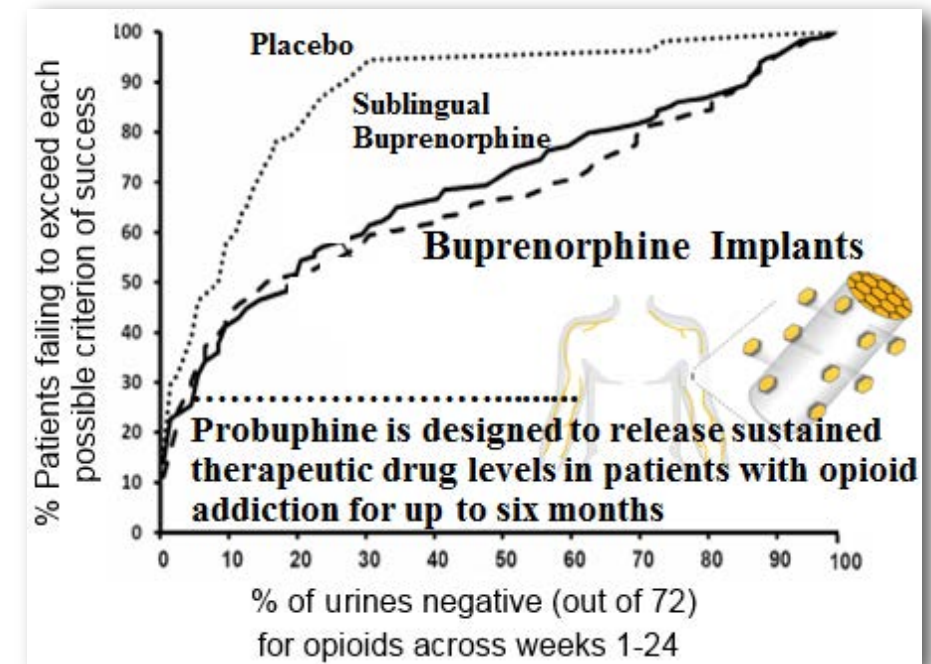


■ Placebo: N=124

■ XR-NTX: N=126

Krupitzky et al., Lancet 2011

PROBUPHINE®

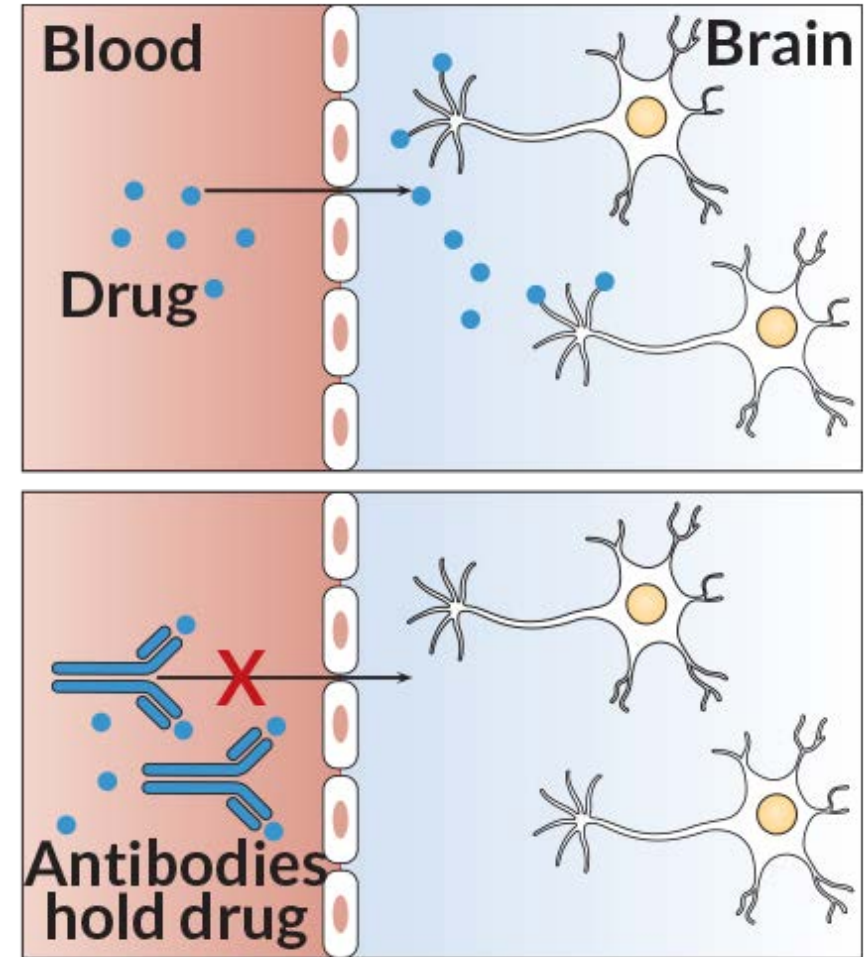
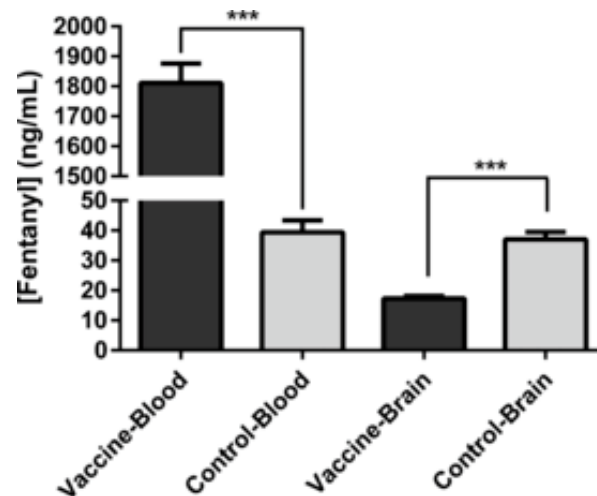
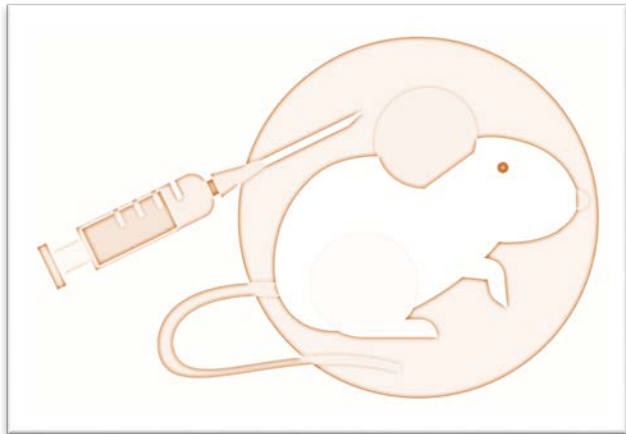


Rosenthal et al., Addiction 2013;105.

FDA approval – May 26, 2016

Innovative Opioid Addiction Treatments: Fentanyl Vaccine

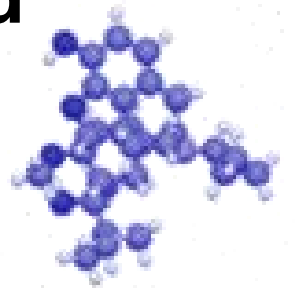
- 2016: First vaccine for fentanyl and fentanyl analogs reported in a mouse model
- Successfully stimulated antibody production
- Reduced fentanyl reaching the brain
- Reduced analgesia and protected against overdose



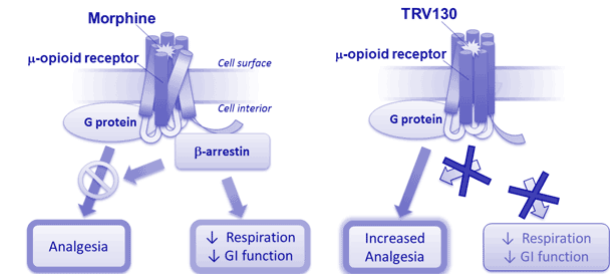
*Bremer et al, 2016;
Janda and Treweek, 2012.*

Cutting Edge Science Meeting Series to End the Opioid Crisis

**1 Medications Development for Opioid Use Disorders and
for Overdose Prevention and Reversal -- June 5, 2017**



**2 Development of Safe, Effective, Non-Addictive Pain
Treatments -- June 16, 2017**



**3 Understanding the Neurobiological Mechanisms
of Pain -- July 7, 2017**

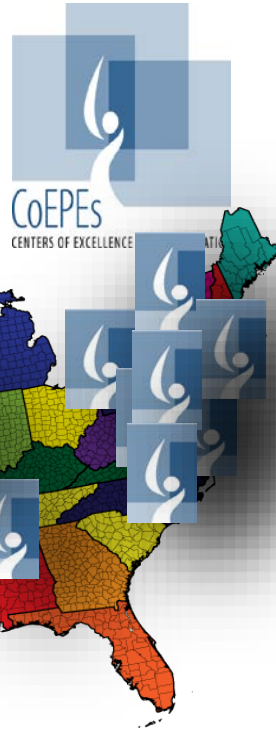


Education

PAIN

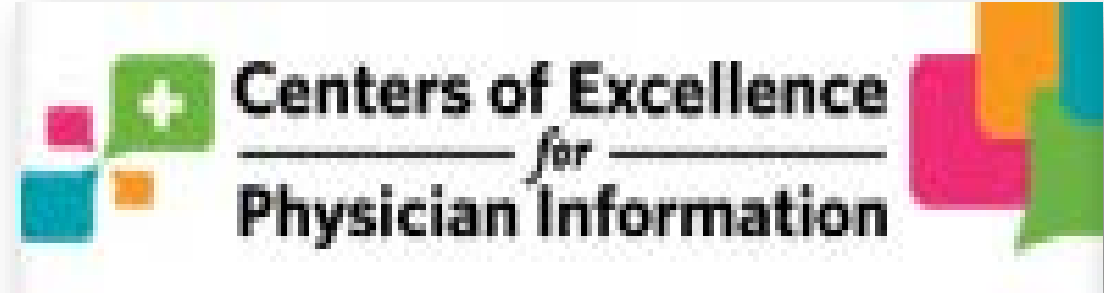
NIH Pain Consortium Centers of Excellence in Pain Education

ORWH NIA
OBSSR NINR
NIDA NICHD
NIDCR NIAMS
NINDS NCCIH



Goal:
Improve pain treatment
through education

SUD



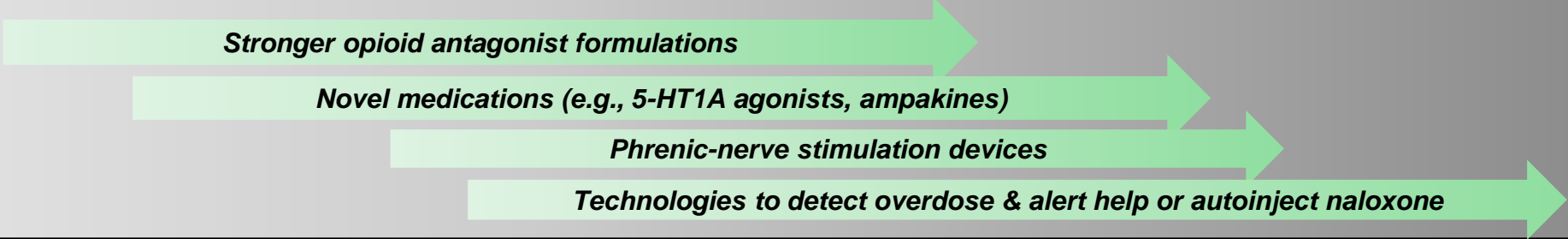
Goal:
Prevent SUD and improve
outcomes in addiction
through education of health
care providers



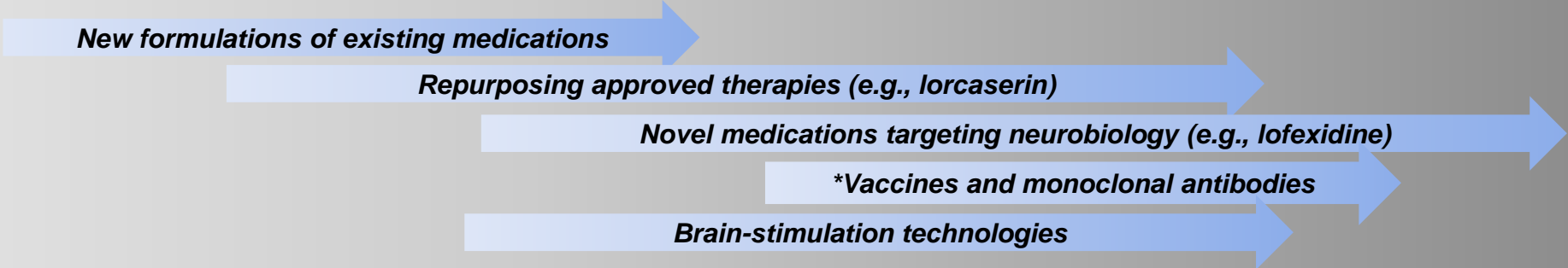
SCIENTIFIC STRATEGIES FOR COMBATING THE OPIOID EPIDEMIC

SHORT-TERM STRATEGIES INTERMEDIATE STRATEGIES LONG-TERM STRATEGIES

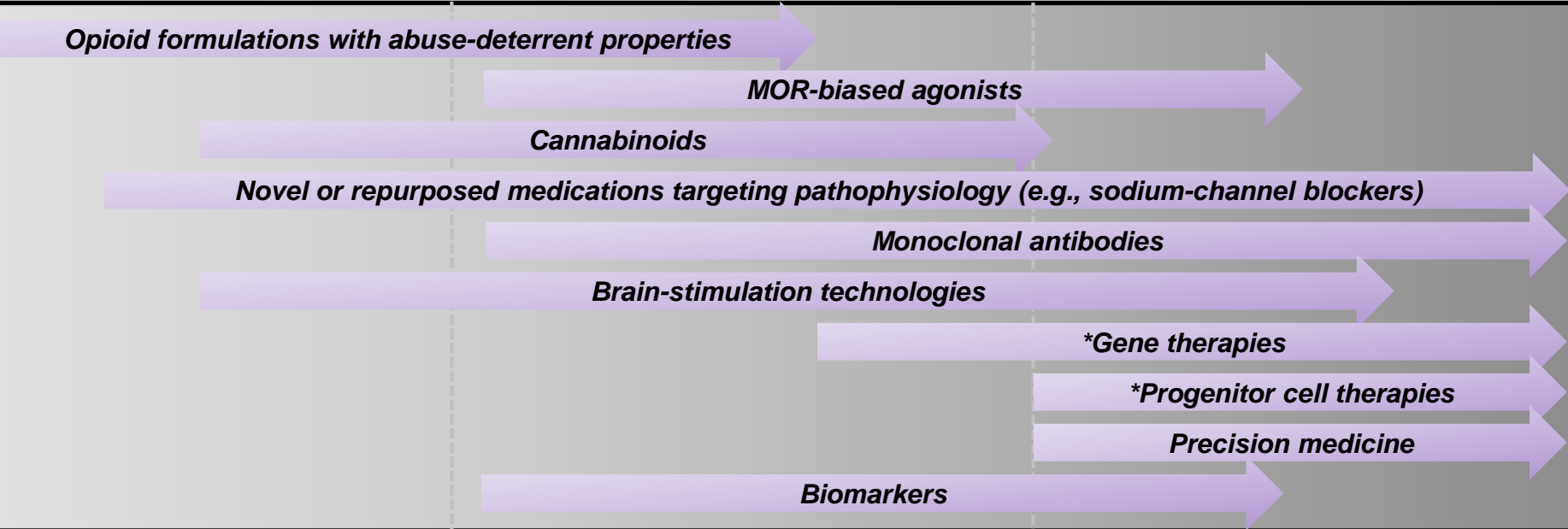
OVERDOSE PREVENTION & REVERSAL



TREATMENT OF OPIOID-USE DISORDERS



TREATMENT OF CHRONIC PAIN



Adapted from Volkow & Collins, NEJM, 2017.