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### **W14 Vaping: What You Didn't Know About Electronic Cigarettes — And Why You Should Care**

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After attending this presentation, attendees will be able to: (1) understand the mechanism and advantage of aerosols as a drug delivery system; (2) articulate the history of electronic cigarette development, their operation, and their components; (3) understand how electronic cigarettes are manipulated for abuse; and, (4) describe an analytical approach for e-cigarette components and e-liquid formulations to include real casework involving electronic cigarettes.

This presentation will impact the forensic science community by increasing awareness of electronic cigarette use as an emerging and popular drug of choice and the abuse trend leading to an international criminal justice concern. This presentation will also provide a foundation by which controlled substances units, forensic toxicologists, death investigators, and medical examiners can develop analytical methodologies and refine interpretative opinions when electronic cigarettes are used as a Route Of Administration (ROA).

Electronic cigarettes (e-cigarettes or e-cigs), known as “Personal Vaporizers” (PV) by avid users or Electronic Nicotine Delivery Systems (ENDS) by the industry, have experienced a significant increase in popularity for those seeking an alternative to smoking traditional tobacco products. These products are comprised of a battery-powered atomizer and a cartridge filled with a pharmaceutical (nicotine), flavorings, and water dissolved in glycerol products. E-cigarette devices are manufactured with a spectrum of personalization opportunities such as off-the-shelf non-customizable devices, customizations such as self-wrapping of the element, homemade wicks, self-preparation of the e-cigarette liquid formulation, cups to hold plant material, dripping vs. wicking, and wattage adjusters to administer a desired drug dosage.

The lack of enforced regulation has made e-cigarettes easy to access and has shepherded the nefarious use of electronic cigarettes. The use of the electronic cigarette as an illicit drug delivery device is touted on websites, forums, blogs, and videos describing how best to use them for specific illicit drugs such as tetrahydrocannabinol, methamphetamine, fentanyl, and heroin. They also explain at length the benefits of “vaping” illicit drugs as it can be done in public without question (there is no odor and vaping is not just acceptable, it is “cool”).

Analyzing paraphernalia for drug usage is a practiced and conceivably straightforward methodology established in controlled substance laboratories nationwide; however, electronic cigarettes are still largely uncharacterized. Little is known or understood about their construction, let alone how they are potentially used to deliver illicit drugs. Additionally, from a toxicological perspective, little is documented regarding the delivery of nicotine, particularly as a function of power, for electronic cigarettes. Additionally, even less is known regarding the adulteration of electronic cigarettes and how the e-cigarettes are used or modified to optimize the delivery of an adulterant. Few peer-reviewed manuscripts exist in the literature that describe, define, and illustrate the use of electronic cigarettes.

This presentation will describe how electronic cigarettes work and their efficacy in drug delivery. Given that one of the roles of the forensic scientist is to define and characterize drug usage trends, this is being recognized as a relevant and identified threat to public health and criminal justice. This presentation will increase insight into the analytical efforts in controlled substances and in interpreting the findings and opinions of scientists, medical examiners, death investigators, and forensic toxicologists as related to electronic cigarettes. Attendees will also be more aware of the nature of drug usage, abuse, and overdose cases in which electronic cigarettes were used to deliver an illicit drug.

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#### **Electronic Cigarettes, Controlled Substances, Toxicology**