Although multiple forms of electronic cigarettes have existed since the 1960s, the modern e-cigarette was developed in 2003 in China and entered the American market in 2007. Since then, use of e-cigarettes in the U.S. has exploded. But what was once marketed as a “safer” alternative to conventional combustible cigarettes is now showing a downside—particularly in e-cigarettes’ increasing popularity with adolescents.

Cigarettes...or Not?

E-cigarettes (also known as electronic nicotine delivery systems or ENDS) are battery-operated devices designed to deliver nicotine to users through a vapor rather than smoke. Propylene glycol and/or glycerin are the main ingredients used to produce the vapor. Flavorings and other chemicals are added and heated to produce an aerosol that resembles cigarette smoke. They deliver nicotine without the dangerous health consequences of tobacco smoke.

E-cigarettes are often marketed as being safer than conventional cigarettes and even as having health benefits because they may help smokers quit the habit. People using e-cigarettes are “vaping” rather than smoking—that is, users exhale a water vapor rather than chemical-filled tobacco smoke.

Safe...or Not?

The most significant negative health consequences of conventional cigarette use (such as cancer and heart disease risks) are related to the tar and other chemicals produced by tobacco smoke. The pleasurable effects (that reinforce use and are addictive) are primarily produced by the nicotine in the tobacco. By avoiding the tobacco combustion, e-cigarettes reduce some exposure to these chemicals.

Whether or not the water vapor produced by e-cigarettes is harmless is still up for debate. There are few scientific research studies on the devices, and no studies that have been able to assess the long-term health effects on users.

Although e-cigarettes do appear to have fewer toxins than what is found in conventional cigarettes and their smoke, e-cigarette vapor does contain nicotine and can include a variety of carcinogens and toxic chemicals. These can include formaldehyde, acetaldehyde, as well as other substances that are created as a part of the device’s heating process. The health impact from repeated exposure to these substances is not clear yet.

E-cigarette use has tripled in one year among middle and high school students, according to an April 2015 report from the Center for Disease Control (CDC) and Federal Drug Administration (FDA).

New data from the National Youth Tobacco Survey indicate that, among high school adolescents, e-cigarette use increased to 13.4 percent—approximately 2 million students—in 2014. In 2013 this figure was 4.5 percent.

Even among middle school adolescents, e-cigarette use has increased to 3.9 percent—approximately 450,000 students—in 2014. In 2013, this figure was 1.1 percent.

E-cigarette use now surpasses all other tobacco products among youth, higher than conventional cigarettes (at 9.2 percent among high schoolers), hookah smoking (at 9.4 percent), cigars (at 8.2 percent) and smokeless tobacco (at 5.5 percent). Nearly 25 percent of all high schoolers reported use of some type of tobacco product.

There is much cause for concern. CDC Director Tom Frieden states, “nicotine exposure at a young age may cause lasting harm to brain development, promote addiction and lead to sustained tobacco use.” During adolescence, the brain growth and development is very rapid; nicotine has both known and unknown effects on adolescent brain development.
Addictive...or Not?

The biggest drawback of e-cigarettes is, of course, that they contain nicotine, a highly addictive drug. According to the National Institutes of Health (NIH), nicotine activates reward pathways in the brain that regulate feelings of pleasure. However, the pleasurable sensations quickly dissipate, causing the smoker to continue smoking to maintain nicotine’s pleasurable effects and prevent withdrawal symptoms, which can include irritability, craving, depression and anxiety, among others.

In contrast to the goal of many in the medical field to encourage use of e-cigarettes as a means of smoking cessation, there is evidence that e-cigarettes are actually drawing new users—individuals who have not smoked before—into using the product and becoming addicted to nicotine.

Because e-cigarettes are not marketed as tobacco products, or products that have a specific therapeutic purpose, they are not currently regulated by the Federal Drug Administration (FDA). This extends to the liquids and flavorings used. As a result, there are no checks or oversight in place to regulate e-cigarettes’ purity or safety. There also is concern over e-cigarettes’ ability to deliver amounts of nicotine that could be toxic.

The lack of federal oversight of e-cigarettes has led many states and municipalities to pass their own laws concerning e-cigarette sales and use in public. These laws vary widely. In fact, e-cigarette laws vary so much from state-to-state and even county-to-county that a list compiled by the American Nonsmokers’ Rights Foundation of the different laws is currently 13 pages long.

Gateway Drug...or Not?

Finally, and most worryingly, e-cigarettes are becoming more and more popular among adolescents. Use among middle and high school students tripled in one year, from 2013 to 2014 (see sidebar). Lack of regulation, easy availability and flavors geared toward an adolescent palette all contribute to interest among this population.

Besides the unknown long-term health impact, there is concern that e-cigarettes may serve as a “gateway” to using conventional tobacco products. Even worse, a recent NIH report states that “recent research suggests nicotine exposure may also prime the brain to become addicted to other substances,” such as cocaine and other drugs. Because an adolescent’s brain is still developing, nicotine use may alter certain neural pathways and reward centers, setting the person up for other addiction problems.

For example, the Substance Abuse and Mental Health Services Administration (SAMHSA) reports that 79 percent of adult smokers who are nicotine dependent said they started smoking before they were 18 years old. New studies show that nicotine can have a “priming effect” for cocaine use.

Although e-cigarettes were first marketed as a way for smokers to receive nicotine in a more “healthy” way or as a method for quitting nicotine all together, the increasing use by nonsmokers, especially adolescents, has dampened enthusiasm for those supposed positive effects. Much more research needs to be done to determine if e-cigarettes, in fact, do more harm than good.

Sources

NIH Report – Is Nicotine Addictive?
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Substantial success has been gained in preventing youth cigarette smoking in the last several decades. However, Mitch Zeller, director of the FDA’s Center for Tobacco Products states that “the surge in youth use of novel products like e-cigarettes forces us to confront the reality that the progress we have made in reducing youth cigarette smoking rates is being threatened.”

Although many tobacco products, including cigarettes, are regulated by the FDA’s tobacco control authority, e-cigarettes are not currently regulated. Current work is finalizing the rule to regulate e-cigarettes as well as other unregulated tobacco products (including hookah and some cigars). The CDC report states that comprehensive tobacco prevention for youth must broaden to include all tobacco products, including e-cigarettes.

Source

CDC Newsroom: E-cigarette use triples among middle and high school students in just one year