Dependence

"Nicotine is the principal pharmacological agent that causes dependence. Nicotine is delivered via the pulmonary route. The speed, efficacy, and magnitude of nicotine delivered produces a higher addiction" (NASEM, 2018, p.256). Becoming dependent on nicotine can lead to addiction, and will also lead to withdrawal symptoms if the addict tries to quit.

Withdrawal symptoms include:
- Stress
- Anxiety
- Anger
- Mood Swings
- Lack of concentration
- Grades dropping
- Lack of motivation

Coping skills:
- Exercise
- Play a game
- Watch a movie
- Write in a journal
- Hang out with non-smoking friends
- Create a project
- Finish a project
- Work on homework
- Listen to music

VAPING IS STILL TOBACCO.

Text "Start My Quit" to 855-891-9989 or call. Free, confidential help. Just for teens.

WWW.MYLIFEMYQUIT.COM

MY LIFE MY QUIT.

Source: My Life My Quit (2020)

www.mylifemyquit.com was developed with youth who provided insight into how best to reach teens looking for support to stop using tobacco products, including electronic cigarettes like JUUL. My Life, My Quit coaches are specially trained to listen and understand teens, provide personalized support, and build relationships that support quitting tobacco (My Life My Quit, 2020).

Cardiopulmonary Impact

The Airways of "Healthy" Vapers are Abnormal

Non-smoker   Smoker   Vaper
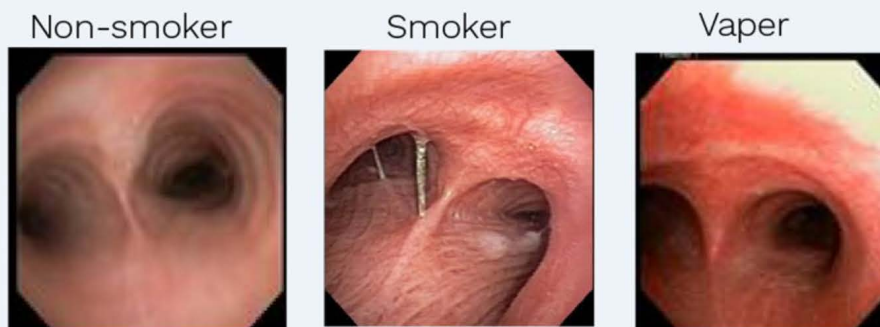
New research has found that vaping alters the physical appearance of airways and lung macrophages.

Source: Ray Coakley (Ghosh et al. American Journal of Respiratory and Critical Care Medicine 2018)

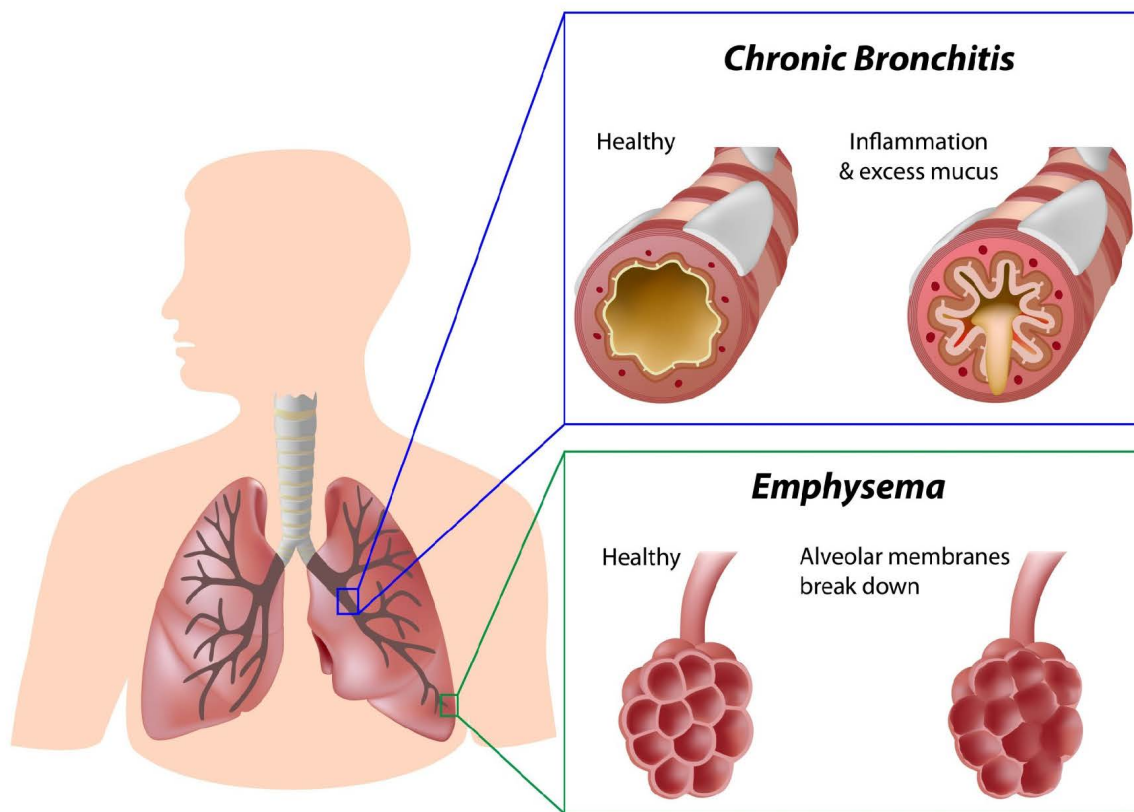Source: Ghosh et al. (2018)

Notice in the picture above:

- The non–smoker airways are straight up and down, and you can see the macrophages are circular patterned. Macrophages destroy bacteria, viruses, and fungi. They are an essential part of the body's immune system.

- The smoker's airways are tilted and no longer straight up and down. They are narrowed, show signs of irritation, and contain phlegm. Notice the macrophages are now curved and no longer making a circular pattern.

- The vaping airways have extreme irritation, changes in the airways, and no signs of macrophages.

"We have concerns about the direct effects of e-cigarettes on the airways. This includes the potential for the use of such products to cause changes to airways that could be a precursor to cancer" (FDA Report On Seizures, 2019).

Cardiopulmonary Impact

Chronic Obstructive Pulmonary Disease (COPD)

Chronic Bronchitis

Healthy

Inflammation & excess mucus

Emphysema

Healthy

Alveolar membranes break down

Source:123RF, [alila]

Often promoted as a healthier alternative to smoking, current e-cigarette users were 1.3 times more likely to develop chronic lung diseases like emphysema, asthma and bronchitis. People who smoke conventional cigarettes increased their risk factor of developing chronic lung diseases by 2.6 times. For dual users—people who smoke and use e-cigarettes at the same time—these two risks multiply, more than tripling the risk of developing lung disease.
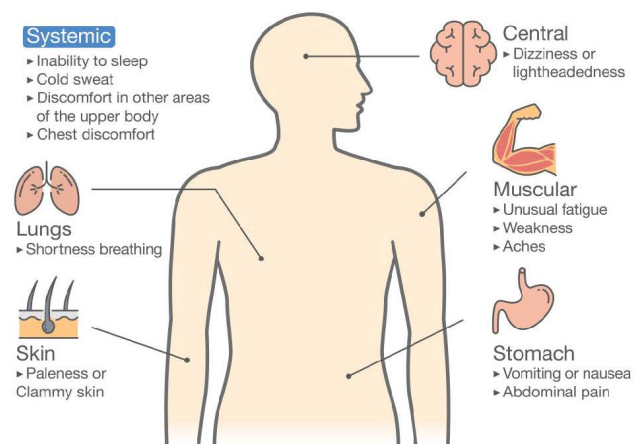
(Glantz, 2020)

Cardiopulmonary Impact
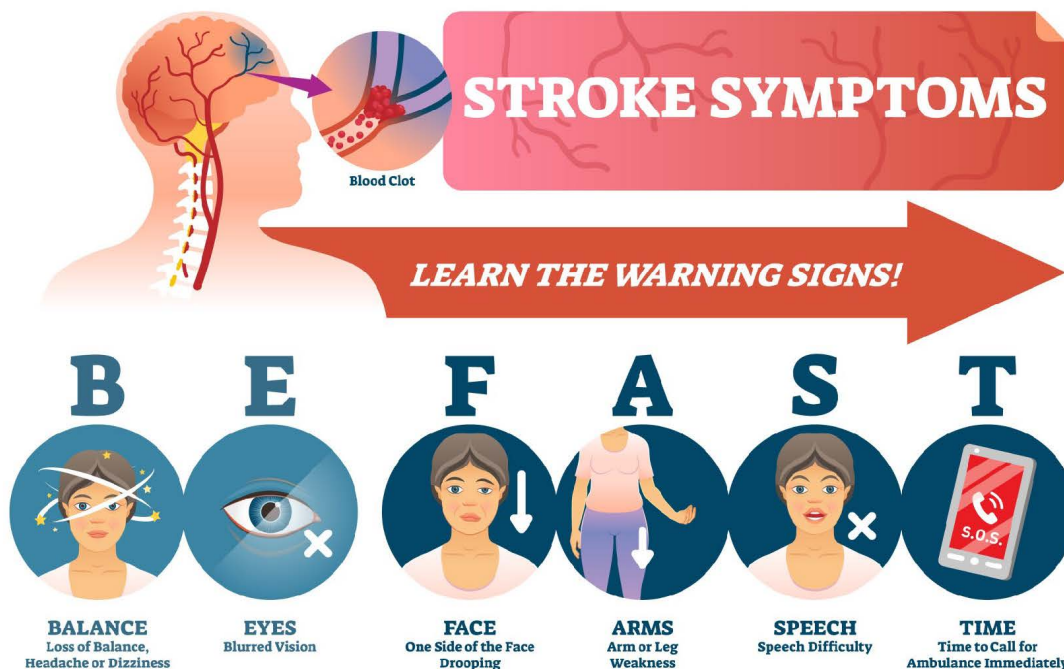
Compared with non-users, e-cigarette users are:

- 34 % more likely to have a heart attack.

- 25 % more likely to have coronary artery disease.

- 55 % more likely to suffer from depression or anxiety.

- 30 % more likely to suffer a stroke, high blood pressure, and circulatory problems.

(ACC, 2019)

Warning Signs of a Heart Attack

Systemic
▸ Inability to sleep
▸ Cold sweat
▸ Discomfort in other areas of the upper body
▸ Chest discomfort

Lungs
▸ Shortness breathing

Skin
▸ Paleness or Clammy skin

Central
▸ Dizziness or lightheadedness

Muscular
▸ Unusual fatigue
▸ Weakness
▸ Aches

Stomach
▸ Vomiting or nausea
▸ Abdominal pain

Source:123RF, [Suriya Siritam]

STROKE SYMPTOMS

Blood Clot

LEARN THE WARNING SIGNS!

B BALANCE
Loss of Balance, Headache or Dizziness

E EYES
Blurred Vision

F FACE
One Side of the Face Drooping

A ARMS
Arm or Leg Weakness

S SPEECH
Speech Difficulty

T TIME
Time to Call for Ambulance Immediately
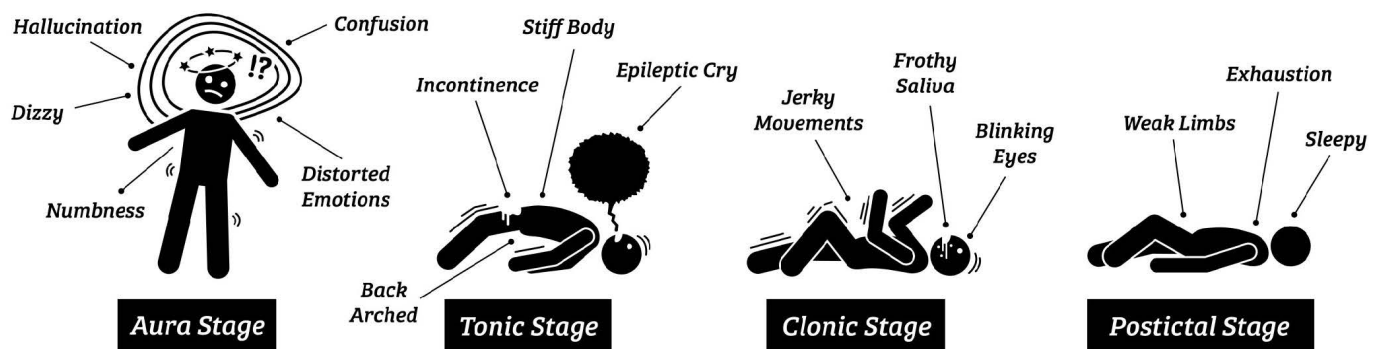
Source:123RF, [normaals]

Seizures

Stages of a Seizure

Source: 123RF, [Khoon Lay Gan]

The FDA has seen a recent increase in voluntary reports that mentioned seizures occurring with e-cigarette use (e.g., vaping) signaling a potential emerging safety issue. E-cigarette users are experiencing seizures, with most reports involving youth or young adult users. Seizures or convulsions are known potential side effects of nicotine toxicity and have been reported in the scientific literature in relation to intentional or accidental swallowing of e-liquid (FDA Report On Seizures, 2019).

"If you think a person is having a seizure, call 911 and seek immediate medical help. For exposures with less serious visible effects, or if you have questions, call poison control at 800-222-1222"

(U.S. Food & Drug Administration, 2019)

Vaping Leads to Smoking Traditional Cigarettes

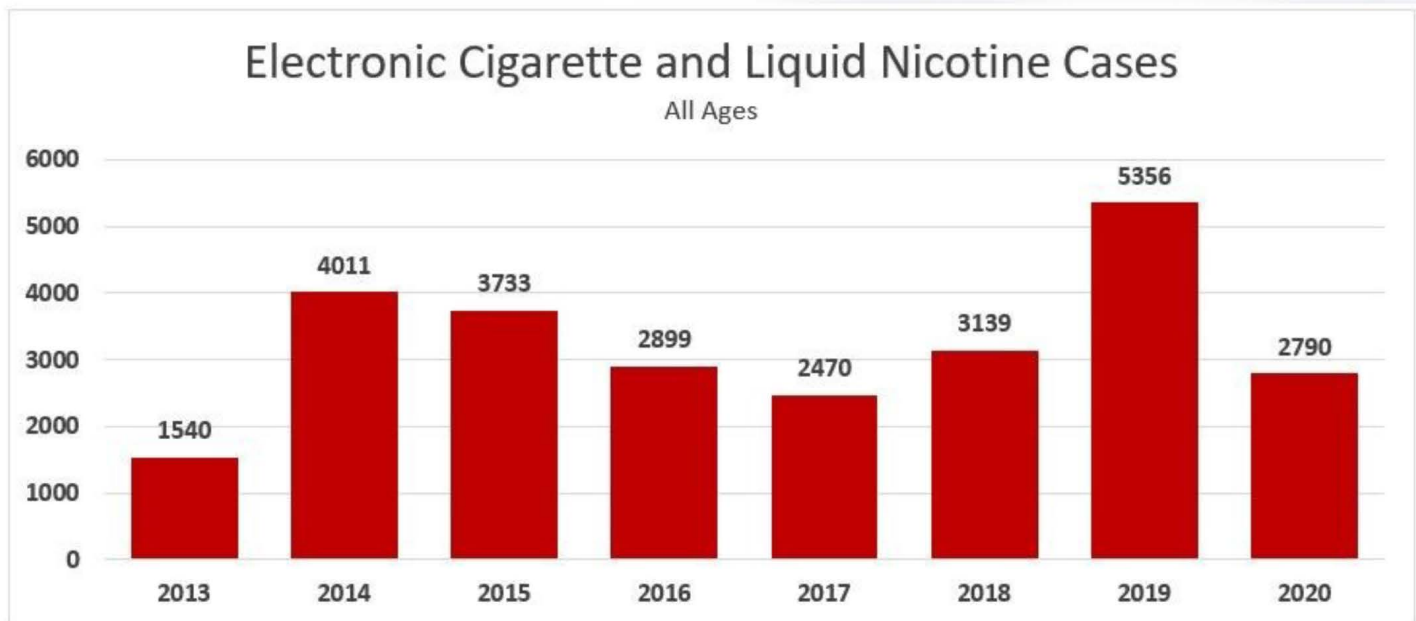
Source:123RF, [Diego Vito Cervo]

"When compared to adolescents who do not use e-cigarettes, adolescents who use e-cigarettes are 4x more likely to start smoking tobacco cigarettes within 18 months of starting e-cigarettes" (Primack, 2018).

"Teens have a 30 % chance of smoking a regular cigarette within 6 months of trying their first e-cigarette" (NIDA, 2016).

Poison Control

Electronic Cigarette and Liquid Nicotine Cases
All Ages

Year	Cases
2013	1540
2014	4011
2015	3733
2016	2899
2017	2470
2018	3139
2019	5356
2020	2790

As of December 31, 2020   Source: AAPCC, 2021

Poison control centers began receiving calls about e-cigarettes and liquid nicotine products in 2011, which coincides with the initial period when these products reached the U.S. market. These products often contain a greater concentration of nicotine than other nicotine/tobacco products on the market. Some children and toddlers who come in contact with e-cigarette devices or liquid nicotine have become very ill: sometimes even requiring emergency department visits with nausea and vomiting being the most significant symptoms.

Exposures to vaping liquids and other products containing nicotine can cause nausea, vomiting, and dizziness. In serious cases, exposure can lead to life-threatening and severe symptoms like seizures, decreased heart rate, and decreased blood pressure. These symptoms can happen to anyone of any age, but the risk is greatest in children due to their size .

You can reach your local poison control center by calling the Poison Help hotline: 1-800-222-1222. To save the number in your mobile phone, text POISON to 797979.

(AAPCC, 2021)

Outbreak of Lung Injury

As of June 2019, the Center for Disease Control and Prevention (CDC), the U.S. Food and Drug Administration (FDA), state and local health departments, and other clinical and public health partners are investigating a multi-state outbreak of lung injury associated with the use of e-cigarette, or vaping, products.

- All E-cigarette, or Vaping, product use Associated Lung Injury (EVALI) patients have reported a history of using e-cigarette, or vaping products.

  - THC is present in most of the samples tested by the FDA and most patients report a history of using THC-containing products.

  - The latest national and state findings suggest products containing THC, particularly those obtained off the street or from other informal sources (e.g. friends, family members, illicit dealers), are linked to most of the EVALI patients and play a major role in the outbreak.

  - A small percentage of findings report using only nicotine products.

Symptoms of Lung Injury Reported by Patients in This Outbreak

Patients in this investigation have reported symptoms such as:
- cough, shortness of breath, chest pain
- nausea, vomiting, abdominal pain, diarrhea
- fever, chills, weight loss

Some patients have reported that their symptoms developed over a few days, while others have reported that their symptoms developed over several weeks. A lung infection does not appear to be causing the symptoms.

Irrespective of the ongoing Investigation

- E-cigarette, or vaping, products should never be used by youths, young adults, or women who are pregnant.

- Adults who do not currently use tobacco products should not start using e-cigarette, or vaping, products.

- THC use has been associated with a wide range of health effects, particularly with prolonged heavy use. The best way to avoid potentially harmful effects is to not use THC, including through e-cigarette, or vaping, products. Persons with marijuana use disorder should seek evidence-based treatment by a health care provider.

- There is no safe tobacco product. All tobacco products, including e-cigarettes, carry a risk.

(CDC's Office on Smoking and Tobacco Use, 2019)

Vitamin E Acetate

Laboratory data shows that vitamin E acetate, an additive in some THC-containing e-cigarette, or vaping, products, is strongly linked to the E-cigarette, or Vaping, product use Associated Lung Injury (EVALI) outbreak.

Key Facts about Vitamin E Acetate

- Vitamin E acetate is used as an additive, most notably in THC-containing e-cigarette, or vaping, products.

- Vitamin E is a vitamin found in many foods, including vegetable oils, cereals, meat, fruits, and vegetables. It is also available as a dietary supplement and in many cosmetic products, like skin creams.

- Vitamin E acetate usually does not cause harm when ingested as a vitamin supplement or applied to the skin. However, previous research suggests that when vitamin E acetate is inhaled, it may interfere with normal lung functioning.

(CDC's Office on Smoking and Tobacco Use, 2019)

- A recent study analyzed samples from 51 EVALI cases from 16 states and a comparison group of samples from 99 individuals without EVALI for vitamin E acetate, plant oils, medium chain triglyceride (MCT) oil, coconut oil, petroleum distillates, and diluent terpenes.

- Vitamin E acetate was identified in bronchoalveolar lavage (BAL) fluid samples (fluid samples collected from the lungs) from 48 of the 51 EVALI patients, but not in the BAL fluid from the healthy comparison group.

- No other toxicants were found in BAL fluid from either group, except for *coconut oil and limonene (1 EVALI patient each)

(Blount et al., 2020, p.697).

Source:123RF, [Roxane Gonzalez Leyva]

*Vegetable glycerin is a known component of vaping liquids. Vegetable glycerin is made from soybean, coconut or palm oils. Please refer to page 28 for more information about Vegetable Glycerin.

Bacterial Exposure Study

Harvard School of Public Health Researchers examined 75 popular e-cigarette products:
- 37 single-use cartridges
- 38 e-liquids from 10 top-selling U.S. brands
- The products were classified into four different flavor categories:
  - Tobacco, menthol, fruit, and other
  - Screened for the presence of endotoxin and glucan (toxic inflammatory substances that damage the lungs).

Researchers found:
- 2 % of the products contained traces of endotoxin, a potential inflammatory molecule found in bacteria.
- 81 % of the products contained traces of glucan, a toxic substance found in the cell walls of most fungi.

Exposure to these microbial toxins has been associated with a myriad of health problems, including asthma, reduced lung function, and inflammation.

(Lee Mi-Sun et al., 2019).

Source: 123RF, [Borya Galperin]

Respiratory Viruses (Influenza, Coronavirus, etc.)

The lungs have natural methods for cleaning air as it moves through the lungs. Cilia (hair like fibers) help clean the lungs, and microphages (white blood cells) help fight infections and viruses. Even coughing helps protect the lungs.

According to a study done by researchers at Stanford University School of Medicine, young people who vape/smoke are at a higher risk of contracting respiratory viruses and if infected, will have a more difficult time fighting off the disease.

Source:123RF, [Kateryna Kon]

Researchers found that individuals who vaped were five to seven times more likely to be infected by the COVID-19 disease than those who did not use e-cigarettes. They were also five times more likely to exhibit symptoms.

According to the research, there could be several reasons vapers are at a higher risk for contracting the COVID-19 disease.

- E-cigarettes are harmful to the lungs and eventually alter the immune system, making each exposure to the virus more likely to trigger an infection.

- Second hand vaping particles emitted from e-cigarette users could have droplets with the virus on them.

- Sharing devices.

- Coronavirus spreads through repeated touching of one's hand to the mouth and face, which is common among cigarette and e-cigarette users.

- Smoking and vaping damage cilia and macrophages

(Gaiha et al., 2020)