The opioid epidemic: How what we already know can help us

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Painkillers And The Heroin Market

A growing number of people are using heroin in recent years, in part because it can be cheaper and easier to find than opioid painkillers purchased on the black market. **Most heroin users were first hooked on prescription opioids**, which generated $11 billion in 2010 for the pharmaceutical industry.

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**Substance abuse treatment facilities admissions by primary drug**

- Heroin
- Other Opiates and Synthetics

<table>
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<th>Year</th>
<th>Heroin</th>
<th>Other Opiates and Synthetics</th>
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</table>

*2012 data for Mississippi, Pennsylvania, and West Virginia are not available.

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**4 out of 5 new heroin users have abused painkillers.**

**A Cheaper High**

**$30 can buy one oxycodone pill on the street in New York...**

or six hits of heroin.

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Sources: SAMHDA, Los Angeles Times, Frost & Sullivan
Commonalities of Disorders

- ANATOMY:
  - Anterior Cingulate Cortex
  - Prefrontal Cortex
  - Hippocampus
  - Amygdala
  - Thalamus

- MOLECULAR DETERMINANTS:
  - Dysregulated Neurotransmitters
    - Serotonin
    - Dopamine
    - Norepinephrine
    - Acetylcholine
    - Glutamate
    - GABA
  - Altered Cytokine Profile
    - Increase proinflammatory cytokines (TNF, IL-1, IL-6)
    - Decrease antiinflammatory cytokines (IL-4, IL-10)

Hippocampus

↑ TNF
Neurobiological Circuitry of the Overlap of Pain and Addiction

Shurman, Koob, and Gutstein, Pain Medicine, 2010;11:1092-1098
The dark side of opioids

• Ineffective in many cases
• Serious side effects
• Tolerance
• Dependence
• Addiction
• Respiratory depression
• Constipation
• Etc.
Developmental Neurosciences: Do We Know Enough to Prevent or Reverse Major Behavioral Disorders?
Etiology of Addiction

Progression of the Addictive Process

Individual factors: Genetics, Life Stress

Reward
positive reinforcement

Relief
negative reinforcement

Escalating/Compulsive Use

Protracted Abstinence

Dependence/Withdrawal

Relapse
FDA Takes Important Steps to Stem the Tide of Opioid Misuse and Abuse

Posted on September 28, 2017 by FDA Voice

By Scott Gottlieb, M.D.
Imatinib reverses opioid tolerance in rats

Wang et al., Nature Medicine, 2012
Proposed mechanism of tolerance inhibition
STATE OF EMERGENCY
Rate of drug-related overdose deaths per 100,000 people in Pennsylvania counties in 2015

BY THE NUMBERS
QUIET EPIDEMIC
Sobering facts about substance abuse

53%
Percentage of overdose deaths in Pennsylvania in 2015 in which an opioid was found in toxicology test results

No. 3
Where Pennsylvania ranked among all U.S. states in the number of opioid deaths in 2014; only California and Ohio had more

6
The number of counties in western Pennsylvania in the top 10 of those in the state with the highest drug-related death rates per 100,000 people

Overdose deaths per 100,000 people
0-9 10-19 20-29 30-39 40-46
Pennsylvania Coroner Data, www.census.gov