

ENGINEERING NEURBIOLOGICAL SYSTEMS

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DRUG	AMERICAN DEATHS / YEAR
Tobacco	480,000
Alcohol	88,000
Opioid Overdose	59,000
Benzodiazepine Overdose	9,000
Cocaine	6,784
Methamphetamine	5,740
Total Deaths from Drugs	648,524
Total Deaths in United States	2,626,418

INDUSTRY	SALES - \$ BILLIONS
Benzodiazepine	509
Alcohol	212
Tobacco	128
Marijuana-If legalized in US	45
Mexican / Columbian Drug Cartels	29
Opioid Medications	19
Comparison-US Auto	70

Upstate Addiction/Pain Medicine

Transference Focused Psychotherapy Staff

- 2 Addiction Psychiatry Fellows
- PGY 1 Psychiatry Residents: 12 weeks
- MS 3 and 4 Medical Students

Pain Service

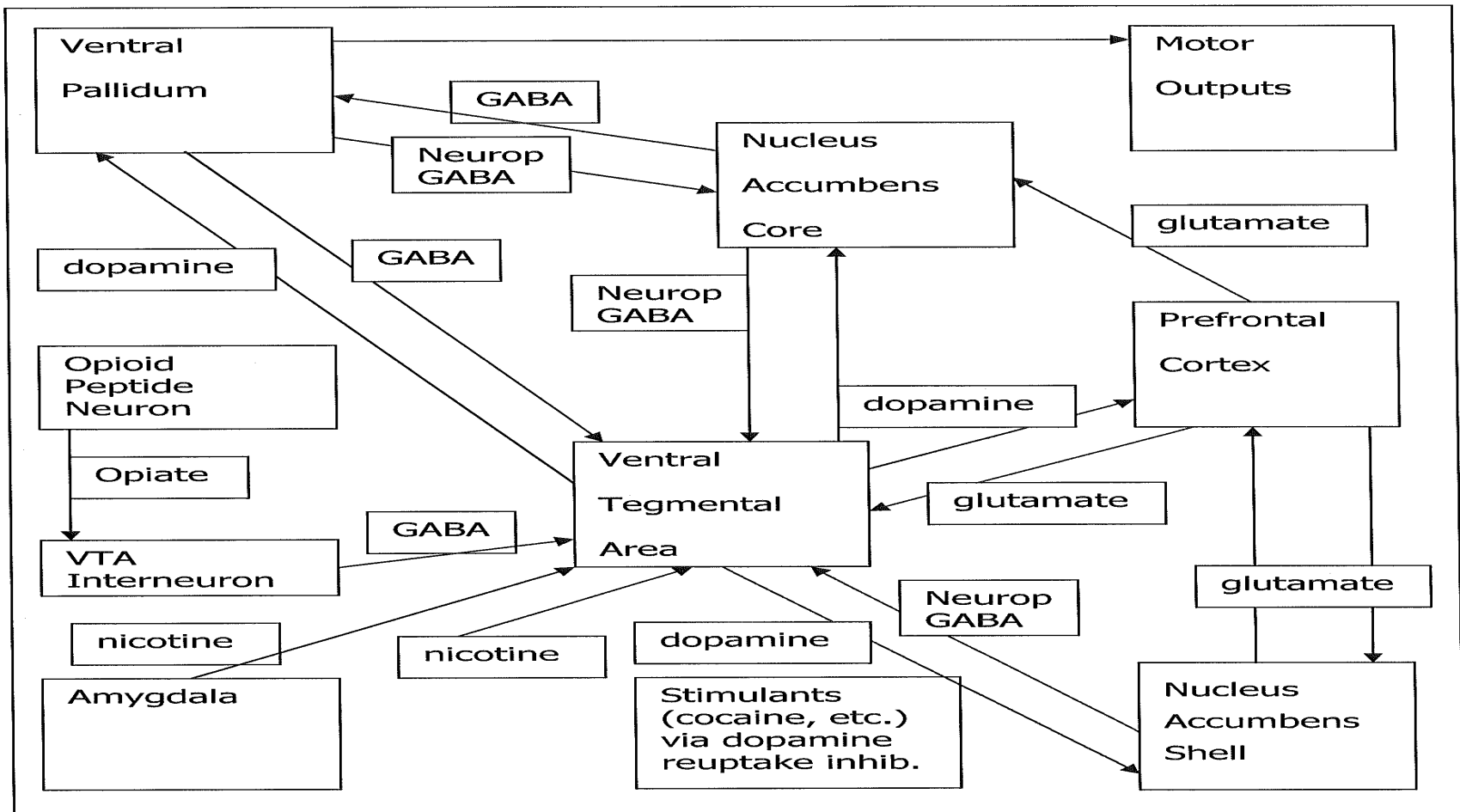
- Pain Fellows
- Internal Medicine, Neurology Residents
- MS 1 and 2 Medical Students

Engineering Biology

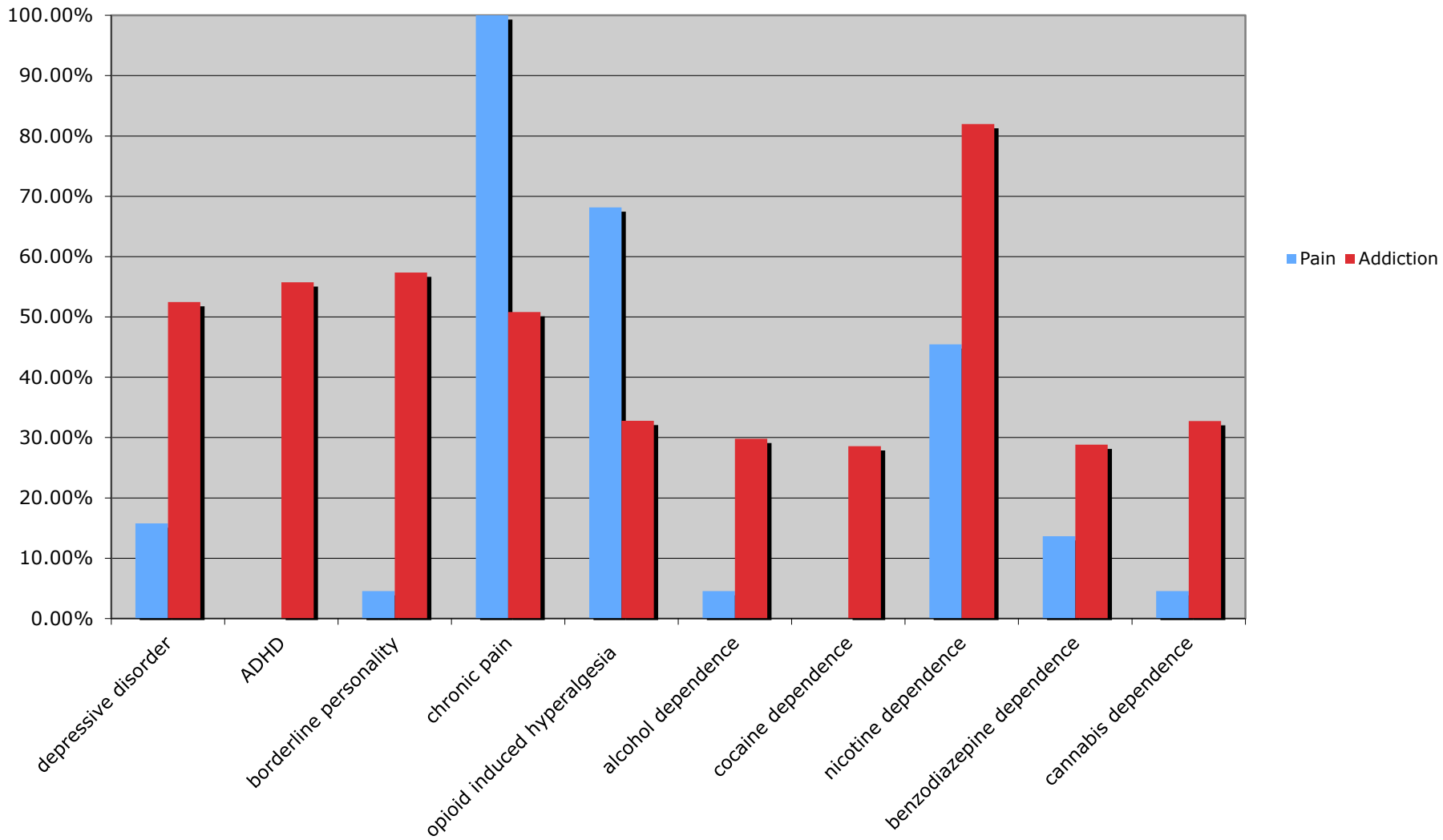
The purpose of an abstraction hierarchy is to hide information and manage complexity

To be useful, biological engineering abstraction hierarchies must allow individuals to work at any one level of complexity without regard for the details that define other levels, yet allow for the principled exchange of limited information across levels

BRAIN ADDICTION PATHS

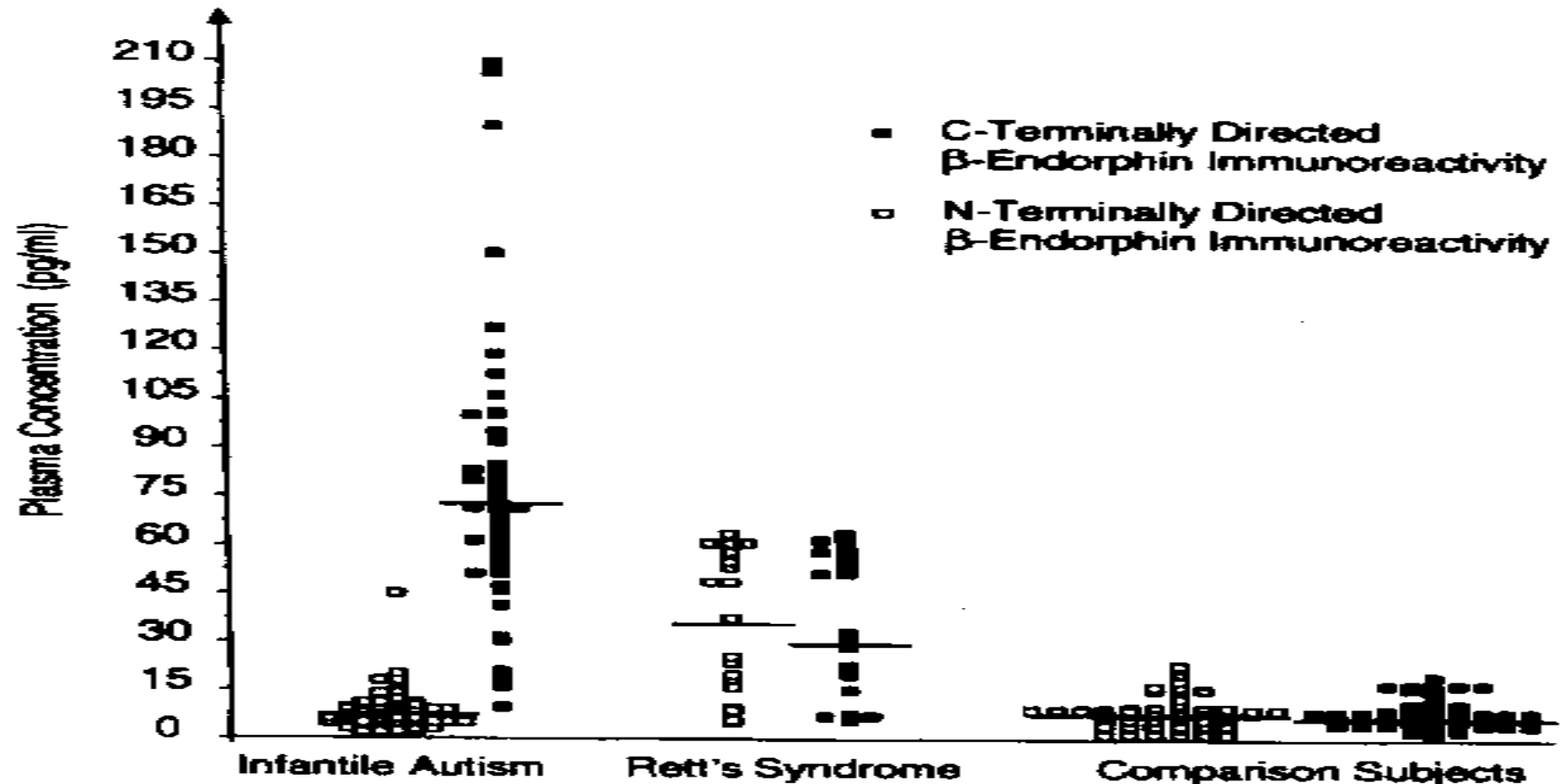


Craving/Dreaming Pathways: Neurop=neuropeptides, GABA=gamma amino butyric acid



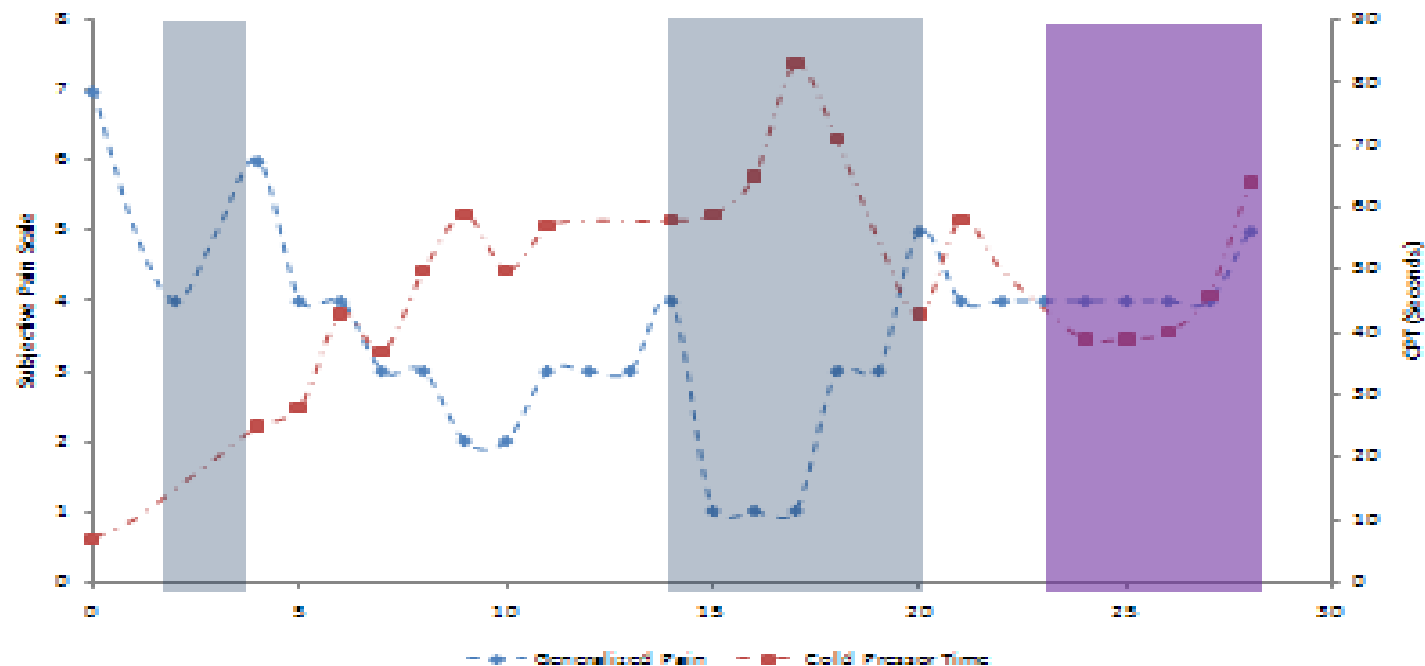
Leboyer...Panksepp, Launay 1994 Autism is a Hyperopioidergic Disease

FIGURE 1. Plasma N- and C-Terminally Directed β -Endorphin Protein Immunoreactivity Obtained in 67 Children With Infantile Autism, 22 Girls With Rett's Syndrome, and 67 Normal Comparison Subjects^a



Is Fibromyalgia an Endocrine/Endorphin Deficit Disorder helped by LDN? (Ramanathan, Panksepp, Johnson 2012)

Response to LDN



CPT in seconds.

Subjective pain scores on a scale of 0-10 (0: best & 10:worst).

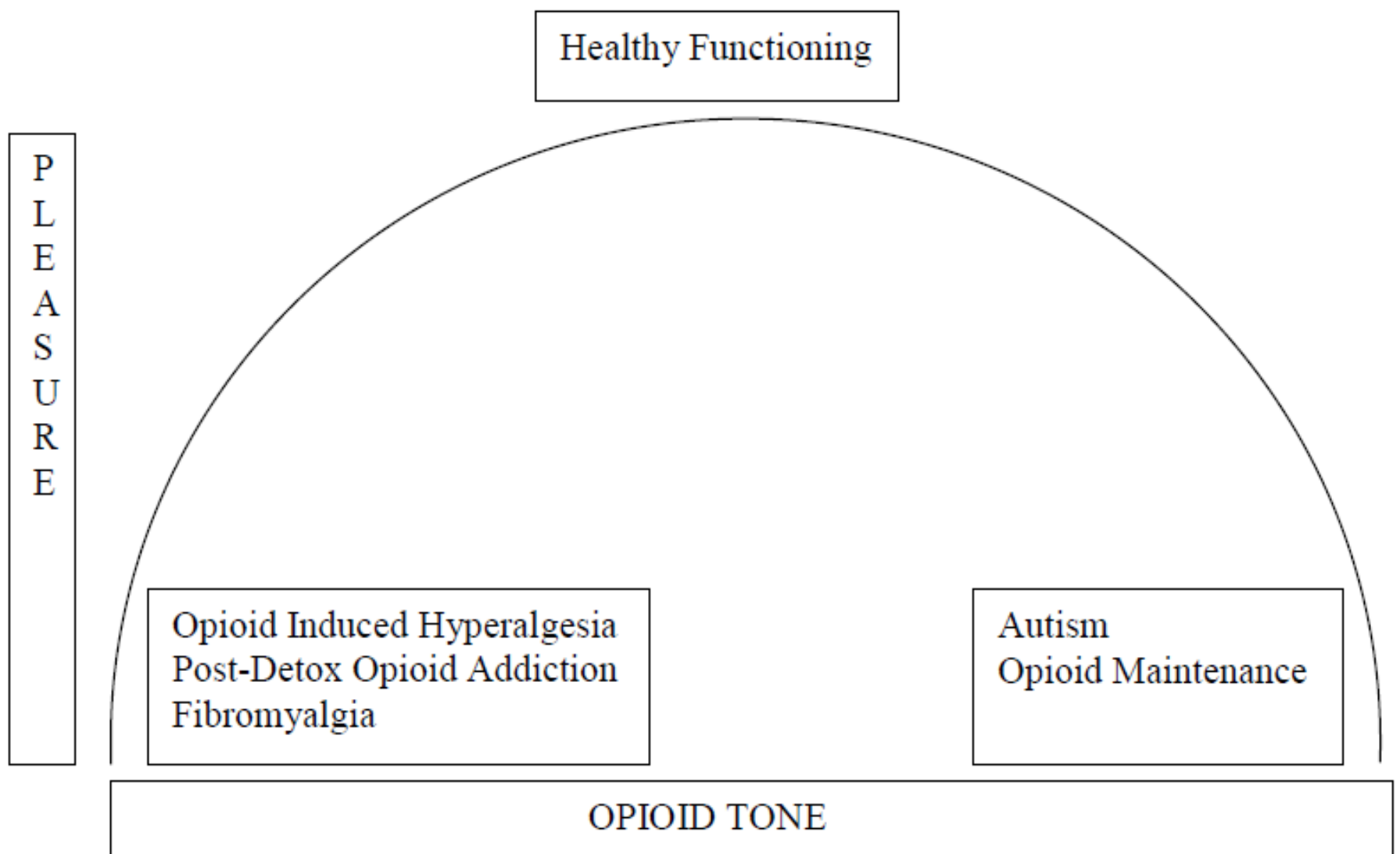


Figure 1 – Relationship of pleasure and opioid tone in the central nervous system subcortical pathways

Public Health References

- SAMHSA. National Survey of Drug Use and Health. 2015.
- National Institute of Health: NIDA, NIAAA websites
- <https://www.nytimes.com/interactive/2017/06/05/upshot/opioid-epidemic-drug-overdose-deaths-are-rising-faster-than-ever.html?mcubz=0>
- Benzodiazepines: \$509 <http://www.bendbulletin.com/localstate/2119922-151/benzodiazepines-treat-anxiety-cause-long-term-problems>
- Alcohol: \$212 [Alcoholic Beverage Market Overview In The United States www.parkstreet.com/alcoholic-beverage-market-overview/](http://www.parkstreet.com/alcoholic-beverage-market-overview/)
- Tobacco: \$128 [statistica website](http://www.statista.com) August 20, 2018
- : \$45 https://taxfoundation.org/marijuana-tax-legalization-federal-revenue/#_ftnref5
- Mexican / Columbian Drug Cartels: \$29 NYTimes 2012
- Opioid Medications: \$19 CNBC on 4/27/16 reported \$24 billion/year for opioid medications, 80% sold in the US
- Automotive Industry: \$70 <https://www.statista.com/topics/1721/us-automotive-industry/>
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Neuropsychanalytic References

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- Johnson B. Addiction and will. *Frontiers in Human Neuroscience* 2013;7:545. Doi
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- Ramanathan S., Panksepp J., Johnson B. Is fibromyalgia an endocrine/endorphin deficit disorder? - Is low dose naltrexone a new treatment option? *Psychosomatics*. 53:591-4, 2012.
- Leboyer M, Bouvard MP, Recasens C, Philippe A, Guilloud-Bataille M, Bondoux D, Tabuteau F, Dugas M, Panksepp J, Launay JM, et al. [Difference between plasma N- and C-terminally directed beta-endorphin immunoreactivity in infantile autism.](#) *Am J Psychiatry*. 1994 Dec;151(12):1797-801.

