

# **Chemistry Cares:**

## *Mental Health & Substance Abuse Campaign (Extended)*

### Numbers to call for support:

#### Canada wide:

- Wellness Together Canada: 1-866-585-0445 (24 hours, free, available in different languages, chat services)
- Kids Help Phone: 1-800-668-6868 (for youth, 24 hours, chat services)

#### Ontario:

- Addiction, Mental Health, and Problem Gambling Services (ConnexOntario): 1-866-531-2600 (24 hours and chat services)
- Good2Talk: 1-866-925-5454 (24 hours, for postsecondary students between 17-25)

If you are in need of university services or don't know where to start, please contact us at [ugcc@uwindsor.ca](mailto:ugcc@uwindsor.ca) and we'd be happy to help guide you in the right direction.



### Why We Made this Campaign

While mental health awareness has improved over the years and resources have become more plentiful, societal stigma against addiction still prevails. It is imperative that as science students, we use our critical thinking skills to consider the implications of this stigma and use our knowledge to inform others of the validity of addiction as a true illness that requires treatment. During the COVID-19 pandemic, Windsor-Essex has seen a rise in its opiate-related deaths with the pandemic largely shadowing many of the other crises at hand. We wanted to create a campaign during mental health awareness month that reminds ourselves of other important issues still very prevalent, highlighting those suffering from addiction.

## Part 1: The Neuroscience

### What is Addiction?

Addiction is a mental illness characterized by a physical and psychological dependence on a substance. It often begins by consuming the substance frequently, and building a tolerance for it. Tolerance begins once an individual needs to consume even more of the substance to feel those same effects they felt when they first began using. Prolonged use of the substance can result in a cycle of addiction where the drug must be consumed in order for the individual to avoid symptoms of withdrawal.

### What is the Difference Between *Addiction* and *Dependence*?

The terms “addiction” and “dependence” are used interchangeably, when in fact, they are two separate concepts. Dependence is when an individual establishes a physical tolerance to substance and can be overcome by progressively using the substance less over time. Addiction is when the prolonged use of a substance has caused the brain to chemically alter and the only route to overcoming it is through treatment.

### What is the *Mesolimbic Reward System*?

The limbic system of the brain - also known as the “reward” circuit - is involved in drug and substance addictions (e.g., alcohol, tobacco, caffeine, cocaine, heroin, etc.). The pathway within this system begins at the ventral tegmental area (VTA) in the midbrain, which is on top of the brainstem. The pathway then extends to the nucleus accumbens, towards the front of the brain. Other structures involved in the limbic system include the hippocampus, the amygdala and the hypothalamus.

Dopamine is the main neurotransmitter in the brain reward pathway. As a general statement, it can be said that all addictive drugs increase brain levels of dopamine. Addictive drugs interfere with normal dopamine transport, prolonging its stay in the synapse which, therefore, prolongs its feel-good effects.

Due to the effect that addictive drugs have on physical brain chemistry, addictive drugs can alter neurons. Some of the changes that occur can contribute to psychological dependence when intake of the drug has stopped (e.g., depression, cravings, etc).

### What is the *withdrawal*?

Withdrawal is a biochemical and psychological response a person experiences upon ceasing to use a chemical substance. It can last for hours, and in some cases, it can last up to days. The effects of withdrawal symptoms depends on the frequency and amount of substance use. Some chemically-related withdrawal symptoms include: tremors, headaches, muscle pain, sleeping issues, and rapid heart beat. Psychologically-related

withdrawal symptoms can include irritability, anxiety, restlessness, difficulty concentrating, and grieving the loss of the substance.

#### Typical warning signs of addiction can include:

- Ignoring commitments/responsibilities
- Lapses in concentration/memory
- Being oddly secretive about parts of personal life
- Changes in physical appearance (weight fluctuations)
- Withdrawal from normal social contacts
- Problems at work, school, or home

#### Some drug addiction symptoms or behaviours include:

- Decreased mental sharpness
- Poor performance at school or at work
- Reduced number of friends and interests
- Experiencing a feeling that you are craving the regularly (daily or multiple times a day)
- Feeling that you need to take more of the drug to feel its effect
- Making certain that you have enough of the drug, even though you can't afford it
- When you try to stop using the drug, you fail in your attempts and experience withdrawal symptoms
- Even though the drug is causing problems in your life or causing you physical or psychological harm, you still use it
- Doing things to get the drug that you normally wouldn't do, such as stealing or doing other risky activities when you're under the influence

#### What is rehabilitation?

According to [startyourrecovery.org](http://startyourrecovery.org): Rehab is defined as a place with intensive, supervised programs designed to safely help drug/alcohol addicts overcome their addiction and give them the tools they need to live a healthy life.



## THE STATISTICS

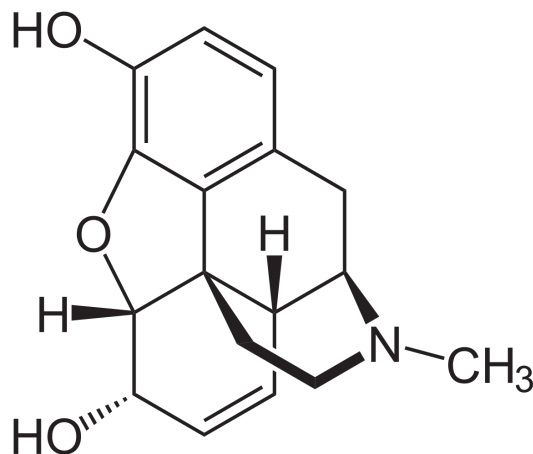
- In Canada, almost 6 million people (21% of the population) will meet the criteria for addiction in their lifetime.  
(<https://ontario.cmha.ca/addiction-and-substance-use-and-addiction/>)
- In Ontario, about 10% of the population uses substances problematically.  
(<https://ontario.cmha.ca/addiction-and-substance-use-and-addiction/>)
- The rate of opioid users in Windsor-Essex County was 18.9% greater than the provincial rate of opioid users  
(<https://www.wechu.org/about-us/reports-and-statistics/opioid-misuse-windsor-essex-county>)
- Windsor has the 7th highest rate of opioid users when compared to 49 other areas in Ontario  
(<https://www.wechu.org/about-us/reports-and-statistics/opioid-misuse-windsor-essex-county>)
- Compared to 15 weeks spanning from March to May in 2019, there has been a 38% increase in opioid related deaths to the same weeks in 2020, presumably related to the onset of the COVID-19 pandemic in Ontario  
(<https://www.publichealthontario.ca/-/media/documents/o/2020/opioid-mortality-covid-surveillance-report.pdf?la=en>)
- Windsor & Essex County drug-related emergency room visits have been higher in the first quarter of 2020 compared to the first quarter of both 2018 and 2019  
(<https://www.wechu.org/reports/opioid-overdose-statistics>)
- In 2019, there were 249 opioid-related emergency room visits in Windsor & Essex County, which is 3.2 times greater than it was in 2007  
(<https://www.wechu.org/reports/opioid-overdose-statistics>)



## Part 2: The Chemistry

### Let's Get Chemical!

Since the opioid crisis has been affecting many Canadians and has been on the rise in Windsor-Essex, let's describe some of the chemical properties of common opioids:

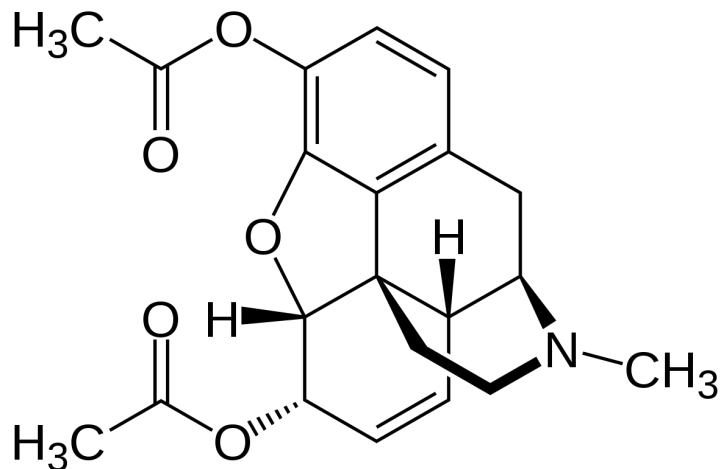


**MORPHINE:** Morphine is a highly addictive painkiller with tolerance developing rapidly. It is most commonly prescribed after surgery or for intense pain. It is heavily sought after for its rapid effect of a euphoric state due to its highly hydrophobic structure which can easily cross the membrane. The euphoric or “happy-like” state is achieved by morphine locking onto endorphin receptor sites to initiate the same response as a natural endorphin is, but much more intense and with severe side effects.

*Short-term effects:* Pain relief, drowsiness, dilated pupils, incomprehensible speech, euphoric feeling, stomach pain including aches, nausea, vomiting

*Long-term effects:* addiction, compromised immune system, depression, social withdrawal

*Treatment:* medical professionals, rehabilitation centers

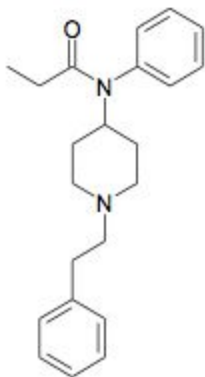


**HEROIN:** Heroin is another drug in the opioid family, coming from the opium poppy flower. Heroin can be taken intravenously, first giving the user a “rush” then a “high.” This is theorized to be due to the drug first bathing in the brain (resulting in a euphoric, analgesic state), followed by distribution in the blood resulting in the high (a drowsy, dream-like state). Its hydrophobicity allows easy diffusion across the Blood-brain barrier, which is mostly impermeable to other drugs and compounds.

*Short-term effects:* dry mouth, warm flushing of skin, heavy feeling in arms/legs, nausea/vomiting, itching, back-and-forth semi-consciousness

*Long-term effects:* insomnia, collapsed veins, damaged tissue in nose, infection of heart lining and valves, abscesses, constipation/stomach cramping, liver/kidney disease, lung complications, depression and anxiety

*Treatment:* pharmacological interventions (methadone/naltrexone which exhibit a similar opioid structure but act to dampen the effects) and cognitive-behavioural therapy



**Fentanyl:** Another powerful opioid-based analgesic but is 50-100 times more potent than morphine. Fentanyl can be administered as a drug patch, intravenously or as lozenges. Illegally, fentanyl is also mixed with other drugs such as MDMA, cocaine and heroin due to its high production rate at low costs. Synthetic drugs like fentanyl contribute extremely heavily to the ongoing opioid epidemic in North America.

*Short-term effects:* nausea, vomiting, tiredness, dizziness, trouble sleeping, constipation, increased sweating, feeling cold, headache, diarrhea, loss of appetite

*Long-term effects:* Multiple organ system damage due to decreased oxygen in body tissues, Deterioration of pre-existing mental health conditions, seizures, Adrenal insufficiency, Androgen deficiency,

*Treatment:* Naloxone is a medicine that can treat a fentanyl overdose when given right away, Fentanyl Addiction Treatment Centres ( to have assistance in detox and withdrawal ), therapy

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