



Risks of E-Cigarettes: Digital Lesson Educator Guide

ELEMENTARY SCHOOL | SUPPLEMENTAL LESSON BUNDLE

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Background Info

Why is learning about cigarettes and e-cigarettes important?

While most people are informed about the risks of cigarette smoking today, there are many misconceptions about e-cigarettes and the danger they pose to a person's health and well-being. Many people assume that e-cigarettes are a safe alternative to cigarettes, and while it is true that e-cigarettes do have fewer toxic chemicals than cigarettes, they are still toxic. The aerosol released by most e-cigarettes is not harmless water vapor, as many believe, but instead can contain both nicotine and harmful chemicals, such as formaldehyde¹ and propylene glycol.² It is the nicotine in these e-cigarettes that can lead to addiction, and some types of e-cigarettes contain much more nicotine than regular cigarettes.

The growing use of e-cigarettes, especially by young people, is a serious public health threat. While there are laws to keep teens and middle school age students from buying and using cigarettes, laws to restrict the selling of e-cigarettes to minors have only recently been passed. From 2017 to 2019, there was a 135% increase in high-school e-cigarette use and a 218% increase in middle-school e-cigarette use.⁴ The story has shifted slightly in 2020—19.6% of high school students and 4.6% of middle school students report using e-cigarettes within the past 30 days.³ The results reflect over 2.5 million middle and high schoolers using the product in the past 30 days. Even more concerning, 38.9% of current high school e-cigarette users and 20% of current middle school e-cigarette users were frequent or daily users, a strong indication of addiction. For that reason, it is imperative that students learn about nicotine addiction and serious health risks associated with e-cigarettes. They must learn how to make healthy

decisions, and techniques for not using cigarettes and e-cigarettes, and encourage their peers to do the same.

How will my students learn about the dangers of cigarettes and e-cigarettes?

In these three sessions, students will investigate what is hidden in the vapor from e-cigarettes and the negative and harmful effects these chemicals can have on a person's body when inhaled or ingested. Through a series of activities, students will discover how nicotine and other substances in smoke, second-hand smoke, and vapor can negatively affect the body systems and organs, potentially causing disease and even death. They will use this information to help construct and practice refusal skills and exit strategies when faced with pressure from peers to experiment with e-cigarettes.

How do the sessions work?

Instructional Sequence: The Risks of E-cigarettes Educator Guide provides details to help educators facilitate a series of three sessions of approximately 45 minutes designed to be taught in sequence and used with fifth-grade students. This guide was created to give educators ideas and strategies for presenting the content in the digital lesson. It provides slide-by-slide details for educators to be prepared to engage with students as they explain, discuss, and effectively facilitate the content in each of the sessions.

In addition to the Educator Guide, an accompanying presentation was created using slides so that it can be used in a variety of classroom settings. If you are using a laptop with a projector, simply progress through the slides by clicking to advance. Teacher notes are included for each slide with information on how to proceed.

1 <https://www.sciencedaily.com/releases/2018/05/180521184653.htm>
and <https://www.nejm.org/doi/full/10.1056/NEJMc1413069>
2 <https://www.ncbi.nlm.nih.gov/books/NBK507184/>

3 <https://www.fda.gov/tobacco-products/youth-and-tobacco/youth-tobacco-use-results-national-youth-tobacco-survey>
4 https://www.cdc.gov/mmwr/volumes/69/wr/mm6937e1.htm?s_cid=mm6937e1_w

Session Structure

Each session provides the following information to guide you through its implementation and teach the necessary skills and content:

- **Learning Objectives:** Each session includes its overall goals as well as specific behavioral and cognitive objectives for students.
- **Materials:** Any materials necessary for the session are clearly outlined and included when possible to facilitate easy implementation of the session.
- **Key Terms:** Any words that can be used as vocabulary words will be defined for you.
- **Key Talking Points:** To help you guide discussion and reinforce key concepts, key points are listed next to the corresponding slides.
- **Anticipated Student Responses:** Where relevant, anticipated student responses for activities and questions are provided next to corresponding slides.
- **Wrap Up:** A learning summary is provided at the end of the first two sessions for you to provide reinforcement of the key concepts and objectives of each session.



Session 1

Learning Objectives

Students will be able to:

- **Define** the terms "vapor" and "aerosol".
- **Examine** the various types of chemicals found in e-cigarette aerosol.
- **Discuss** the misconceptions that people have about e-cigarette aerosol.

Overview

Using a demonstration to open the lesson, students will learn that the vapor that comes from the liquid used by e-cigarettes is made up of tiny particles containing nicotine and harmful toxic chemicals. While second-hand smoke from cigarettes is generally accepted by the public as containing harmful chemicals, there are many misconceptions around what is in second-hand e-cigarette aerosol.

Slides 2–5 contain activities to engage students in understanding that the aerosol a person inhales and exhales from an e-cigarette is not harmless “water vapor” as many people think. It allows them to discover surprising uses of some of the chemicals that make up aerosol from e-cigarettes and the harmful effects these chemicals can have on the body when inhaled or ingested.

Content Areas

Science, STEM

Target Grade Level

Grade 5

Materials

- 3–6 ml Phenolphthalein indicator solution (available online through e-commerce sites, select grocery stores, or science supply companies)
- 50 ml 1.0M sodium hydroxide solution (available online through e-commerce sites or science supply companies)
- 50 ml distilled water
- A clear glass or beaker (100 ml or more) or clear jar
- **What’s Hiding in E-Cigarettes?** card set, one per pair
- **What’s Hiding in E-Cigarettes?** student handout, one per student

Educator Prep

Before the session begins:

- Add 50 ml of distilled or purified water into a clean glass or beaker.
- Add 50 ml or approximately ¼ cup of sodium hydroxide (NaOH) solution to the cup.
- Stir to mix well.
- If materials are not available, there is an alternative activity described under slide 3.

Key Terms

- **E-Cigarette:** A battery-powered device that heats a liquid (usually containing nicotine, flavorings, and other chemicals) to make an aerosol that is inhaled. Also considered a noncombustible tobacco product or Electronic Nicotine Delivery System (ENDS).

- **JUULing:** A common term for vaping or using a JUUL brand e-cigarette
- **Vaping:** The act of using an e-cigarette
- **Vapor:** A substance diffused or suspended in the air
- **Aerosol:** The tiny particles or droplets that are inhaled and exhaled by an e-cigarette user after the flavored e-liquid is heated.
- **Appeal:** Advertising message intended to make someone buy a product

Slide 3 | Engage

- Open by showing students the glass of water and sodium hydroxide at the front of the classroom. Ask students to share what they think is in the glass. (They will likely guess that it is water). Explain to students that while they will not be allowed to taste the liquid, a volunteer may be able to smell it.
- Allow a student to smell the glass using a wafting technique and observe it more closely. Wafting involves cupping your hand across the opening of a container to push the odor towards the nose. Ask the student to share their observations with the class, Does it have any smell? Do you see anything in the glass (color, bubbles, etc.) that may indicate it is anything other than water?
- After the student has shared their observations, take a small amount of phenolphthalein solution (a dropper full or more ~3–6 ml)—which is also a clear liquid—and add it to the glass. Stir the solution and it should turn pink! Ask students to hypothesize what has happened. Why did the water turn pink?
 - **Anticipated student responses might include:** *The dropper was filled with dye, there was a chemical reaction, etc.*
- Reveal to students that, while there was water

in the glass, the glass also contained a strong and dangerous chemical called sodium hydroxide which, if ingested, can cause major damage to the tissues inside the body and could even lead to death. How could we not know that a seemingly harmless glass of water could actually be so dangerous?

- Alternatively, use the slide to facilitate the demonstration using the same instructional bullets. Point to the clear beaker and ask students to make their observations. Then, point to the second image of a pink beaker to discuss how a seemingly harmless glass of water could be hiding dangerous chemicals.

KEY TALKING POINTS

- **Things are not always as they appear.**
- **Observation is how we gather information—but it's not always fool-proof.**
- **A chemical reaction occurred when the color in the beaker changed from clear to pink.**

Slide 4 | Engage, Cont.

- Direct students' attention to the picture of the aerosol from e-cigarettes on the screen.
 - **Note:** Some students may be unfamiliar with the terms "e-cigarettes" or "vaping." These are often associated with the brand name "JUUL," and students might be more familiar with the term "JUULing." If necessary, clarify that JUUL is only a brand name of an e-cigarette company, and reinforce the terms "e-cigarettes" and "vaping."
- Explain to students that a vapor is a substance in a gaseous state. Although the aerosol (often called "vapor") from the e-cigarette looks like

a uniform, translucent cloud, this aerosol is much like the liquid in the glass.

- When a person uses an e-cigarette, they are actually inhaling an aerosol, which is a suspension of fine solid or liquid particles in a gas. Explain to students that e-cigarettes produce an aerosol by heating a liquid that usually contains nicotine (the addictive drug in regular cigarettes, cigars, and other tobacco products) flavorings, and other chemicals that help to make the aerosol. Users inhale this aerosol into their lungs.
- Read aloud the two discussion questions. Do they think there might be things we can't see in the aerosol? Ask them to share anything they have heard previously about the aerosol from e-cigarettes.

- **Anticipated student responses might include:** *Yes, because some chemicals are*

KEY TALKING POINTS

- **Vapors are substances in a gaseous state.**
- **E-cigarettes contain aerosols, which are tiny particles or droplets that are inhaled and exhaled by an e-cigarette user after the flavored e-liquid is heated.**
- **Vaping is the act of inhaling an aerosol.**
- **Vapor is often associated with water, but many chemicals can also vaporize.**
- **Second-hand smoke is generally accepted by the public as containing harmful chemicals, but there are many misconceptions around what is in the second-hand aerosol of e-cigarettes that can also be harmful.**
- **Second-hand smoke and second-hand aerosol both expose people involuntarily to chemicals.**⁴

invisible; yes, because there are chemicals in e-cigarettes; no, because vapor is water.

Slide 5 | Engage, Cont.

- Divide students into pairs or small groups. Explain to students that they will be given a set of cards that contain substances that may or may not be found in various types of e-cigarette aerosol.
- Distribute one **What's Hiding in E-Cigarettes?** card set to each small group. Instruct students to read the name and description of the substance on each card and organize the cards into two groups. One group of cards should be substances that they think *are* in e-cigarette aerosol, and the other group should have cards that they think *are not* in e-cigarette aerosol. Give students time to read through the cards and sort them.
- Once groups have finished their own sort, ask student groups to compare their piles with another group and discuss how and why they sorted them in the way they did.

Slide 6 | Engage, Cont.

- Distribute a **What's Hiding in E-Cigarettes?** handout to each student. Reveal the answers to the card sort activity.
 - **Note:** All substances listed on the cards will be found in e-cigarette aerosol (either inhaled or exhaled) *except water*.
- As each substance on the cards is listed, ask students to show (by raising hands or standing up) how many of them thought that particular substance was in e-cigarette aerosol. Each time one of the substances is revealed to be in e-cigarette aerosol, ask the students to record the name and notes about each on their handout.

4 https://www.cdc.gov/pcd/issues/2019/18_0531.htm

- Read aloud the discussion questions. Ask students to share their reaction to the card sort with the class—are they surprised or shocked about the types of harmful substances found in e-cigarettes?
- Facilitate a class discussion using one or more of the following questions. Anticipated/sample responses are included in parentheses:
 - **Is it important for people who use e-cigarettes to know this information?**
(Yes, because it affects their health.)
 - **Do you think most people know this information?**
(No. That's why so many people still vape, unlike smoking cigarettes.)
 - **What impact does learning this information have on you?**
(Answers will vary.)
 - **After learning this information, do you think someone would still want to use an e-cigarette?**
(Probably—people still smoke even though it has been linked to cancer. They may also already be addicted and can't stop.)
 - **Why do you think the number of people who use e-cigarettes is on the rise?**
(People think it's safer than cigarettes.)
 - **Some e-cigarettes contain flavors you may recognize like candy and other sweets—who do you think they are trying to appeal to?**
(Children.)

KEY TALKING POINTS

- **Many of the substances listed on the cards have serious health risks and should never be inhaled or ingested into a human body.**
- **Most people do not know all the chemicals found in e-liquid (used in e-cigarettes) or aerosol that is inhaled when using an e-cigarette.**
- **E-cigarette “vapor” is NOT water vapor. It is made up of tiny particles containing nicotine and harmful toxic chemicals.**
- **It is important the people have information about what they are putting into their body when they use e-cigarettes.**

Slide 7 | Wrap Up

Reinforce students' learning by reviewing the following points:

- Vapors are substances in a gaseous state.
- Aerosols are tiny particles or droplets that are inhaled and exhaled by an e-cigarette user after the flavored e-liquid is heated.
- E-cigarettes contain many chemicals that can have harmful effects on the body.
- There are many misconceptions that people have about e-cigarette aerosol.
- It is important that people are informed about the potential health risks of using e-cigarettes.

Session 2

Learning Objectives

Students will be able to:

- **Identify** that both cigarettes and e-cigarettes contain harmful chemicals.
- **Explain** that nicotine is the chemical in e-cigarettes and cigarettes that causes people to become physically dependent or addicted to smoking and vaping.
- **Discover** how smoking and vaping negatively affect various parts of the body and body systems.
- **Discuss** why there are additional risks to young people who choose to use cigarettes and e-cigarettes.

Overview

Students will explore truths and myths about e-cigarettes when compared to tobacco products and will identify that both have nicotine and other harmful chemicals. They will then participate in a gallery walk visiting different parts of the brain and body that are impacted by second-hand smoke, smoking, and vaping. During their gallery walk, they will annotate a blank human body shape to indicate which parts of the body are impacted and how the structure and function of each of these parts are influenced by these substances.

Content Areas

Science, STEM

Target Grade Level

Grade 5

Materials

- **Busting E-Cigarette Myths** student handout, one per student
- **Gallery Walk Posters** (5), one of each
- **Human Body** student handout, one per student
- Timer
- **Session 2 Exit Ticket** student handout, one per student

Educator Prep

Before the session begins:

- Print and hang up gallery walk posters around the classroom.
 - **Note:** If possible, print on large or poster-sized paper to provide students with a better view.
 - **Alternative Method:** Instead of printing handouts or posters, the different body systems can be displayed on a computer and situated for use by the students as stations or presented as an online resource that students can use as a guide.

Key Terms

- **Nicotine:** A highly addictive drug found in tobacco.
- **Addiction:** When someone's body has chemical changes that can make it nearly impossible to avoid a certain substance.

Slide 9 | Explore

- Divide students into pairs and distribute one **Busting E-Cigarette Myths** handout to each pair.
- Review the activity instructions.
- Read the first statement about e-cigarettes listed in handout. Ask student pairs to discuss the statement and predict if it should be confirmed or busted. Repeat for the other two statements.
- When the students have finished gathering and analyzing their evidence from the article, review the statements one at a time with the class and allow students to vote with “confirmed” or “busted”. Allow student pairs to share what evidence they found from the article that supports their stance.

KEY TALKING POINTS

- **Both cigarettes and e-cigarettes contain harmful chemicals.**
- **While e-cigarettes may contain lower levels of toxins than cigarettes, most still contain nicotine, which causes people to become addicted to smoking or vaping.**

Slide 10 | Explore, Cont.

- Tell students that for their next activity, they will be participating in a Gallery Walk to learn how smoke, aerosol from e-cigarettes, and second-hand smoke and aerosol can affect various parts of a person’s body and brain.
- Divide students into five groups, and distribute a copy of the **Human Body** handout to each student.
- Direct students to sketch a picture of each body part or system that is affected by e-cigarettes and vaping on their Human Body Sheet as they visit each station. They should also add a caption beside their sketch with information from the poster that explains how the body part or system is affected by e-cigarette use.
 - **Note:** If you wish to have smaller groups at each station, double the stations so there are two of each body part or system.
- Use a timer to begin four minutes. Direct student groups to rotate to the next poster when the timer sounds, creating their sketches and recording information.
- Start the timer again and repeat until each group has seen each poster.

KEY TALKING POINTS

- The harmful chemicals in aerosol that is inhaled and exhaled from using e-cigarettes can negatively affect the body in many ways.
- The nicotine found in e-cigarettes can lead to addiction, which makes it very hard for a person to stop, even though they may be harming their health or the health of others.

Slide 11 | Explore, Cont.

- Distribute a **Session 2 Exit Ticket** handout to each student.
- Instruct students to answer each question in ONE sentence and record information from the gallery walk notes to support their answer.
- Collect the **Session 2 Exit Tickets** to check for understanding.

Slide 12 | Wrap Up

Reinforce students' learning by reviewing the following points:

- The serious health risks that come from e-cigarettes and vaping far outweigh any good feeling that a person might get from using tobacco products or nicotine.
- Young people and children are especially at risk of health problems from e-cigarettes and second-hand aerosol, as their bodies are still developing.
- Exposing young people to the chemicals in aerosol from using e-cigarettes can disrupt their brain development and lead to future addiction and health problems.
- Use of e-cigarettes is often seen as a safer alternative for adult smokers; however, *both* cigarette smoke and e-cigarette aerosol contain harmful chemicals and *both* second-hand smoke and second-hand aerosol expose people involuntarily to chemicals.⁵

⁵ https://www.cdc.gov/pcd/issues/2019/18_0531.htm

Session 3

Learning Objectives

Students will be able to:

- **Describe** the health risks that come from the use of cigarettes and e-cigarettes.
- **Practice** strategies that will help students to reduce the risks of cigarette and e-cigarette use.
- **Use** facts, statistics, and images to encourage peers to make healthy choices about avoiding the use of cigarettes and e-cigarettes.

Overview

Explain that one way to reduce the risk of the negative effects of vaping and smoking is to use exit strategies or refusal skills when in a situation where people are using or offering e-cigarettes. Provide sample strategies and refusals before providing students with the opportunity to role-play using these strategies in various scenarios about vaping and smoking. This role-play will emphasize what they have learned about health risks. As a final challenge, student groups will use images to create a PechaKucha presentation that encourages their peers to make positive health choices.

Content Areas

Science, STEM

Target Grade Level

Grade 5

Materials

- Devices with internet access and presentation software, one per group (See **Technology Notes** on pages 14 and 15 for additional details)
- Timer
- **Your Life. Your Choice.** student handout, printed double-sided, one per student

Key Terms

- **Exit Strategy:** A thoughtful way to get out of an uncomfortable situation.
- **Refusal Skill:** Something that can help you say “no” in a creative way.

Note: PechaKucha is a presentation format that was developed by architects in Tokyo. It is an effective strategy to help students summarize information and present it in a simple and engaging format. These presentations are typically characterized by 20 strategically placed presentation slides that are displayed for 20 seconds each, but for the sake of time, students will only be creating 10 slides. Slides can be created using any presentation platform (PowerPoint, Google Slides, Prezi, etc.). It may be helpful to provide a collection of images for students to select from to create their presentation. If technology is not available, students can use 10 pieces of paper or 10 index cards to create their presentation using words or illustrations.

Slide 14 | Explain

- Explain to students that while the number of young people using cigarettes is decreasing, the number of students, in both high school and middle school, who are trying and using e-cigarettes is steadily increasing.
- Ask students to guess what percentage of high school students have used e-cigarettes in the last 30 days, according to the 2019 National Youth Tobacco Survey. Allow students to share their estimations with the class.
 - Share the answer (27.5%).
- Next, ask students to guess what percent of middle school students have used e-cigarettes in the last 30 days. Allow students to share their estimations with the class.
 - Share the answer (10.5%).
- Ask students if this information is surprising to them.
 - Direct their attention to the percentages on the graph that shows the increase in e-cigarette use in just 1 year (2018-2019). Explain that while the numbers of students using e-cigarettes may seem low, especially in middle school students, the increase from 2018 to 2019 is disturbing. Nearly 50% more middle school students used e-cigarettes in just one year.
- Read aloud the discussion questions:
 - **How many high school students are choosing *not* to use e-cigarettes?**
(answer: 72.5%)
 - **How many middle school students are choosing *not* to use e-cigarettes?**
(answer: 89.5%)

Emphasize that while the increase in students using e-cigarettes is worrisome, the overwhelming majority of young people choose not to vape.

KEY TALKING POINTS

- **Although cigarette use by teens and young people is declining, the use of e-cigarettes by these groups is increasing quickly.**
- **We can learn strategies to help us refuse cigarettes and e-cigarettes.**
- **Students need to find ways to encourage their peers to refuse to use cigarettes and e-cigarettes.**

Slide 15 | Explain, Cont.

- Ask students to think about why young people might choose to experiment with e-cigarettes. Record students' predictions on the board.
- Share the third most common reason people choose to experiment according to the National Youth Tobacco Survey. See if it appeared on the class's prediction list. Repeat until you have revealed all three reasons.
- Next, ask students in pairs to brainstorm some possible healthy alternative activities that kids can do instead of using e-cigarettes. Review each top reason given and ask students to verbally share their positive alternatives with the class.

KEY TALKING POINTS

- **There are many reasons why kids may want to experiment with e-cigarettes.**
- **It is important for kids to be educated about the dangers of and misconceptions about e-cigarettes.**
- **There are many healthy alternative activities to using e-cigarettes.**

feel the most pressured/likely to be offered an e-cigarette. For example, in the bathroom, with a new group of friends, with someone they like or an older sibling. They should show a positive way that they can refuse this offer. Explain to students that insulting someone or being mean is not an effective refusal skill.

- Read aloud examples of exit strategies.
- Give students time to create their scenario and practice it. Allow each group to act-out their role-play scenario for the class.
- As students have learned, many young people don't think that e-cigarettes are harmful. In the role-play they create, the student(s) being pressured also need(s) to inform their peers about the dangers of using e-cigarettes in a creative way, such as using humor or giving your own reasons for not wanting to use e-cigarettes. This is more positive and effective than being mean or putting others down for their use of e-cigarettes.
- Invite groups to the front of the class to act out their scenarios. Ask the class to observe the role plays and provide feedback. Invite at least 2-3 groups to share, but do not pressure all groups to role play in front of the class.
- After groups present, ask students to reflect on their role-playing experiences by discussing one or more of the following questions:

- **Which strategies did you see that you think would be successful in real life?**
- **How comfortable would you be using those strategies?**
- **How did you feel stating your refusal strategy?**
- **What did you like about this role-playing activity?**
- **Are their ways you might revise your own after seeing others?**

Slide 16 | Explain, Cont.

- Explain to students that it is important to practice ways to say "no" to offers from their peers to try e-cigarettes. These are called exit strategies and refusal skills.
- Divide students into groups of four. Inform students that in this activity, each group will role-play a short scenario where a student or students might be asked to try e-cigarettes by their peers. Ask students to think about some "high-risk" situations where they may

KEY TALKING POINTS

- It is important that kids learn and practice exit strategies and refusal skills to help say "no" when they feel pressure from peers to make potentially harmful decisions.
- Because many kids don't see e-cigarette use as harmful, it is important to help inform young people about nicotine addiction and the danger to their long-term health.

Slide 17 | Wrap Up

Reinforce student learning by reviewing the following points:

- There are multiple ways to say "no" to using e-cigarettes. Some may feel more comfortable to us than others.
- It is important to support peers who also are trying to make good choices. Suggesting exit strategies and refusal skills to friends can be helpful for them.

Slide 18 | Elaborate

- Explain to the students that they will have the opportunity to apply what they have learned in a small challenge. In groups, they will be creating PechaKucha presentations.
 - **Note:** PechaKucha is a presentation format that was developed by architects in Tokyo. It is an effective strategy to help students summarize information and present it in a simple and engaging format.

These presentations are typically characterized by 20 strategically placed presentation slides that are displayed for 20 seconds each, but for the sake of time, students will only be creating 10 slides. Slides can be created using any presentation platform (PowerPoint, Google Slides, Prezi, etc.). It may be helpful to provide a collection of images for students to select from to create their presentation. If technology is not available, students can use 10 pieces of paper or 10 index cards. On each piece of paper or card they can write words or draw illustrations to create their presentation.

- Divide students into groups of four and provide each group with a device that has internet access. Share the goal of the challenge: to encourage their peers to make positive choices about smoking and vaping.
- Share the activity directions. Instruct students to use approved search engines or other image-bearing resources to find 10 images to support their goal. Encourage students to include information that reflects what they have learned about how e-cigarettes and vaping influence their physical health. They can include images of alternative healthy activities, highlight health risks, or share relevant data—whatever students think would be influential to their peers to deter them from trying e-cigarettes and vaping.
 - **Technology Note:** If devices with internet access are not available, provide students with a collection of magazines, advertisements/mailers, printed images, etc. to look through in order to collect images.

- Students will use presentation software to organize their 10 images strategically. They will only display each slide for 20 seconds each. Remind them that it shouldn't be a race to talk as quickly as possible, but rather, students should be effectively summarizing the most important points they want to communicate to their peers. Encourage the groups to practice a few times before presenting.
 - **Technology Note:** If devices with presentation software are not available, students can present their images on separate sheets of paper or a large poster board.
- Provide each group time to share their presentation. Use a timer to switch slides every 20 seconds if they are not able to use automated slide transition.

Slide 19 | Evaluate

- To conclude their learning on the Risks of E-cigarettes, challenge students to reflect on everything they have learned to make a choice about e-cigarette use.
- Distribute a **Your Life. Your Choice.** handout to each student. Instruct them to thoughtfully complete the sheet using information from the three sessions to support their decisions.
- Thank the students for learning with you and challenge them to make a promise to themselves about their choices when it comes to cigarettes and e-cigarettes!

References

1. **Electronic Cigarettes (E-cigarettes)**
<https://www.drugabuse.gov/publications/drugfacts/electronic-cigarettes-e-cigarettes>
2. **Vaporizers, E-Cigarettes, and other Electronic Nicotine Delivery Systems (ENDS)**
<https://www.fda.gov/tobacco-products/products-ingredients-components/vaporizers-e-cigarettes-and-other-electronic-nicotine-delivery-systems-ends>
3. **Surgeon General's Advisory on E-cigarette Use Among Youth**
https://www.cdc.gov/tobacco/basic_information/e-cigarettes/surgeon-general-advisory/index.html
4. **Know the Risks: E-Cigarettes and Young People**
<https://e-cigarettes.surgeongeneral.gov/knowtherisks.html>

National Content Standards

Next Generation Science Standards

- **LS1.D: Information Processing**

By the end of Grade 5. Different sense receptors are specialized for particular kinds of information, which may then be processed and integrated by an animal's brain, with some information stored as memories. Animals are able to use their perceptions and memories to guide their actions. Some responses to information are instinctive—that is, animals' brains are organized so that they do not have to think about how to respond to certain stimuli.

- **LS1.A: Structure and Function**

By the end of Grade 5. Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

- **PS1.A: Structure and Properties of Matter**

By the end of Grade 5. Matter of any type can be subdivided into particles that are too small to see, but even then, the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.

CDC National Academic Standard for Health Education

- **Standard 4**

Grades 3-5: Students will demonstrate the ability to use interpersonal communication skills to enhance health and avoid or reduce health risks.

- **4.5.1** Demonstrate effective verbal and nonverbal communication skills to enhance health.
- **4.5.2** Demonstrate refusal skills that avoid or reduce health risks.

- **Standard 8**

Grades 3-5: Students will demonstrate the ability to advocate for personal, family, and community health.

- **8.5.1** Express opinions and give accurate information about health issues.
- **8.5.2** Encourage others to make positive health choices.

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What's Hiding in E-Cigarettes?

CARD SORT 1 of 2

Instructor Directions: Cut each set into individual cards. Each pair of students will need one complete set.

Substance:

Acetaldehyde (ac·et·al·de·hyde)

Notes:

- Used to produce disinfectants, drugs, and perfumes
- Extremely flammable liquid or vapor
- Has been linked to lung, liver, kidney, and nervous system damage as well as cancer

Substance:

Nicotine (nic·o·tine)

Notes:

- Highly addictive
- Very toxic if inhaled or swallowed
- Causes an increase in heart rate and blood pressure, dizziness, nausea, stomach pain

Substance:

Acrolein (acro·le·in)

Notes:

- Is used as a pesticide to control algae, weeds, bacteria, and mollusks
- May be fatal if inhaled or swallowed
- When inhaled, may cause sore throat, coughing, shortness of breath

Substance:

Propylene glycol (pro·pyl·ene gly·col)

Notes:

- Used in fog machines
- Hazardous if ingested, is an irritant if it comes in contact with skin, eyes, or is inhaled
- May be toxic to the nervous system and cause damage to organs

Substance:

Diacetyl (di·ace·tyl)

Notes:

- Used by manufacturers to give foods a buttery taste
- Vapors can cause damage to airways and abnormal lung function
- When inhaled can cause "popcorn lung," a scarring of the air sacs in the lungs

Substance:

Various Flavor Chemicals

Notes:

- Generally considered safe for ingestion
- Have not been tested for toxic or irritating characteristics when inhaled

Substance:**2,3-Pentanedione** (pen·tane·dione)**Notes:**

- Used as a food flavoring
- Causes skin, eye, and respiratory irritation
- Linked to “popcorn lung,” a scarring of the air sacs in the lungs

Substance:**Glycerine** (glyc·er·in)**Notes:**

- Added to food, cosmetics, and pharmaceuticals
- Can cause severe lung damage when inhaled
- Inhalation is linked to asthma and lung cancer

Substance:**Cadmium** (cad·mi·um)**Notes:**

- Used in electroplating and batteries
- Is a toxic heavy metal
- Inhalation can cause damage to kidneys, lungs, bones, and can be fatal

Substance:**Formaldehyde** (form·al·de·hyde)**Notes:**

- Used in manufacturing building materials, as a preservative in medical labs, and in some glues
- Main ingredient in embalming fluid (used to preserve dead bodies)
- Has been linked to cancer, birth defects, damage to kidneys, liver, and nervous system

Substance:**Benzene** (ben·zene)**Notes:**

- Found in gasoline
- Inhalation can irritate the respiratory tract and damage the nervous system
- Linked to diseases such as Leukemia and bone marrow failure

Substance:**Water****Notes:**

- Found in the fluids of most living organisms
- Main component of streams, lakes, and oceans
- Necessary for all known forms of life

What’s Hiding in E-Cigarettes?



Directions: As the answers are revealed to the card-sorting activity, record the substances that ARE found in e-cigarettes and notes about each in the table below:

Name of Substance	Notes
What is your reaction to the information you’ve learned about what’s hiding in e-cigarettes?	



Busting E-Cigarette Myths

Directions: Gather evidence in the tables below to confirm or bust each myth about e-cigarettes as you watch the video!



MYTH 1: Using e-cigarettes is less harmful to a person's health than smoking cigarettes.

Confirmed 	Busted 
Evidence:	Evidence:

MYTH 2: E-cigarettes are less addictive than cigarettes.

Confirmed 	Busted 
Evidence:	Evidence:

MYTH 3: Using e-cigarettes is a safe alternative to smoking cigarettes.

Confirmed 	Busted 
Evidence:	Evidence:

Article

E-cigarette aerosol generally contains fewer toxic chemicals than the deadly mix of 7,000 chemicals in smoke from regular cigarettes. However, e-cigarette aerosol is not harmless. It can contain harmful and potentially harmful substances, including nicotine, heavy metals like lead, volatile organic compounds, and cancer-causing agents.

The e-cigarette aerosol that users breathe from the device and exhale can contain harmful and potentially harmful substances, including:

- Nicotine
- Ultrafine particles that can be inhaled deep into the lungs
- Flavoring such as diacetyl, a chemical linked to a serious lung disease
- Volatile organic compounds
- Cancer-causing chemicals
- Heavy metals such as nickel, tin, and lead

E-cigarettes are still fairly new, and scientists are still learning about their long-term health effects. Here is what we know now.

Most e-cigarettes contain nicotine, which has known health effects.

- Nicotine is highly addictive.
- Nicotine is toxic to developing fetuses.
- Nicotine can harm adolescent and young adult brain development, which continues into the early to mid-20s.

It is difficult for consumers to know what e-cigarette products contain. For example, some e-cigarettes marketed as containing zero percent nicotine have been found to contain nicotine.

Besides nicotine, e-cigarette aerosol can contain substances that harm the body.

- This includes cancer-causing chemicals and tiny particles that reach deep into lungs. However, e-cigarette aerosol generally contains fewer harmful chemicals than smoke from burned tobacco products.

E-cigarettes are not currently approved by the FDA as a quit smoking aid. The U.S. Preventive Services Task Force, a group of health experts that makes recommendations about preventive health care, has concluded that evidence is insufficient to recommend e-cigarettes as a way for adults to stop smoking.

https://www.cdc.gov/tobacco/basic_information/e-cigarettes/about-e-cigarettes.html

Organs affected:

Heart
Blood vessels

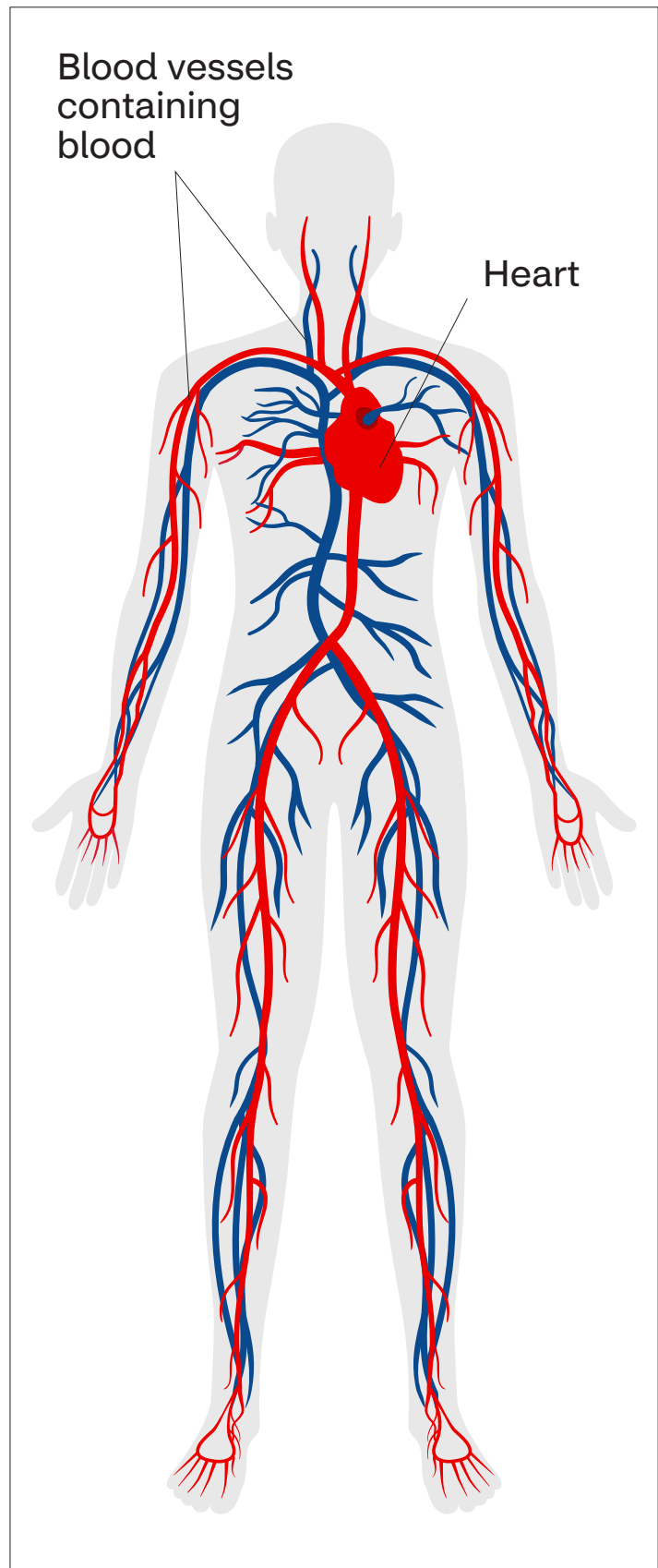
Normal organ function:

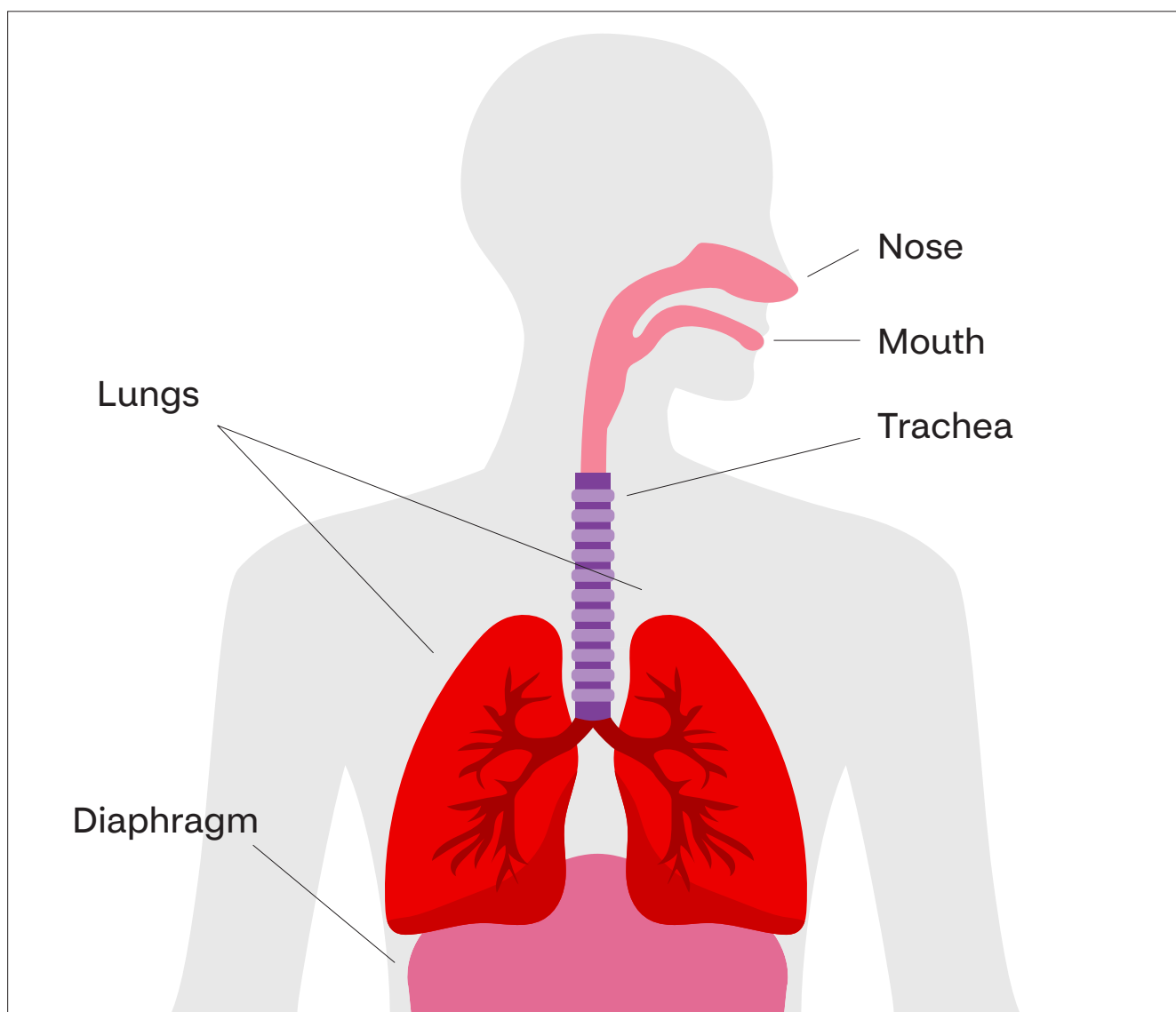
The heart pumps oxygen-rich blood to all of the other organs of your body, and returns oxygen-poor blood to the lungs.

The blood vessels carry blood throughout the body, delivering oxygen and removing carbon dioxide.

Damage done:

- Nicotine damages blood vessels, making them thicken and grow narrower and unable to move blood properly.
- The lack of blood flowing properly to the heart can cause blockages in the cardiovascular system, much like clogged pipes in a home. This can lead to serious health conditions such as heart disease and stroke.





Organs affected:

Lungs

Normal organ function:

The lungs allow you to move oxygen in the air you breathe into your bloodstream, while removing carbon dioxide.

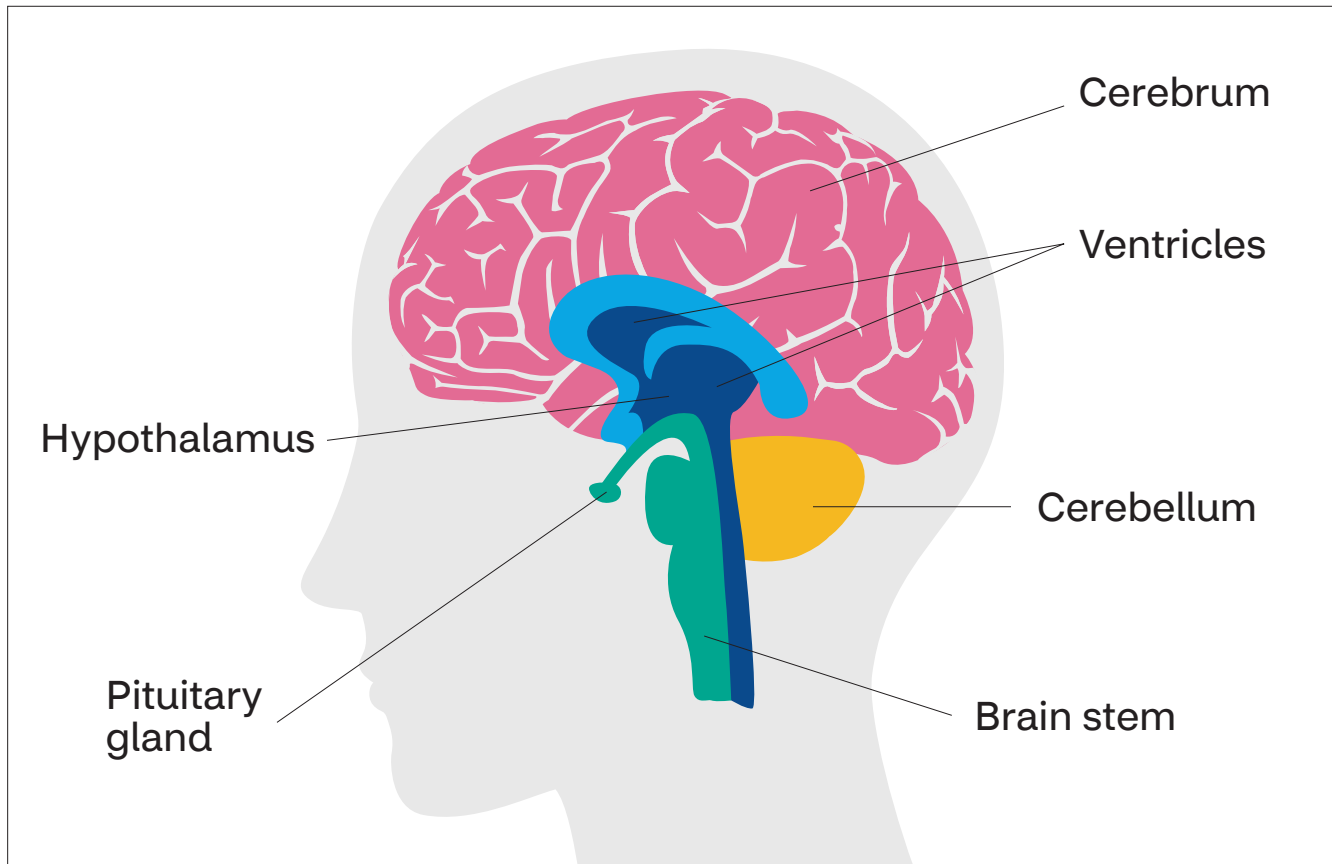
Damage done:

Harmful chemicals from e-cigarettes and vaping can:

- Damage tiny sacs in the lungs, making it hard to exchange oxygen and carbon dioxide
- Trigger asthma attacks
- Cause diseases of the respiratory system such as emphysema and bronchitis

The Nervous System

The Brain



Area of the brain affected:

Hypothalamus

Normal organ function:

Along with regulating your body temperature and other important functions, the hypothalamus releases a hormone called **dopamine**, a part of the body's reward system, causing people to feel pleasure and satisfaction.

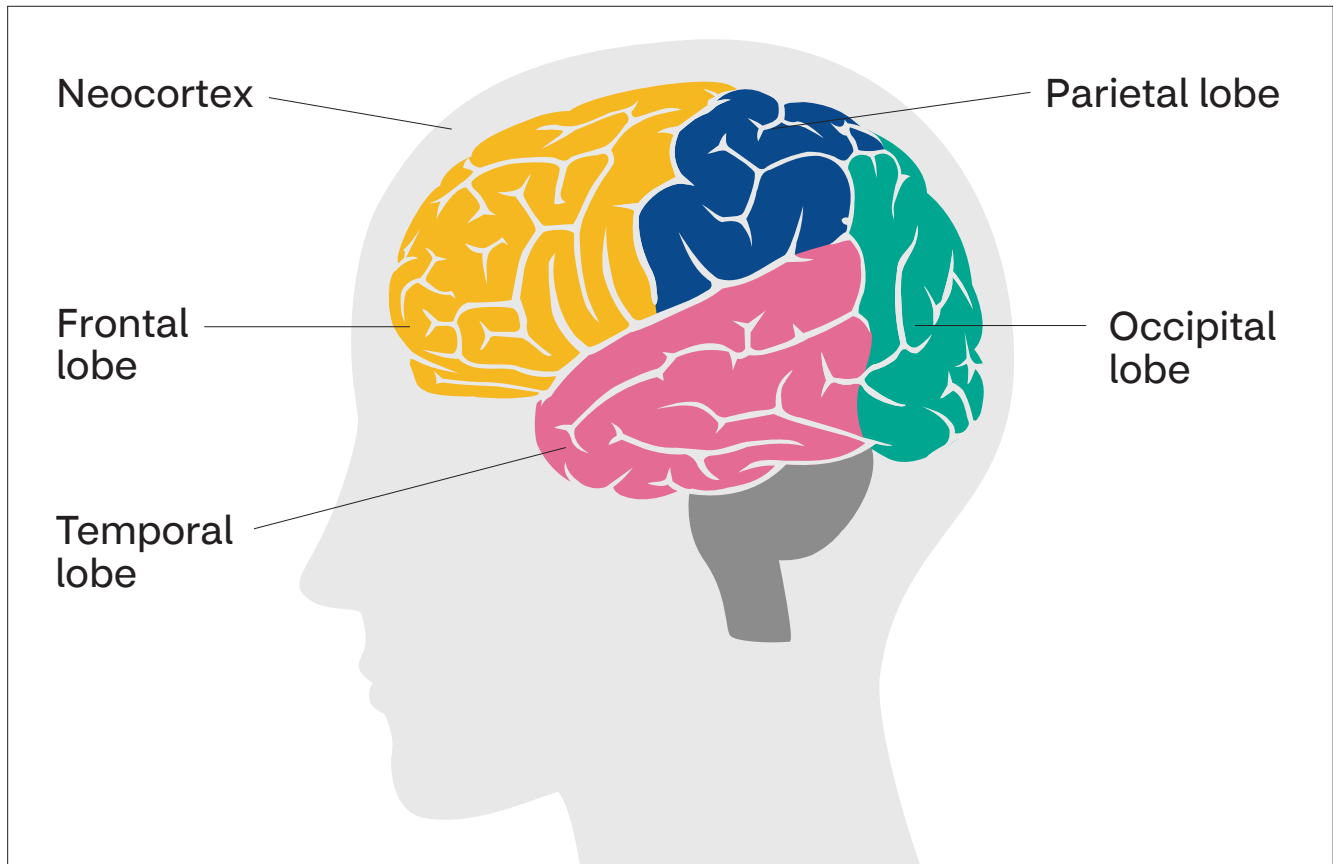
Damage done:

The nicotine inhaled and exhaled in the aerosol from e-cigarette use causes a release of dopamine in the brain.

- This may not sound so bad, but the pleasure response from the dopamine released when a person is vaping can lead to addiction.
- While dopamine is not harmful to the body, but there are many other harmful chemicals inhaled and exhaled when vaping, and the more a person encounters these chemicals, the more harm they can do to their health.

The Nervous System

The Brain



Area of the brain affected:

Frontal Lobe

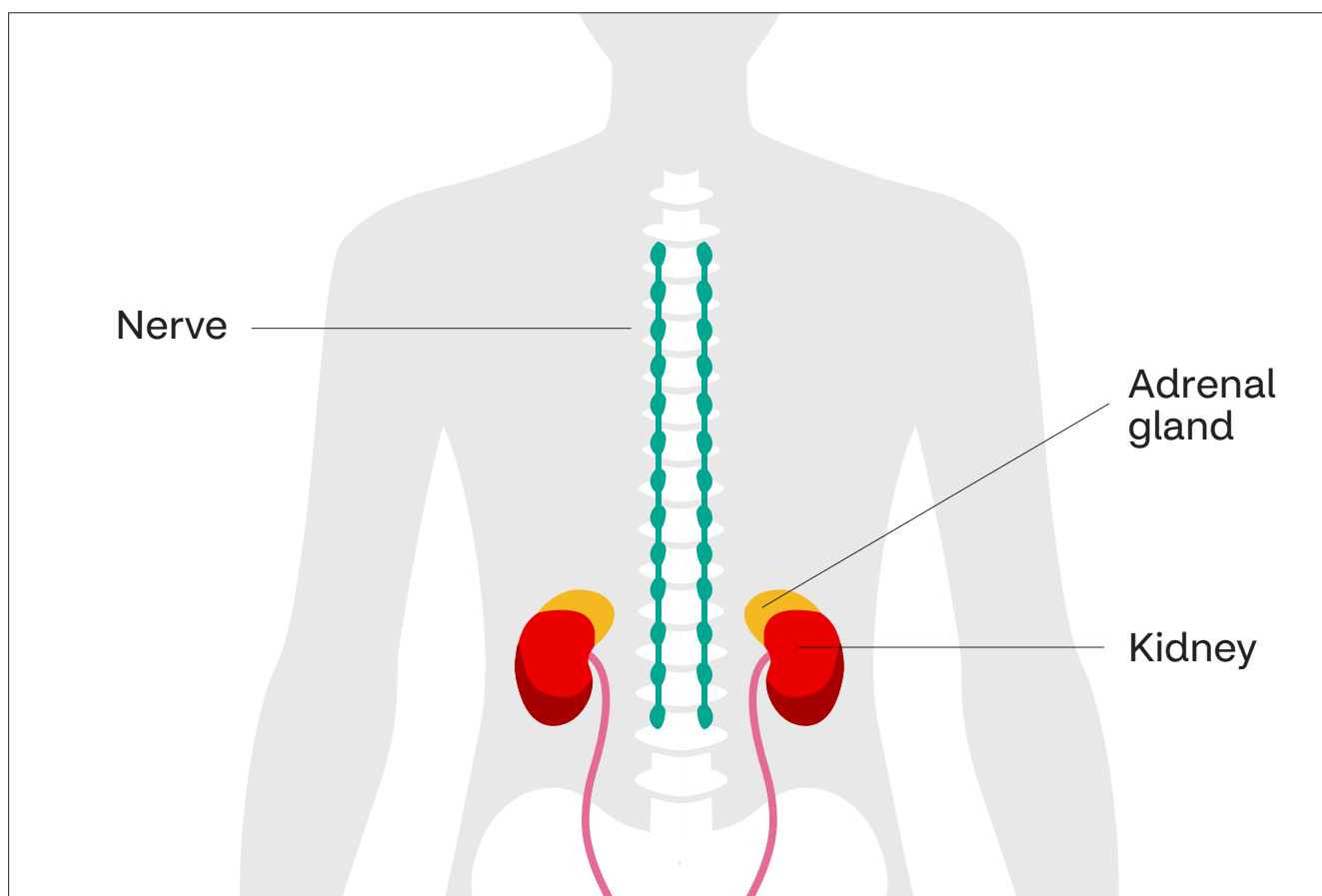
Normal organ function:

The frontal lobe of the brain is responsible for many things, including decision making, impulse control, attention span, and emotions. It also controls the movement of some parts of the body.

Damage done:

The outer layer of the frontal lobe is called the **prefrontal cortex**, an area that isn't fully developed until around the age of 25.

- Research has found that nicotine used by young people can disrupt the development of the prefrontal cortex, making it thinner than someone who does not vape.
- Using products that contain nicotine can also disrupt the function of this area of the brain, making it harder for young people to control their impulses and emotions.



Area affected:

Adrenal glands

Normal organ function:

The adrenal glands are small glands that sit on top of each of your two kidneys. These glands make and release important hormones into the bloodstream that allow a person to break down food, respond to stress, and fight off infection.

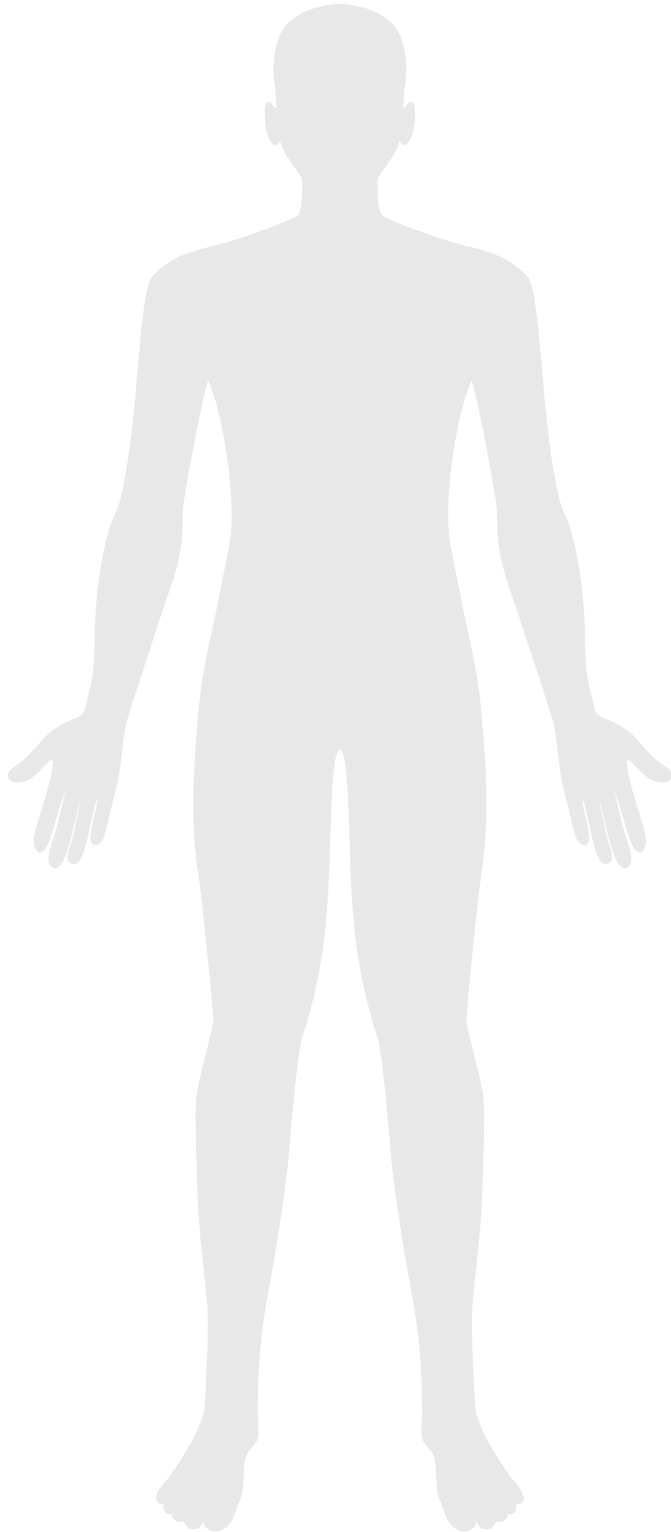
Damage done:

The **adrenal medulla**, part of your adrenal glands, produce a hormone called **epinephrine**, also known as adrenaline.

This is often called the “fight or flight” hormone, because it is released when your body thinks there is a threat.

- When epinephrine is released, it increases a person’s blood pressure and heart rate.
- The nicotine inhaled when vaping causes excess epinephrine to be released, which can stress the cardiovascular system that is responsible for blood flow throughout the body.
- High blood pressure and heart rate due to vaping can increase a person’s chances of developing heart disease.

Directions: As you visit each part of the body in the gallery walk, draw a picture of the body part on the body diagrams and add information to your sheet about how e-cigarettes and vaping can affect that part.



Session 2 Exit Ticket

Directions: Use your **Human Body** handout to answer the following questions in ONE SENTENCE each. Support your answer with evidence from the gallery walk.

1. Why is it so important that people choose to not use e-cigarettes or vape?

What did you learn from the gallery walk that supports your answer?

2. Why is it especially important for children and young people to avoid vaping?

What did you learn from the gallery walk that supports your answer?

Part 1: Reflect on what you have learned in the three sessions to make a choice regarding e-cigarette use. Remember—it is your life, and you have the power to choose!

What is your choice regarding e-cigarettes?

What are your reasons for your choice?

Your Life. Your Choice.

Part 2: Think about situations in which you might need to hold strong to your choice and plan how you will react to that situation.

(Example: If I am offered an e-cigarette by a friend, then I will be able to say “Nah, I’m good” and walk away.)

If,

Then,

If,

Then,

If,

Then,

Signature: _____ Date: _____