

# SCIENCE, TRANSLATED

MAKE SCIENTIFIC DISCOVERIES ACCESSIBLE FOR THE WORLD



Science, Translated

## FEATURED TOPICS:

HEALTH AND MEDICINE  
PSYCHOLOGY AND SOCIETY  
ENVIRONMENT AND  
ECOLOGY

## JANE NGUYEN AND BIANCA MAMMARELLA

*Discussing Science, Translated publications  
and academic involvement*

# ABOUT SCIENCE, TRANSLATED

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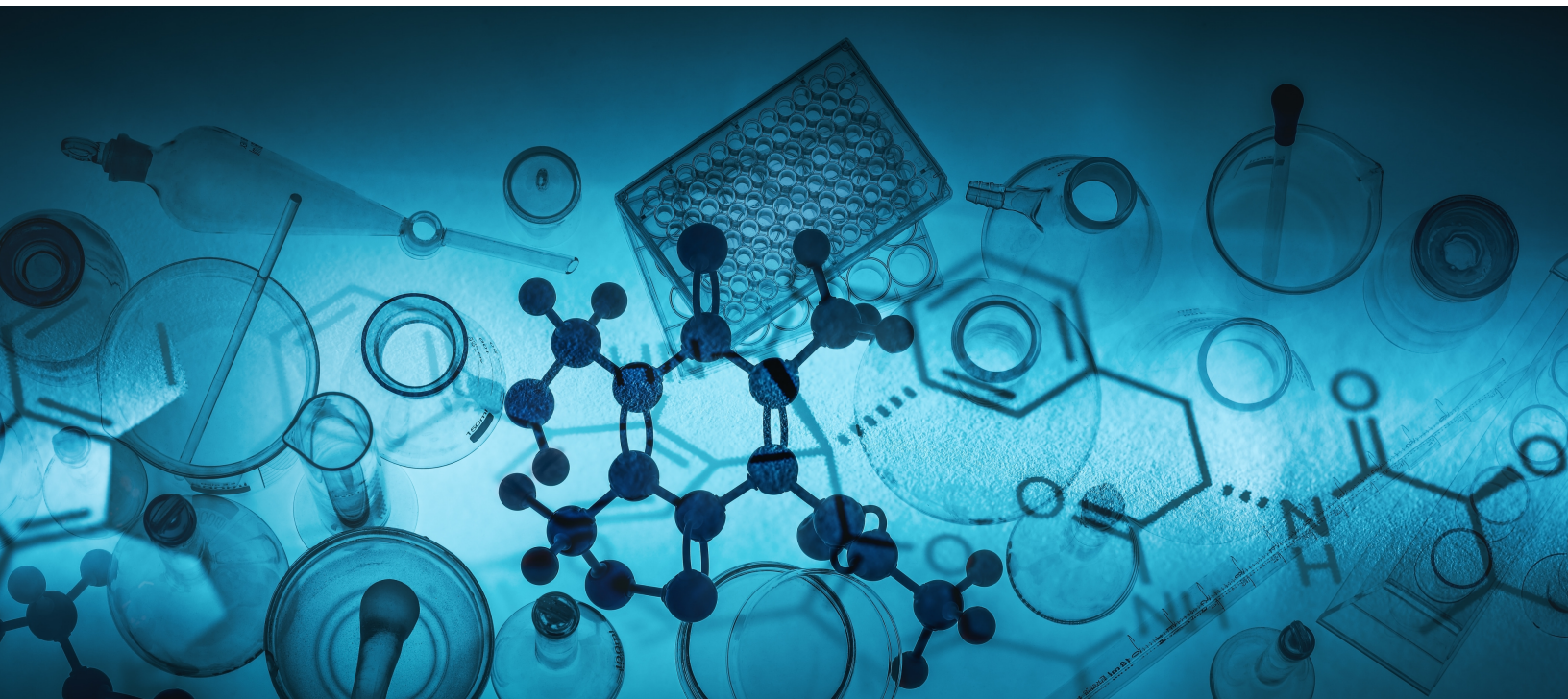
*Science, Translated is a student-led international journal platform for students of all levels of academia to disseminate scientific knowledge, share their ideas, and connect with other budding scientists through scientific journalism. With the help of a team of dedicated student journalists from various esteemed universities across the world, we produce scientific articles on topics relating to a wide range of STEM topics, including (but not limited to) biology, physics, chemistry, astronomy, medicine, ecology, and psychology. The focus of our journal is to translate and analyze recently published research papers and scientific literature and simplifying their contents for students and the general public to increase awareness of ongoing research.*

*"Science, Translated was founded in 2020 with the main intention of bridging the gap between researchers and academia and the general public. There is groundbreaking research happening around us every day, discoveries changing the way we view the principles of this world. Yet, the public is often not made aware of these notable advancements due to a lack of information flow between researchers and the public."*

**- Ashley Yeh and Saumya Tawakley,  
Editors-in-Chief of Science Translated**

*"Science, Translated is not just a journal. It is a resource for anyone interested in growing their knowledge in STEM. Article publications are just one of the many formats we use to translate science to other students and the general public. Using our social media accounts, we connect with a broad range of audience through our short form contents and videos covering the latest scientific knowledge and discoveries."*

**- Labiba Nawar  
Outreach Director and Lead Editor of Science,  
Translated Journal**



# Health Holidays

Health holidays not only raise awareness for health illnesses that many deal with every day, but also highlight ways that we can care for ourselves. Take a look at some of the holidays happening this summer and take some time to learn more!

World Bicycle Day

Jun  
3

International Nystagmus Day

Jun  
20

World Hydration Day

Jun  
23

World Hepatitis Day

Jul  
28

Jun  
1

National Heimlich Maneuver Day

Jun  
6

National Cancer Survivors Day

Jun  
14

World Blood Donor Day

Aug  
6

Cycle to Work Day

Aug  
30

National Grief Awareness Day



# JOURNALIST SPOTLIGHT

FEATURES: JANE NGUYEN & BIANCA MAMMARELLA



# JANE NGUYEN

## FEATURED JOURNALIST

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*Hello everyone, I am your host Diana Amiscaray. I am excited to introduce you to Jane Nguyen, a Ph.D candidate specializing in Chemical and Biomolecular Engineering at John Hopkins University.*

*Before we begin, I would like to congratulate you on your recent research publication! Can you give our audience a little overview of your experiment?*

*"I study the underlying mechanisms in diseases affecting the vasculature such as diabetes and cardiovascular diseases. Vascular diseases and hypoxia affect endothelial cells, and the cells that support them, which are pericytes. I'm focusing on the communication between these cells from the perspective of molecules that they secrete in response to hypoxia."*



*Speaking of publications, you've co-written a very informative article about the global transmission of COVID-19 on our website. In your article, you've asked the rhetorical question, "why does the information keep changing?" What would you say to people experiencing frustration, or perhaps even skepticism, about the constant change in the information reported?*

*"With all the new data being published at lightning speeds, there will be conflicting evidence that informs rapid changes in rules. This is because we are learning new things about a novel virus that, in itself, is constantly changing and mutating. Like you said, with the change comes skepticism. Skepticism to me is good. It motivates a search for answers that are more comprehensive, logical, and hopefully, more accurate. Scientists like me are here to help you clarify what you read or saw online. This is where I think Science, Translated can be an indispensable platform to mediate scientific communication."*



*I've heard about your involvement as a mentor and, I was wondering, What advice would you give women who are considering or are already pursuing a career in STEM?*

*"My go-to tips are:*

- 1. Always be curious, and don't be afraid to ask questions*
- 2. Actively seek out mentorship to help you answer those questions!*
- 3. Just try it. "*





# BIANCA MAMMARELLA

## FEATURED JOURNALIST



*Hello everyone. I am your host Labiba Nawar. In this interview, we bring you one of our dedicated journalists, Bianca Mammarella. It is great to have you here with us, Bianca! Tell us a little bit about yourself.*

*"Thank you for having me Labiba. I am excited for this interview. I am a 2nd year Integrated Science Student at McMaster University. My research interests are quite broad, with various research interests such as medicine, pharmacology, cardiology, and public health. Currently, I am a research student and a part-time pharmacy assistant."*



*I would like to discuss your experience as a pharmacy assistant. How has your experience been with the current COVID-19 vaccine distribution?*

*"My site began as an AstraZeneca vaccine clinic which later transitioned to a Pfizer vaccine clinic per government guidelines. I have learned a lot about time and stress management and collaborations through this experience. Proper time management is important as you never know what experiences clinic may bring you."*



*This is definitely insightful, which brings us to my next question. You are quite active in research and currently a research student with the McMaster Cardiology Research Department. Tell us some highlights from this experience.*

*"My involvement in cardiology research began in grade 11. Back then, I worked on seven primary research trials focusing on electrophysiology research through a co-operative education placement. Now, I am fulfilling a very similar position with McMaster. Both of these positions helped me discover my passion for cardiology research."*



*Wow, Bianca, you have been dedicated to research from a young age! On the topic of research, check out the following pages to read Bianca's recently published article with Science, Translated!*

*Check out our Instagram page for the full interview.*



# NEW ARTICLE RELEASES

SUMMER 2021 WRITING CYCLE



## **TRAUMATIC BRAIN INJURY AND ANESTHETICS**

By Bianca Mammarella

Traumatic brain injuries (TBI) have an increased occurrence in today's day and age. TBI cases vary tremendously as some diagnosed patients are fully conscious, while others are in a comatose state. This increased presence of TBIs in our health care system poses many threats to patients who may require related or unrelated procedures that use general anesthetics. The interaction between this type of injury and anesthetic has just recently gained awareness as the use of general anesthetics on TBI patients has been seen to worsen patient outcomes. This review will discuss the definition of both a TBI and general anesthetics, how general anesthesia works, and the threat it poses to this patient population.

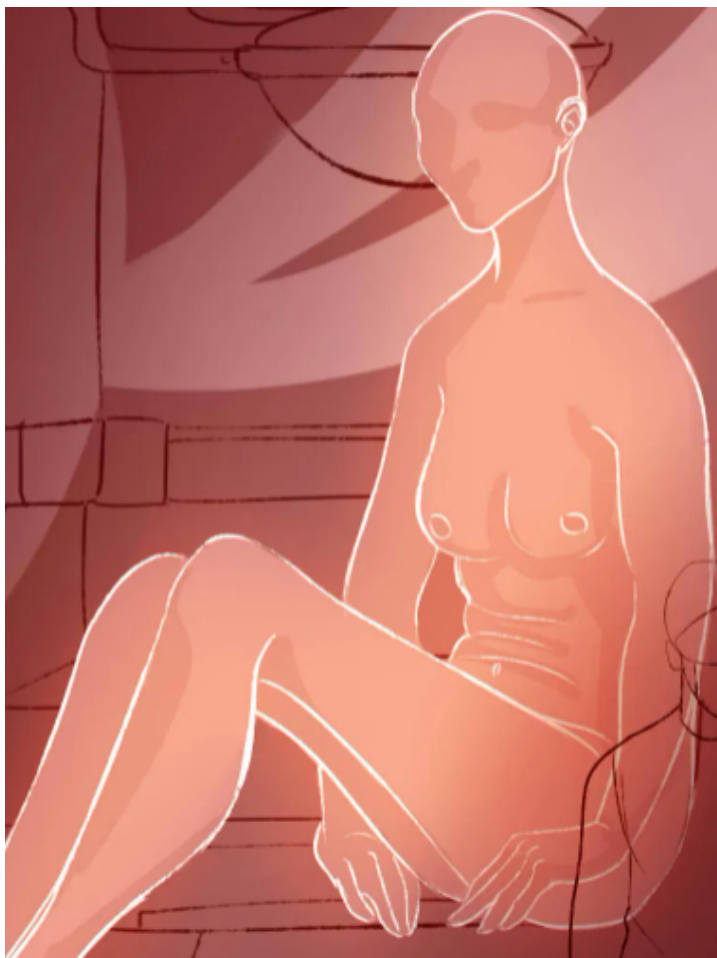
## **DOUGHNUT ECONOMICS: WHY WE HAVE TO THINK BEYOND ECONOMIC GROWTH**

By Audra Miller

The end of the COVID-19 pandemic has brought in a need for recovery strategies that can benefit everyone. Do we have to continue shooting for increased profits year after year at the cost of our environment and free time? In short, no. One way to change this goal would be through an economic model known as the Doughnut. Here, social justice and sustainability are at the forefront, and pure profits are not the only goal, so there is room for every person in a nation to grow and achieve prosperity and happiness. Doughnut economics brings a new way of thinking about success and could be just what we need to recover from the pandemic.







## **THE UNDERDIAGNOSIS OF THE FEMALE BODY IN BREAST CANCER**

By Angel Xing

One example of a remaining healthcare disparity is the underdiagnosis of the female body in breast cancer treatment. While mammograms are the main diagnostic tool for breast cancer, many individuals expressed discomfort with the procedure. Worse, scientists found that mammograms are not 100% effective for detecting breast cancers at all ages. The over-reliance on mammograms results in late diagnoses.

Besides facing possible underdiagnoses, there is often another hurdle in the treatment of breast cancer. Despite a wide variety of treatment methods, interviews with Robin Beasley and Melanie Adrian found a lack of transparency from the medical practitioners to the patients about their options. So the pair ended up taking it upon themselves to start a non-profit organization, Be The Choice, and create a virtual tool, Decision Trees, to empower patients and show each treatment step and path.

## **BIODEGRADATION OF OIL SPILLS IN THE ARCTIC**

By Ivy Truong

As nations across the globe race to strengthen their industrial and technological sectors, environmental responsibilities inevitably become neglected. Focusing on the potential for local microorganisms to degrade the oil by biodegradation naturally opens up the potential to create specialized recovery procedures for the specific environmental conditions of different bodies of water. This article discusses the biodegradation potential of the Arctic by looking at various environmental factors that have the largest effect on oil biodegradation. The efficacy of natural biodegradation depends on the environment. Therefore, observing the ecological influences on the process provides insight into areas that can best increase the biodegradation rate.

The types of microorganisms and the marine conditions are different for every environment, which is why the plans for each oil spill have to be adjusted specifically for those circumstances. The potential for biodegradation of the Arctic waters in Greenland is being examined in light of the largest oil spill occurring recently in the Arctic. The prospect was measured using current knowledge of three major environmental constraints characteristic of the Arctic environment: temperature, hydrodynamic conditions, and the production of sediment plumes, key components affecting oil biodegradation. It is important to consider these factors when reviewing the natural capabilities of the ecosystem when recovering from a man-made disaster.



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# **ARTICLE SPOTLIGHT**

**EDITOR'S PICK: TOP 3 ARTICLES OF THE FIRST HALF OF 2021**



By Inara Nanji  
Posted: March 30, 2021  
Psychology and Society

To say that the pandemic has transformed our lives would be an understatement. Indeed, such a significant event has prompted various mental health difficulties, especially our sleep and dream patterns. Have you ever wondered how COVID-19 has affected your dream content? Why are some of your dreams more vivid? While you may have not considered these questions, many people have thought about them and had similar questions spurring in their minds. So, what is the relation between the pandemic and dreaming?

Figure 1: An illustration of the impact of COVID-19 on sleep and mental health. Source: Global Report Unveils the Coronavirus Pandemic's Impact on Sleep and Mental Health [diagram]. Business Wire.



Irregular fluctuations in sleeping and dreaming patterns are typical; however, extreme factors such as environmental changes and traumatic experiences alter dream content or produce more nightmares. This has previously been associated with terrorist attacks, wars, and during the earlier breakout of infectious diseases (Pesonen et al., 2020). Likewise, the COVID-19 (SARS-CoV-2) pandemic has implanted worries and fears, which alters behaviors and daily life and the lens through which we view the world (Pesonen et al., 2020). Ultimately, these stress and waking concerns have been reflected in sleep-related mentation, which is defined as "the cognition (typically dreams) that is associated with the sleep state that the person was in before being awoken".

Dream's mirror waking day events, which has been explained by the continuity hypothesis – the content of dreams is mainly continuous with waking concepts and concerns of the dreamer. Poor physical and emotional health has been linked with dreams comprising more imagery of illness, injury, sadness, anger, and aggression (MacKay & DeCicco, 2020). Health thoughts or worries has also been related to an increase in dream imagery involving the subject of health or illness causing morning anxiety (i.e., waking up with feelings of stress and worry).



Figure 2: Morning anxiety. Source: Why do I Always Wake up Early? [diagram] Verywell health.

Even trauma experienced indirectly, such as the 9/11 attack in New York, influenced people's dream imagery (MacKay & DeCicco, 2020). It was found that when comparing the dreams of individuals before and after the events of 9/11, their dream subject matter was distinctive, with those following 9/11 being symbolized by the greater intensity and negative emotion (MacKay & DeCicco, 2020).

A study conducted by MacKay and DeCicco (2020) aimed to establish if the COVID-19 pandemic has caused changed dream imagery. Specifically, the comparison between the dream content during the pandemic and before the pandemic (MacKay & DeCicco, 2020). Nineteen participants in the control group had their dreams recorded before the pandemic. Nineteen participants in the COVID-19 group were given a dream journal to record their dreams between February 24, 2020, and March 12, 2020, for two weeks. The researchers used the Hall/Van de Castle coding system to analyze dream content. It is a dream content coding system carried out by construction of a set of categories containing relevant characteristics of dream reports in a reliable and effective way. Dream categories in this study included head, extremities, torso, anatomy, animals, food, location change, COVID-19, coughing, medical, and isolation. The total virus-related imagery contained COVID-19, grocery, coughing, medical, isolation dream imagery (MacKay & DeCicco, 2020).



Figure 3: Virus-related dream imagery. Your coronavirus dreams might tell you how you're really feeling [diagram]. ABC Everyday

Results indicated that individuals in the COVID-19 group reported more location changes, animal dream imagery, and virus-related dream imagery than the control group, which have been linked to morning anxiety (MacKay & DeCicco, 2020). Interestingly, the COVID-19 group reported dreams involving more food and head dream content which can be connected with concerns regarding stocking up on food supplies, food shortages, coughing, checking temperature, and wearing masks due to the pandemic (MacKay & DeCicco, 2020).



Figure 4: Vivid COVID-19 dreams. Source: From being chased to naked Zoom meetings and natural disasters, an expert reveals what's going on as many of us experience VERY fitful nights in lockdown [diagram] Daily mail.

Some limitations were when the study took place as students were stressed about their midterms. Hence that could have been the cause of their morning anxiety rather than the pandemic. The sample sizes were relatively small (N = 38) as the University was shut down because of the pandemic. There was a lack of diversity as most of the sample consisted of Caucasian females, psychology university students as participants indicating limited generalizability. Therefore, future studies could consider more immense and more diverse sample sizes to demonstrate the pandemic better and dreaming relationship and analyze dream imagery before, during, and after the pandemic to gain a more all-inclusive understanding.

One method for easing stress revealed in dreams is dream interpretation. Dream interpretation occurs in various stages and is helpful in gaining a deeper understanding for the dreamer. The first is when the dreamer has to read their dream aloud in a group after which the group then asks questions to clarify the dream report read aloud by the dreamer. Secondly, a brief discussion occurs amongst group members other than the dreamer to infer their feelings and experiences as if it were their dream. Thirdly, these individuals' predictions are induced about the dream, in association with their own lives to give symbolic or metaphorical meanings to dream images. Fourthly, the dreamer responds to the group members' interpretation. Finally, the dreamer interprets their dream in terms of their waking life context for the dream, especially recent life experiences or concerns.

To sum up, as concerns and anxieties regarding the virus are persistent and influence many people during both waking and sleep, it is proposed that dream interpretation may be a favorable method to ease COVID-19-related stress (MacKay & DeCicco, 2020)

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# CORAL COMMUNITIES IN THE CARRIBEAN - TRANSFORMATION SINCE HUMAN ARRIVAL



By Neema Tavakolian  
Posted: March 8, 2021  
Environment and Ecology

## Coral Reefs in the West

For years now every so often we see another headline about the decline of the world's coral reefs spurring articles and debates about global warming, ocean protection, fishing, and pollution. The Caribbean sea hosts one of the world's largest collections of living corals and coral ecosystems. Systematic monitoring of coral communities began in the late 1970's; since monitoring, Caribbean reefs have seen a 50-80% decline in reef-building corals. The decline of corals has resulted in the dominance of greener algae based ecosystems. The evidence does not point to one specific cause, but a multitude of stressors which include the global warming of the seas, land-based pollution, overfishing of herbivorous fish and urchins, and diseases afflicting corals and urchins. The "White Band Disease" that appeared throughout the 1980's specifically decimated 80% of elkhorn and staghorn corals. Significant coral bleaching events have occurred predominantly since the early 1990's until present day increasing coral disease and vulnerability.



Figure 1: Elkhorn coral facts  
Source: <https://wildfor.life/species/elkhorn-and-staghorn-coral>

## Experiment

Data on coral species and their compositions were gathered via semi-quantitative, quantitative, and qualitative records from a variety of sources ranging from peer-reviewed scientific literature, government reports, and historical literature. Data for corals starting from the 1980s were obtained from the Global Coral Reef Monitoring Network (GCRMN) database that consists of peer-reviewed literature from 1970-2011.

The researchers focused the study on 14 different coral taxonomic groups that are common throughout the Caribbean and persist through time since the Late Pleistocene era (131,000-12,000 years ago) to 2011. The researchers also analyzed coral data based on depth or reef zone which was divided up into "reef crest" (0-6 m.) and "midslope" (6-20 m.) reef zones. For the experiment, stress tolerances of different corals were also taken note of.

## Results

The long term changes regarding Caribbean reefs were divided into three main categories: declines in competitive corals by the 1960's, increase of stress tolerant and weedy (fast growing corals that usually are first to colonize a reef) corals by the 1970's and 1980's, and the leveling off of these stress tolerant and weedy corals by the 1980's and 1990's. These trends were consistent with all 14 groups of coral. These trends were also consistent at most depths from most of the site locations. Overall, corals declined in all locations at every depth with sensitive corals declining the most. Weedy corals increased their share of reefs relative to other species. Most significant declines in corals were 2000-2004 at the reef crest and 1985-1989 at the midslope zones. This research covers about 131,000 years of coral reef history in the Caribbean and the researchers found that coral reefs drifted from competitive *Acropora* corals typified by fast growth, large and structurally complex colonies, and high rates of reproduction by fragmentation and lower tolerance to human disturbances to systems dominated by stress-tolerant and weedy corals with relatively slower growth, lower-relief colony forms, and higher tolerance to human disturbances (Cramer et. al, 2021, p. 6).

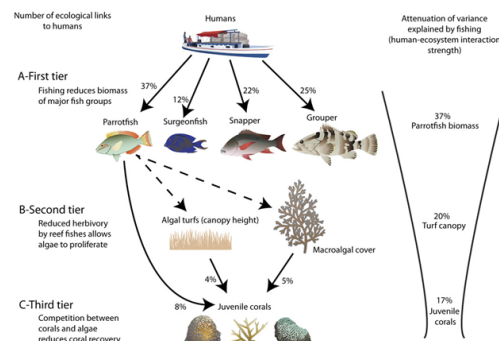


Figure 2: Three tiers of measured effects of human fishing towards just juvenile corals, not including other detrimental anthropogenic activities on corals. Solid lines indicate statistically significant results with the proportion of variance explained between each tier. Dashed lines represent significant correlations across data, but the clarity of these relationships was swamped by interregional variation in hierarchical models. This figure was based on a different study in 12 islands along 700-km of an eastern Caribbean archipelago comparing fished and unfished coral reefs.  
Source: <https://doi.org/10.1126/sciadv.aao5493>

## What now?

Now that we have a general history about what has happened to the corals since humans have been introduced, what now? It is not like humans are going to disappear and the coral reefs are going to thrive again. The damage has been done, but there is still time and room to prepare. Some good news on the horizon is that corals are beginning to adapt to the effects of global warming and reefs are even being found at latitudes previously impossible. Because of various studies and international efforts, we now know more about corals than ever before. Educating the public about coral reefs and the importance of keeping our oceans healthy would be one of the most effective ways to spread awareness and activism for these natural monuments.

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# EXPLAINING OPIOID ADDICTION: DEBUNKING MYTHS AND DEFINING TERMS



By Angel Xing  
Posted: January 15, 2021  
Health and Medicine

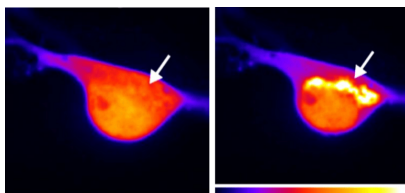
In the United States, over 500,000 lives were claimed by opioid overdose between 1999 to 2018. To this day, the opioid crisis continues to cause grief for many communities across North America. Although there is a growing awareness about the epidemic, the damage of the opioid crisis is prolonged by the stigmas, myths, and unfamiliarity with opioid addiction. Considering the magnitude of people affected by this issue, it is necessary to become more informed about opioid addiction.

## Common Myths

### 1. Opioid painkillers are just stronger versions of other pain relief medications (e.g Tylenol).

This is not true. Different types of pain relief medications function in various ways. There are pain relief medications that focus on decreasing inflammation, such as NSAIDs (non-steroidal anti-inflammatory drugs), and corticosteroids (injections with strong anti-inflammatory effects). One common type of NSAID is ibuprofen, a key active ingredient in Advil. Another common pain relief medication is acetaminophen, commonly known by the brand name Tylenol, which reduces pain by acting on the brain.

Opioid painkillers are different. They are narcotics, meaning that they reduce pain messages to the brain. By activating opioid receptors, G protein-coupled receptors (GPCRs), on nerve cells, they reduce feelings of pain. In short, they modify how the brain receives pain.



A nerve cell before opioid receptor activation (left) and 20 seconds after activation by morphine (right). Drs. Miriam Stoeber and Damien Jullié of von Zastrow lab, UCSF

Since there are many different types of pain relief medication, they act on the body differently and have different side effects. Be sure to check with your doctor or pharmacist for specific instructions!

### 2. You won't get addicted to opioids if you are careful.

Addiction alters brain chemistry. The impact of the opioids is directly on the nerve cells in the brain, so it directly affects the brain. Opioids stimulate the brain's reward system, triggering withdrawal symptoms that drive dependence and addiction. In other words, one's mentality or caution cannot entirely prevent them from developing an addiction to these drugs.

There also exists the misconception that medication prescribed by a doctor would not be addictive. The properties of a drug depend on the chemical structure of the drug. Discuss all options and risks with your physician.

Addiction is also not the be-all, end-all of taking prescription opioids, but they must be taken with caution.

### 3. Everyone has an equal risk for addiction.

Different groups are more susceptible to addiction. This depends on a variety of risk factors, including past/current substance abuse, untreated psychiatric disorders, young age, and social environments. It is a combination of biological, psychiatric, and social factors. As seen with the opioid crisis that is a product of socio-structural factors outside of an individual's control, certain circumstances can increase the risk of addiction. Thus, clinicians must use assessment tools for addiction risk when prescribing opioids.

## Key Terms

What are **OxyContin** and **oxycodone**?

Such as the relationship between acetaminophen and Tylenol, Oxycodone is the drug name for opioid painkillers, and OxyContin is the brand name. Some other common opioids include Vicodin, Percocet, methadone, Opana, Dilaudid, fentanyl, and morphine.

What is the difference between **tolerance**, **dependence**, and **addiction**?

As explained by the National Institute on Drug Abuse, tolerance describes the situation in which a person needs a higher dose of the drug to achieve the same effect as when they first took it. This is because their body is not as receptive to the drug at the time of their first dose.

Dependence is when a person stops using a drug and experiences withdrawal symptoms. People who are dependent on medication are not necessarily addicted.

Addiction is characterized by an overwhelming and uncontrollable compulsion to take a drug or substance. This is where a person cannot stop taking a drug despite harmful consequences, even when their treatment is complete.

What is **naloxone**?

This is a short-acting drug that successfully blocks opioid receptors. Naloxone has been in use for over 30 years in treating opioid-overdose, especially the induced respiratory problems. Naloxone can be administered in three main ways: intravenous, intramuscular, or intranasal.

Typically, naloxone is administered by emergency medical personnel, but peers and family members are usually the first responders. Naloxone's efficacy is time-dependent because death typically happens within 1-3 hours after the overdose. Since it is best to intervene within an hour of the overdose symptoms, there is a growing need to increase access to this drug.



Naloxone nasal spray (left), and naloxone injectable (right). Canada, Health. "Naloxone." Canada.ca, / Gouvernement Du Canada, 18 Apr. 2019.

## What to do if someone has an opioid overdose?

Telltale symptoms of an opioid overdose include:

1. Blue lips, fingernails, or toenails
2. Breathing very slowly or not at all
3. Faint or no pulse
4. Pale and clammy skin
5. Unresponsive to their name or pain
6. Snoring or gurgling noises while asleep or nodding out

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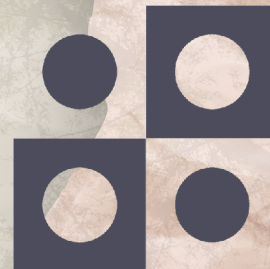
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