



EFFECT OF CHEMICALS IN VAPE LIQUIDS ON RESPIRATORY AND IMMUNE SYSTEMS

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Abstract

Every day millions of people around the world, including teenagers and young adults, choose vaping as an alternative to traditional cigarettes. Of course, because they come in different sizes and shapes, they also contain flavorings such as fruits, berries, candies, and so on. The growing popularity of vaping in recent years has led to the widespread use of this habit among young people. But if they think about what might be behind those flavorful clouds of vapor? Studies show that vaping liquids contain toxic substances that can damage not only the respiratory system, but also the immune system.

Introduction

The relevance of the topic is due to the growing number of vape users and the increasing incidence of diseases associated with inhaling substances contained in electronic cigarettes. This article discusses the main components of vape liquids and their effects on the respiratory and immune systems. Despite their perceived safety, the chemicals in vape liquids can have devastating effects on the respiratory and immune systems. Typically, vape liquids contain propylene glycol, glycerin, various flavors, colors, and other additives, often nicotine. [1] At first glance, these substances may seem harmless because they are used in the food industry. However, the thermal decomposition of propylene glycol and glycerin contained in the device's refill fluid produces acrolein and formaldehyde, which have toxic properties and can cause respiratory irritation. Inhalation of these vapors causes inflammation of the airways, impairs the function of cilia (tiny hairs in the airways that help clear the lungs), and may cause irritation of the mucous membranes and swelling. Some studies also suggest a risk of developing chronic lung diseases such as bronchitis and COPD (chronic obstructive pulmonary disease). There is a term called EVALI (E-cigarette or Vaping Product Use-Associated Lung Injury) for acute lung injury associated with e-





cigarette use. Symptoms can include coughing, shortness of breath, and chest pain, and in some cases the effects can be irreversible. [2] Vaping can lead to a number of serious health complications, so let's look at some of the consequences. Damage to alveoli and impaired gas exchange. Alveoli are tiny air sacs in the lungs where oxygen and carbon dioxide are exchanged between air and blood. The breakdown products of chemicals in vape liquids can cause irritation and inflammation of the alveoli. This damage disrupts normal gas exchange, reducing breathing efficiency and increasing the risk of developing chronic lung diseases such as COPD. E-cigarette aerosol may contain carcinogenic chemicals. The chemical diacetyl, used in some e-cigarette flavorings, has been linked to the serious lung disease bronchiolitis obliterans (popcorn lung disease), [3] a rare, non-cancerous condition in which the smallest airways (bronchioles) in the lungs become inflamed. This inflammation can eventually lead to scarring, airway obstruction, and permanent damage to the lungs," says Catalina Teba, M.D. [4] Some people (mostly young adults) experience cramping when using e-cigarettes. Children and adults can develop nicotine poisoning if e-cigarette liquid is swallowed, inhaled, or absorbed through the skin or eyes. E-cigarette use can also cause serious injuries due to faulty batteries that have caused fires and explosions. [3] Chemicals in the aerosol can cause inflammation of the mucous membranes of the nose, throat, and bronchi, leading to coughing, sore throat, dry mouth, and chest tightness. It also increases susceptibility to respiratory infections. An article in the journal Thorax examines how exposure to tobacco smoke, including vaping, affects alveolar macrophages in the lungs. Chemicals from smoke and vapor disrupt the function of these immune cells, leading to inflammation and a decreased ability to fight infection. This increased macrophage dysfunction increases the risk of chronic lung disease. The article highlights the important role of macrophages in maintaining lung health and how their damage by pollutants can lead to long-term consequences [5].

Nicotine, which is present in most vape liquids, has immunosuppressive effects. One of its main mechanisms is to inhibit the activity of macrophages. Macrophages are cells that actively participate in the body's defense response by engulfing and destroying harmful microbes, such as bacteria and viruses, and removing dead or damaged cells. The nicotine that enters the body through vaping can weaken the function of these cells, reducing their ability to effectively fight off infections. This makes the body more susceptible to various illnesses, such as respiratory infections, and makes it more difficult to recover from illnesses that have already occurred. In addition, nicotine exposure can weaken the overall immune response, leading to a longer and more severe course of infection. Thus, nicotine not only promotes





addiction, but also weakens the immune system, increasing the risk of disease and complications.

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