

## Chapter 11: Neuropharmacology and drug abuse

Citation team:

Manali Shah

Niko Polite

Caitlin Cooley

5.2 Speed of drug effect. (n.d.). Retrieved from

<https://www1.health.gov.au/internet/publications/publishing.nsf/Content/drugtreat-pubs-front6-wk-toc~drugtreat-pubs-front6-wk-secb~drugtreat-pubs-front6-wk-secb-5~drugtreat-pubs-front6-wk-secb-5-2>

- Abd El-Aty, A. M., Goudah, A., & Abo El Sooud, K. (2001). Pharmacokinetics, intramuscular bioavailability and tissue residue profiles of ceftazidime in a rabbit model. *Dtsch Tierarztl Wochenschr*, *108*(4), 168-171.
- Abdel-Magid, A. F. (2015). Allosteric modulators: an emerging concept in drug discovery. *ACS Med Chem Lett*, *6*(2), 104-107. doi:10.1021/ml5005365
- About Electronic Cigarettes (E-Cigarettes). (2020, February 24). Retrieved April 1, 2020, from [https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/about-e-cigarettes.html](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/about-e-cigarettes.html)
- Adinoff, B. (2004). Neurobiologic processes in drug reward and addiction. *Harv Rev Psychiatry*, *12*(6), 305-320. doi:10.1080/10673220490910844
- Administration, S. A. a. M. H. S. (2019). Key substance use and mental health indicators in the United States: Results from the 2018 National Survey on Drug Use and Health (HHS Publication No. PEP19-5068, NSDUH Series H-54). Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. Retrieved from <https://www.samhsa.gov/data/>.
- Al-Hasani, R., & Bruchas, M. R. (2011). Molecular mechanisms of opioid receptor-dependent signaling and behavior. *Anesthesiology*, *115*(6), 1363-1381. doi:10.1097/ALN.0b013e318238bba6
- America's Drug Overdose Epidemic - Data to Action. (2020, March 24). Retrieved April 1, 2020, from <https://www.cdc.gov/injury/features/prescription-drug-overdose/index.html>
- Andre, C. M., Hausman, J. F., & Guerriero, G. (2016). Cannabis sativa: The Plant of the Thousand and One Molecules. *Front Plant Sci*, *7*, 19. doi:10.3389/fpls.2016.00019
- Atlas, R. I., Morris, R. J., & Kratochwill, T. R. (2007). *The Practice of Child Therapy*: Taylor & Francis.
- Bailey, D. G., Dresser, G., & Arnold, J. M. (2013). Grapefruit-medication interactions: forbidden fruit or avoidable consequences? *Cmaj*, *185*(4), 309-316. doi:10.1503/cmaj.120951
- Banerjee, N. (2014). Neurotransmitters in alcoholism: A review of neurobiological and genetic studies. *Indian J Hum Genet*, *20*(1), 20-31. doi:10.4103/0971-6866.132750
- Bardal, S. K., Waechter, J. E., & Martin, D. S. (2011). Chapter 2 - Pharmacokinetics. In S. K. Bardal, J. E. Waechter, & D. S. Martin (Eds.), *Applied Pharmacology* (pp. 17-34). Philadelphia: Content Repository Only!
- Barrus, D. G., Capogrossi, K. L., Cates, S. C., Gourdet, C. K., Peiper, N. C., Novak, S. P., . . . Wiley, J. L. (2016). Tasty THC: Promises and Challenges of Cannabis Edibles. *Methods Rep RTI Press*, *2016*. doi:10.3768/rtipress.2016.op.0035.1611
- Baydala, L. (2010). Inhalant abuse. *Paediatr Child Health*, *15*(7), 443-454.
- Bellinger, A. M., Jafari, M., Grant, T. M., Zhang, S., Slater, H. C., Wenger, E. A., . . . Traverso, G. (2016). Oral, ultra-long-lasting drug delivery: Application toward malaria elimination goals. *Science Translational Medicine*, *8*(365), 365ra157. doi:10.1126/scitranslmed.aag2374

- Benowitz, N. L., Hukkanen, J., & Jacob, P., 3rd. (2009). Nicotine chemistry, metabolism, kinetics and biomarkers. *Handb Exp Pharmacol*(192), 29-60. doi:10.1007/978-3-540-69248-5\_2
- Bishop, M. P., Elder, S. T., & Heath, R. G. (1963). Intracranial Self-Stimulation in Man. *Science*, 140(3565), 394-396. Retrieved from [www.jstor.org/stable/1710935](http://www.jstor.org/stable/1710935)
- Biology of Addiction. (2017, September 8). Retrieved April 2, 2020, from <https://newsinhealth.nih.gov/2015/10/biology-addiction>
- Borghardt, J. M., Kloft, C., & Sharma, A. (2018). Inhaled Therapy in Respiratory Disease: The Complex Interplay of Pulmonary Kinetic Processes. *Can Respir J*, 2018, 2732017. doi:10.1155/2018/2732017
- Brody, T. (2018). Chapter 3 - Food Effect Studies. In T. Brody (Ed.), *FDA's Drug Review Process and the Package Label* (pp. 35-100): Academic Press.
- Carlezon, W. A., & Chartoff, E. H. (2007). Intracranial self-stimulation (ICSS) in rodents to study the neurobiology of motivation. *Nature Protocols*, 2(11), 2987-2995. doi:10.1038/nprot.2007.441
- Carrillo, M., & González, J. M. (2002). A new approach to modelling sigmoidal curves. *Technological Forecasting and Social Change*, 69(3), 233-241. doi:[https://doi.org/10.1016/S0040-1625\(01\)00150-0](https://doi.org/10.1016/S0040-1625(01)00150-0)
- Cederbaum, A. I. (2012). Alcohol metabolism. *Clin Liver Dis*, 16(4), 667-685. doi:10.1016/j.cld.2012.08.002
- Chadwick, B., Miller, M. L., & Hurd, Y. L. (2013). Cannabis Use during Adolescent Development: Susceptibility to Psychiatric Illness. *Front Psychiatry*, 4, 129. doi:10.3389/fpsy.2013.00129
- Chen, J. F., Eltzhig, H. K., & Fredholm, B. B. (2013). Adenosine receptors as drug targets--what are the challenges? *Nat Rev Drug Discov*, 12(4), 265-286. doi:10.1038/nrd3955
- Cheng, J., & Feenstra, M. G. (2006). Individual differences in dopamine efflux in nucleus accumbens shell and core during instrumental learning. *Learn Mem*, 13(2), 168-177. doi:10.1101/lm.1806
- Christian, C. A., Herbert, A. G., Holt, R. L., Peng, K., Sherwood, K. D., Pangratz-Fuehrer, S., . . . Huguenard, J. R. (2013). Endogenous positive allosteric modulation of GABA(A) receptors by diazepam binding inhibitor. *Neuron*, 78(6), 1063-1074. doi:10.1016/j.neuron.2013.04.026
- Colombo, G., Bortolotti, F., Chiapponi, V., Buttini, F., Sonvico, F., Invernizzi, R., . . . Rossi, A. (2016). Nasal powders of thalidomide for local treatment of nose bleeding in persons affected by hereditary hemorrhagic telangiectasia. *Int J Pharm*, 514(1), 229-237. doi:10.1016/j.ijpharm.2016.07.002
- Cornford, C., & Close, H. (2016). The physical health of people who inject drugs: complexities, challenges, and continuity. *Br J Gen Pract*, 66(647), 286-287. doi:10.3399/bjgp16X685333
- Crews, F. T., Morrow, A. L., Criswell, H., & Breese, G. (1996). Effects of ethanol on ion channels. *Int Rev Neurobiol*, 39, 283-367. doi:10.1016/s0074-7742(08)60670-4
- Crocq, M. A. (2007). Historical and cultural aspects of man's relationship with addictive drugs. *Dialogues Clin Neurosci*, 9(4), 355-361.
- Cummings, K. M., & Proctor, R. N. (2014). The changing public image of smoking in the United States: 1964-2014. *Cancer Epidemiol Biomarkers Prev*, 23(1), 32-36. doi:10.1158/1055-9965.Epi-13-0798
- Dashko, S., Zhou, N., Compagno, C., & Piškur, J. (2014). Why, when, and how did yeast evolve alcoholic fermentation? *FEMS Yeast Res*, 14(6), 826-832. doi:10.1111/1567-1364.12161
- David Boyum and Peter Reuter, *An Analytic Assessment of U.S. Drug Policy* (Washington, DC: The AEI Press, 2005)
- de Boer, A. G., Moolenaar, F., de Leede, L. G., & Breimer, D. D. (1982). Rectal drug administration: clinical pharmacokinetic considerations. *Clin Pharmacokinet*, 7(4), 285-311. doi:10.2165/00003088-198207040-00002
- Deneau, G., Yanagita, T., & Seevers, M. H. (1969). Self-administration of psychoactive substances by the monkey. *Psychopharmacologia*, 16(1), 30-48. doi:10.1007/bf00405254

- DiPiro, J. T., & Pharmacists, A. S. o. H.-S. (2010). *Concepts in Clinical Pharmacokinetics*: American Society of Health-System Pharmacists.
- Drug addiction (substance use disorder). (2017, October 26). Retrieved from <https://www.mayoclinic.org/diseases-conditions/drug-addiction/symptoms-causes/syc-20365112>
- Ebenezer, I. Anxiety Disorders. In *Neuropsychopharmacology and Therapeutics* (pp. 211-235).
- Ehrman, R., Ternes, J., O'Brien, C. P., & McLellan, A. T. (1992). Conditioned tolerance in human opiate addicts. *Psychopharmacology (Berl)*, *108*(1-2), 218-224. doi:10.1007/bf02245311
- Eisinger, D. A., Ammer, H., & Schulz, R. (2002). Chronic Morphine Treatment Inhibits Opioid Receptor Desensitization and Internalization. *The Journal of Neuroscience*, *22*(23), 10192. doi:10.1523/JNEUROSCI.22-23-10192.2002
- Elliot Wright, S. (2005). *Heroin*. Chicago: Raintree.
- Enna, S. J., & Bylund, D. B. (2011). *xPharm: The Comprehensive Pharmacology Reference*.
- Fast Facts. (2019, November 15). Retrieved April 1, 2020, from [https://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/fast\\_facts/index.htm](https://www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/index.htm)
- Foster, D. J., & Conn, P. J. (2017). Allosteric Modulation of GPCRs: New Insights and Potential Utility for Treatment of Schizophrenia and Other CNS Disorders. *Neuron*, *94*(3), 431-446. doi:10.1016/j.neuron.2017.03.016
- Frankle, W. G., Laruelle, M., & Haber, S. N. (2006). Prefrontal Cortical Projections to the Midbrain in Primates: Evidence for a Sparse Connection. *Neuropsychopharmacology*, *31*(8), 1627-1636. doi:10.1038/sj.npp.1300990
- Fulcher, E. M., & Frazier, M. S. (2007). Introduction to intravenous therapy for health professionals. Retrieved from <http://public.ebookcentral.proquest.com/choice/publicfullrecord.aspx?p=2072360>
- Garcia-Romeu, A., Kersgaard, B., & Addy, P. H. (2016). Clinical applications of hallucinogens: A review. *Exp Clin Psychopharmacol*, *24*(4), 229-268. doi:10.1037/pha0000084
- Garnock-Jones, K. P., & Keating, G. M. (2009). Atomoxetine: a review of its use in attention-deficit hyperactivity disorder in children and adolescents. *Paediatr Drugs*, *11*(3), 203-226. doi:10.2165/00148581-200911030-00005
- Girenavar, B., Jayaprakasha, G. K., & Patil, B. S. (2007). Potent inhibition of human cytochrome P450 3A4, 2D6, and 2C9 isoenzymes by grapefruit juice and its furocoumarins. *J Food Sci*, *72*(8), C417-421. doi:10.1111/j.1750-3841.2007.00483.x
- Global status report on alcohol and health 2014 published by the World Health Organization. (2014). Retrieved April 1, 2020 from [https://www.who.int/substance\\_abuse/publications/global\\_alcohol\\_report/msb\\_gsr\\_2014\\_1.pdf](https://www.who.int/substance_abuse/publications/global_alcohol_report/msb_gsr_2014_1.pdf)
- Goldstein, N. E., & Morrison, R. S. (2012). *Evidence-Based Practice of Palliative Medicine: Expert Consult: Online and Print*: Elsevier Health Sciences.
- Haass, M., & Kübler, W. (1997). Nicotine and sympathetic neurotransmission. *Cardiovasc Drugs Ther*, *10*(6), 657-665. doi:10.1007/bf00053022
- Hall, W., Carter, A., & Forlini, C. (2015). The brain disease model of addiction: is it supported by the evidence and has it delivered on its promises? *Lancet Psychiatry*, *2*(1), 105-110. doi:10.1016/s2215-0366(14)00126-6
- Hammond, C. (2015). Chapter 8 - The ionotropic nicotinic acetylcholine receptors. In C. Hammond (Ed.), *Cellular and Molecular Neurophysiology (Fourth Edition)* (pp. 173-197). Boston: Academic Press.
- Haney, M., Ward, A. S., Foltin, R. W., & Fischman, M. W. (2001). Effects of ecopipam, a selective dopamine D1 antagonist, on smoked cocaine self-administration by humans. *Psychopharmacology (Berl)*, *155*(4), 330-337. doi:10.1007/s002130100725

- Health risks and benefits of alcohol consumption. (2000). *Alcohol Res Health*, 24(1), 5-11.
- Heard, C. M. B., & Fletcher, J. E. (2011). Chapter 123 - Sedation and Analgesia. In B. P. Fuhrman & J. J. Zimmerman (Eds.), *Pediatric Critical Care (Fourth Edition)* (pp. 1654-1681). Saint Louis: Mosby.
- History.com Editors. (2017, June 14). LSD. Retrieved April 1, 2020, from <https://www.history.com/topics/crime/history-of-ld>
- Howes, J., & Osgood, P. (1974). The effect of delta9-tetrahydrocannabinol on the uptake and release of 14C-dopamine from crude striatal synaptosomes; preparations. *Neuropharmacology*, 13(12), 1109-1114. doi:10.1016/0028-3908(74)90060-4
- Hu, H. (2016). Reward and Aversion. *Annual Review of Neuroscience*, 39(1), 297-324. doi:10.1146/annurev-neuro-070815-014106
- Hua, S. (2019). Advances in Nanoparticulate Drug Delivery Approaches for Sublingual and Buccal Administration. *Front Pharmacol*, 10, 1328. doi:10.3389/fphar.2019.01328
- Information sheet on opioid overdose. (2018, August 21). Retrieved from [https://www.who.int/substance\\_abuse/information-sheet/en/](https://www.who.int/substance_abuse/information-sheet/en/)
- InformedHealth.org [Internet]. Cologne, Germany: Institute for Quality and Efficiency in Health Care (IQWiG); 2006-. How do lungs work? 2016 Nov 3 [Updated 2016 Nov 3]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK401240/>
- Interactive map: Where recreational marijuana will be sold in Illinois beginning Jan. 1. (2019, December 17). Retrieved April 9, 2020, from <https://wgntv.com/news/illinois-recreational-marijuana/interactive-map-where-recreational-marijuana-will-be-sold-in-illinois-beginning-jan-1/>
- Izzo, E., Orsini, C., Koob, G. F., & Pulvirenti, L. (2001). A dopamine partial agonist and antagonist block amphetamine self-administration in a progressive ratio schedule. *Pharmacol Biochem Behav*, 68(4), 701-708. doi:10.1016/s0091-3057(01)00472-5
- Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2019). Monitoring the Future national survey results on drug use 1975-2018: Overview, key findings on adolescent drug use. Ann Arbor: Institute for Social Research, University of Michigan.
- Juárez Olguín, H., Calderón Guzmán, D., Hernández García, E., & Barragán Mejía, G. (2016). The Role of Dopamine and Its Dysfunction as a Consequence of Oxidative Stress. *Oxid Med Cell Longev*, 2016, 9730467. doi:10.1155/2016/9730467
- Karlin, A. (2010). Chapter 33 - Nicotinic Acetylcholine Receptors. In R. A. Bradshaw & E. A. Dennis (Eds.), *Handbook of Cell Signaling (Second Edition)* (pp. 221-224). San Diego: Academic Press.
- Kätsyri, J., Hari, R., Ravaja, N., & Nummenmaa, L. (2013). Just watching the game ain't enough: striatal fMRI reward responses to successes and failures in a video game during active and vicarious playing. *Front Hum Neurosci*, 7, 278. doi:10.3389/fnhum.2013.00278
- Kessler, R. M., Hutson, P. H., Herman, B. K., & Potenza, M. N. (2016). The neurobiological basis of binge-eating disorder. *Neuroscience & Biobehavioral Reviews*, 63, 223-238. doi:<https://doi.org/10.1016/j.neubiorev.2016.01.013>
- Kim, H., Park, H., & Lee, S. J. (2017). Effective method for drug injection into subcutaneous tissue. *Sci Rep*, 7(1), 9613. doi:10.1038/s41598-017-10110-w
- Kobilka, B. K. (2007). G protein coupled receptor structure and activation. *Biochim Biophys Acta*, 1768(4), 794-807. doi:10.1016/j.bbamem.2006.10.021
- Kollins, S. H., & Adcock, R. A. (2014). ADHD, altered dopamine neurotransmission, and disrupted reinforcement processes: implications for smoking and nicotine dependence. *Progress in neuro-psychopharmacology & biological psychiatry*, 52, 70-78. doi:10.1016/j.pnpbp.2014.02.002
- Koob, G. F., & Volkow, N. D. (2010). Neurocircuitry of Addiction. *Neuropsychopharmacology*, 35(1), 217-238. doi:10.1038/npp.2009.110

- Küçüktürkmen, B., & Bozkır, A. (2019). Chapter 10 - A new approach for drug targeting to the central nervous system: Lipid nanoparticles. In A. M. Grumezescu (Ed.), *Nanoarchitectonics in Biomedicine* (pp. 335-369): William Andrew Publishing.
- Lecca, S., Meye, F. J., Trusel, M., Tchenio, A., Harris, J., Schwarz, M. K., . . . Mameli, M. (2017). Aversive stimuli drive hypothalamus-to-habenula excitation to promote escape behavior. *Elife*, 6. doi:10.7554/eLife.30697
- Lecourtier, L., DeFrancesco, A., & Moghaddam, B. (2008). Differential tonic influence of lateral habenula on prefrontal cortex and nucleus accumbens dopamine release. *Eur J Neurosci*, 27(7), 1755-1762. doi:10.1111/j.1460-9568.2008.06130.x
- Lee, H. S. (2016). Recent advances in topical anesthesia. *J Dent Anesth Pain Med*, 16(4), 237-244. doi:10.17245/jdapm.2016.16.4.237
- Leppert, W., Malec-Milewska, M., Zajackowska, R., & Wordliczek, J. (2018). Transdermal and Topical Drug Administration in the Treatment of Pain. *Molecules (Basel, Switzerland)*, 23(3), 681. doi:10.3390/molecules23030681
- Leventhal, A. M., Strong, D. R., Kirkpatrick, M. G., Unger, J. B., Sussman, S., Riggs, N. R., . . . Audrain-McGovern, J. (2015). Association of Electronic Cigarette Use With Initiation of Combustible Tobacco Product Smoking in Early Adolescence. *Jama*, 314(7), 700-707. doi:10.1001/jama.2015.8950
- Lexicon of alcohol and drug terms published by the World Health Organization. (2010, December 9). Retrieved April 1, 2020, from [https://www.who.int/substance\\_abuse/terminology/who\\_lexicon/en/](https://www.who.int/substance_abuse/terminology/who_lexicon/en/)
- Li, P., Snyder, G. L., & Vanover, K. E. (2016). Dopamine Targeting Drugs for the Treatment of Schizophrenia: Past, Present and Future. *Curr Top Med Chem*, 16(29), 3385-3403. doi:10.2174/1568026616666160608084834
- Li, X., Caprioli, D., & Marchant, N. J. (2015). Recent updates on incubation of drug craving: a mini-review. *Addict Biol*, 20(5), 872-876. doi:10.1111/adb.12205
- Lowe, E. S., & Balis, F. M. (2007). CHAPTER 18 - Dose-Effect and Concentration-Effect Analysis. In A. J. Atkinson, D. R. Abernethy, C. E. Daniels, R. L. Dedrick, & S. P. Markey (Eds.), *Principles of Clinical Pharmacology (Second Edition)* (pp. 289-300). Burlington: Academic Press.
- Lynch, W. J., Nicholson, K. L., Dance, M. E., Morgan, R. W., & Foley, P. L. (2010). Animal models of substance abuse and addiction: implications for science, animal welfare, and society. *Comp Med*, 60(3), 177-188.
- Matsumoto, M., & Hikosaka, O. (2007). Lateral habenula as a source of negative reward signals in dopamine neurons. *Nature*, 447(7148), 1111-1115. doi:10.1038/nature05860
- Meye, F. J., Lecca, S., Valentinova, K., & Mameli, M. (2013). Synaptic and cellular profile of neurons in the lateral habenula. *Front Hum Neurosci*, 7, 860. doi:10.3389/fnhum.2013.00860
- Morikawa, H., & Morrisett, R. A. (2010). Ethanol action on dopaminergic neurons in the ventral tegmental area: interaction with intrinsic ion channels and neurotransmitter inputs. *Int Rev Neurobiol*, 91, 235-288. doi:10.1016/s0074-7742(10)91008-8
- Morozova, T. V., Mackay, T. F., & Anholt, R. R. (2014). Genetics and genomics of alcohol sensitivity. *Mol Genet Genomics*, 289(3), 253-269. doi:10.1007/s00438-013-0808-y
- Murray EA, Wise SP, Rhodes SEV. What Can Different Brains Do with Reward? In: Gottfried JA, editor. *Neurobiology of Sensation and Reward*. Boca Raton (FL): CRC Press/Taylor & Francis; 2011. Chapter 4. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK92798/>
- Naloxone. (2012). In *LiverTox: Clinical and Research Information on Drug-Induced Liver Injury*. Bethesda (MD): National Institute of Diabetes and Digestive and Kidney Diseases.
- National Center for Biotechnology Information. PubChem Database. Nicotine, CID=89594, <https://pubchem.ncbi.nlm.nih.gov/compound/Nicotine> (accessed on Apr. 1, 2020)

- National Center for Biotechnology Information. PubChem Database. Naloxone, CID=5284596, <https://pubchem.ncbi.nlm.nih.gov/compound/Naloxone> (accessed on Apr. 6, 2020)
- National Center for Biotechnology Information. PubChem Database. Cocaine, CID=446220, <https://pubchem.ncbi.nlm.nih.gov/compound/Cocaine> (accessed on Apr. 1, 2020)
- National Center for Biotechnology Information. PubChem Database. Psilocybine, CID=10624, <https://pubchem.ncbi.nlm.nih.gov/compound/Psilocybine> (accessed on Apr. 1, 2020)
- National Center for Biotechnology Information. PubChem Database. Lysergide, CID=5761, <https://pubchem.ncbi.nlm.nih.gov/compound/Lysergide> (accessed on Apr. 1, 2020)
- National Institutes of Health (US); Biological Sciences Curriculum Study. NIH Curriculum Supplement Series [Internet]. Bethesda (MD): National Institutes of Health (US); 2007. Information about Alcohol. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK20360/>
- Neubig, R. R., Spedding, M., Kenakin, T., & Christopoulos, A. (2003). International Union of Pharmacology Committee on Receptor Nomenclature and Drug Classification. XXXVIII. Update on Terms and Symbols in Quantitative Pharmacology. *Pharmacological Reviews*, 55(4), 597. doi:10.1124/pr.55.4.4
- Nichols, D. E. (2016). Psychedelics. *Pharmacol Rev*, 68(2), 264-355. doi:10.1124/pr.115.011478
- NIDA. (2020, February 6). Trends & Statistics. Retrieved from <https://www.drugabuse.gov/related-topics/trends-statistics> on 2020, March 30
- NIDA. (2018, January 17). Principles of Drug Addiction Treatment: A Research-Based Guide (Third Edition). Retrieved from <https://www.drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition> on 2020, April 2
- NIDA. (2017, March 23). Health Consequences of Drug Misuse. Retrieved from <https://www.drugabuse.gov/related-topics/health-consequences-drug-misuse> on 2020, March 30
- NIDA. (1997, April 1). Rate and Duration of Drug Activity Play Major Roles in Drug Abuse, Addiction, and Treatment. Retrieved from <https://archives.drugabuse.gov/news-events/nida-notes/1997/04/rate-duration-drug-activity-play-major-roles-in-drug-abuse-addiction-treatment> on 2020, March 30
- NIDA. (2020, January 7). Tobacco, Nicotine, and E-Cigarettes. Retrieved from <https://www.drugabuse.gov/publications/research-reports/tobacco-nicotine-e-cigarettes> on 2020, April 9
- NIDA. (2018, July 13). Cocaine. Retrieved from <https://www.drugabuse.gov/publications/drugfacts/cocaine> on 2020, March 30
- Nutt, D., King, L. A., Saulsbury, W., & Blakemore, C. (2007). Development of a rational scale to assess the harm of drugs of potential misuse. *Lancet*, 369(9566), 1047-1053. doi:10.1016/s0140-6736(07)60464-4
- Olds, J., & Milner, P. (1954). Positive reinforcement produced by electrical stimulation of septal area and other regions of rat brain. *J Comp Physiol Psychol*, 47(6), 419-427. doi:10.1037/h0058775
- Pagel, J. F., & Parnes, B. L. (2001). Medications for the Treatment of Sleep Disorders: An Overview. *Prim Care Companion J Clin Psychiatry*, 3(3), 118-125. doi:10.4088/pcc.v03n0303
- Passie, T., Seifert, J., Schneider, U., & Emrich, H. M. (2002). The pharmacology of psilocybin. *Addict Biol*, 7(4), 357-364. doi:10.1080/135562102100005937
- Peper, A. (2009). Aspects of the relationship between drug dose and drug effect. *Dose-response : a publication of International Hormesis Society*, 7(2), 172-192. doi:10.2203/dose-response.08-019.Peper
- Pietrzykowski, A. Z., Martin, G. E., Puig, S. I., Knott, T. K., Lemos, J. R., & Treistman, S. N. (2004). Alcohol tolerance in large-conductance, calcium-activated potassium channels of CNS terminals is

- intrinsic and includes two components: decreased ethanol potentiation and decreased channel density. *J Neurosci*, 24(38), 8322-8332. doi:10.1523/jneurosci.1536-04.2004
- Pietrzykowski, A. Z., & Treistman, S. N. (2008). The molecular basis of tolerance. *Alcohol Res Health*, 31(4), 298-309.
- Pleuvry, B. J. (2004). Receptors, agonists and antagonists. *Anaesthesia & Intensive Care Medicine*, 5(10), 350-352. doi:<https://doi.org/10.1383/anes.5.10.350.52312>
- Prakash, N., & Wurst, W. (2006). Development of dopaminergic neurons in the mammalian brain. *Cellular and Molecular Life Sciences CMLS*, 63(2), 187-206. doi:10.1007/s00018-005-5387-6
- Racine, E., Sattler, S., & Escande, A. (2017). Free Will and the Brain Disease Model of Addiction: The Not So Seductive Allure of Neuroscience and Its Modest Impact on the Attribution of Free Will to People with an Addiction. *Front Psychol*, 8, 1850. doi:10.3389/fpsyg.2017.01850
- Robinson, T. E., & Berridge, K. C. (2008). Review. The incentive sensitization theory of addiction: some current issues. *Philos Trans R Soc Lond B Biol Sci*, 363(1507), 3137-3146. doi:10.1098/rstb.2008.0093
- Rothman, R. B., & Glowa, J. R. (1995). A review of the effects of dopaminergic agents on humans, animals, and drug-seeking behavior, and its implications for medication development. *Molecular Neurobiology*, 11(1), 1-19. doi:10.1007/BF02740680
- Routtenberg, A., & Lindy, J. (1965). Effects of the availability of rewarding septal and hypothalamic stimulation on bar pressing for food under conditions of deprivation. *J Comp Physiol Psychol*, 60(2), 158-161. doi:10.1037/h0022365
- Rudd, R. A., Aleshire, N., Zibbell, J. E., & Gladden, R. M. (2016). Increases in Drug and Opioid Overdose Deaths--United States, 2000-2014. *MMWR Morb Mortal Wkly Rep*, 64(50-51), 1378-1382. doi:10.15585/mmwr.mm6450a3
- Sabzghabae, A. M., Eizadi-Mood, N., Yaraghi, A., & Zandifar, S. (2014). Naloxone therapy in opioid overdose patients: intranasal or intravenous? A randomized clinical trial. *Arch Med Sci*, 10(2), 309-314. doi:10.5114/aoms.2014.42584
- Schacter, D. L., Gilbert, D. T., & Wegner, D. M. (2010). *Psychology*: Worth Publishers.
- Scheuss, V., & Neher, E. (2001). Estimating Synaptic Parameters from Mean, Variance, and Covariance in Trains of Synaptic Responses. *Biophysical Journal*, 81(4), 1970-1989. doi:[https://doi.org/10.1016/S0006-3495\(01\)75848-1](https://doi.org/10.1016/S0006-3495(01)75848-1)
- Schoffelmeer, A. N. M., De Vries, T. J., Wardeh, G., van de Ven, H. W. M., & Vanderschuren, L. J. M. J. (2002). Psychostimulant-Induced Behavioral Sensitization Depends on Nicotinic Receptor Activation. *The Journal of Neuroscience*, 22(8), 3269. doi:10.1523/JNEUROSCI.22-08-03269.2002
- Siegel, S., & Ellsworth, D. W. (1986). Pavlovian conditioning and death from apparent overdose of medically prescribed morphine: A case report. *Bulletin of the Psychonomic Society*, 24(4), 278-280. doi:10.3758/BF03330140
- Siegmund, B., Leitner, E., & Pfannhauser, W. (1999). Determination of the Nicotine Content of Various Edible Nightshades (Solanaceae) and Their Products and Estimation of the Associated Dietary Nicotine Intake. *Journal of Agricultural and Food Chemistry*, 47(8), 3113-3120. doi:10.1021/jf990089w
- Shubert J, Sharma S. Inhalation Injury. [Updated 2019 Mar 14]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK513261/>
- Slifstein, M., van de Giessen, E., Van Snellenberg, J., Thompson, J. L., Narendran, R., Gil, R., . . . Abi-Dargham, A. (2015). Deficits in prefrontal cortical and extrastriatal dopamine release in schizophrenia: a positron emission tomographic functional magnetic resonance imaging study. *JAMA psychiatry*, 72(4), 316-324. doi:10.1001/jamapsychiatry.2014.2414

- Smith, H. S. (2009). Opioid metabolism. *Mayo Clin Proc*, 84(7), 613-624. doi:10.1016/s0025-6196(11)60750-7
- Stewart, J., & Badiani, A. (1993). Tolerance and sensitization to the behavioral effects of drugs. *Behav Pharmacol*, 4(4), 289-312.
- Stolerman, I. P. (2010). *Encyclopedia of psychopharmacology*. Berlin; London: Springer.
- Streissguth, A., Landesman-Dwyer, S., Martin, J., & Smith, D. (1980). Teratogenic effects of alcohol in humans and laboratory animals. *Science*, 209(4454), 353-361. doi:10.1126/science.6992275
- Substance Abuse and Mental Health Services Administration (US); Office of the Surgeon General (US). Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health [Internet]. Washington (DC): US Department of Health and Human Services; 2016 Nov. CHAPTER 2, THE NEUROBIOLOGY OF SUBSTANCE USE, MISUSE, AND ADDICTION. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK424849/>
- Substance Abuse and Mental Health Services Administration (SAMHSA). 2018 National Survey on Drug Use and Health (NSDUH). Table 2.1B—Tobacco Product and Alcohol Use in Lifetime, Past Year, and Past Month among Persons Aged 12 or Older, by Age Group: Percentages, 2017 and 2018. Available at: <https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/NSDUHDetailedTabs2018R2/NSDUHDetTabsSect2pe2018.htm#tab2-1b>. Accessed 4/1/2020
- Substance Abuse and Mental Health Services Administration. (2019). Key substance use and mental health indicators in the United States: Results from the 2018 National Survey on Drug Use and Health (HHS Publication No. PEP19-5068, NSDUH Series H-54). Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. Retrieved from <https://www.samhsa.gov/data/>
- Tagliazucchi, E., Roseman, L., Kaelen, M., Orban, C., Muthukumaraswamy, Suresh D., Murphy, K., . . . Carhart-Harris, R. (2016). Increased Global Functional Connectivity Correlates with LSD-Induced Ego Dissolution. *Current Biology*, 26(8), 1043-1050. doi:<https://doi.org/10.1016/j.cub.2016.02.010>
- The Controlled Substances Act. (n.d.). Retrieved from <https://www.dea.gov/controlled-substances-act>
- Thiessen, B., Portenoy, R. K., & Argoff, C. E. (2009). Chapter 37 - Adjuvant Analgesics. In C. E. Argoff & G. McClean (Eds.), *Pain Management Secrets (Third Edition)* (pp. 274-286). Philadelphia: Mosby.
- "Tobacco-Related Mortality." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 28 Apr. 2020, [www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/health\\_effects/tobacco\\_related\\_mortality/index.htm#:~:text=Cigarette%20smoking%20causes%20about%20one,the%20United%20States%20each%20year.&text=Cigarette%20smoking%20is%20estimated%20to%20cause%20the%20following%3A&text=More%20than%20480%2C000%20deaths%20annually%20\(including%20deaths%20from%20secondhand%20smoke\)](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/tobacco_related_mortality/index.htm#:~:text=Cigarette%20smoking%20causes%20about%20one,the%20United%20States%20each%20year.&text=Cigarette%20smoking%20is%20estimated%20to%20cause%20the%20following%3A&text=More%20than%20480%2C000%20deaths%20annually%20(including%20deaths%20from%20secondhand%20smoke)).
- Torregrossa, M. M., & Kalivas, P. W. (2008). Microdialysis and the neurochemistry of addiction. *Pharmacol Biochem Behav*, 90(2), 261-272. doi:10.1016/j.pbb.2007.09.001
- Türker, S., Onur, E., & Ozer, Y. (2004). Nasal route and drug delivery systems. *Pharm World Sci*, 26(3), 137-142. doi:10.1023/b:phar.0000026823.82950.ff
- Vanderschuren, L. J., & Ahmed, S. H. (2013). Animal studies of addictive behavior. *Cold Spring Harb Perspect Med*, 3(4), a011932. doi:10.1101/cshperspect.a011932
- Volkow, N. D., Wang, G. J., Fischman, M. W., Foltin, R. W., Fowler, J. S., Abumrad, N. N., . . . Shea, C. E. (1997). Relationship between subjective effects of cocaine and dopamine transporter occupancy. *Nature*, 386(6627), 827-830. doi:10.1038/386827a0
- Wadgave, U., & Nagesh, L. (2016). Nicotine Replacement Therapy: An Overview. *Int J Health Sci (Qassim)*, 10(3), 425-435.

- Waller, D. G., & Sampson, A. P. (2018). 17 - General anaesthetics. In D. G. Waller & A. P. Sampson (Eds.), *Medical Pharmacology and Therapeutics (Fifth Edition)* (pp. 247-256): Elsevier.
- Wenthur, C. J., Gentry, P. R., Mathews, T. P., & Lindsley, C. W. (2014). Drugs for allosteric sites on receptors. *Annu Rev Pharmacol Toxicol*, *54*, 165-184. doi:10.1146/annurev-pharmtox-010611-134525
- White, J. M. (2004). Pleasure into pain: The consequences of long-term opioid use. *Addictive Behaviors*, *29*(7), 1311-1324. doi:<https://doi.org/10.1016/j.addbeh.2004.06.007>
- Wickelgren, I. (1997). Getting the Brain's Attention. *Science*, *278*(5335), 35-37. doi:10.1126/science.278.5335.35
- Willner, P. (1990). *Behavioural models in psychopharmacology : theoretical, industrial, and clinical perspectives*. Cambridge; New York: Cambridge University Press.
- Wise, R. A. (2008). Dopamine and reward: the anhedonia hypothesis 30 years on. *Neurotox Res*, *14*(2-3), 169-183. doi:10.1007/bf03033808
- Wooding, S., Kim, U. K., Bamshad, M. J., Larsen, J., Jorde, L. B., & Drayna, D. (2004). Natural selection and molecular evolution in PTC, a bitter-taste receptor gene. *Am J Hum Genet*, *74*(4), 637-646. doi:10.1086/383092
- World Drug Report 2019: 35 million people worldwide suffer from drug use disorders while only 1 in 7 people receive treatment. (n.d.). Retrieved from [https://www.unodc.org/unodc/en/frontpage/2019/June/world-drug-report-2019\\_-35-million-people-worldwide-suffer-from-drug-use-disorders-while-only-1-in-7-people-receive-treatment.html](https://www.unodc.org/unodc/en/frontpage/2019/June/world-drug-report-2019_-35-million-people-worldwide-suffer-from-drug-use-disorders-while-only-1-in-7-people-receive-treatment.html)
- Yavuz, H., Çetin, K., Akgönüllü, S., Battal, D., & Denizli, A. (2018). Chapter 12 - Therapeutic protein and drug imprinted nanostructures as controlled delivery tools. In A. M. Grumezescu (Ed.), *Design and Development of New Nanocarriers* (pp. 439-473): William Andrew Publishing.
- Yeagle, P. L. (2016). Chapter 15 - Membrane Receptors. In P. L. Yeagle (Ed.), *The Membranes of Cells (Third Edition)* (pp. 401-425). Boston: Academic Press.
- Zou, S., & Kumar, U. (2018). Cannabinoid Receptors and the Endocannabinoid System: Signaling and Function in the Central Nervous System. *Int J Mol Sci*, *19*(3). doi:10.3390/ijms19030833