

# *TerranearPMC Safety Share*

## **Week of July 15, 2013 – Electronic Cigarettes**

While health organizations have placed a concerted effort to end the use of tobacco products, the free market has emerged with a new line of commodities designed to take up the slack of lost revenue dollars. Products such as nicotine gum and patches (that adhere to the skin and release nicotine into the bloodstream) are common commercial items. Another product which is gaining popularity is the electronic cigarette. An electronic cigarette, also known as an e-cigarette, personal vaporizer or PV, is an electronic inhaler that vaporizes a liquid solution into an aerosol mist, simulating the act of smoking tobacco. At this time, health organizations and researchers have not come out with a definitive position regarding the benefits and risks of electronic cigarette use as there have been limited controlled studies. Laws vary widely concerning the use and sale of electronic cigarettes and accompanying liquid solutions with pending legislation and ongoing debate.

The earliest electronic cigarette can be traced to Herbert A. Gilbert, who in 1963 patented a device described as "a smokeless non-tobacco cigarette" that was designed as an alternative to burning tobacco and paper. Then, in 2000, a Chinese pharmacist, Hon Lik, came up with the idea of using a piezoelectric ultrasound-emitting element to vaporize a pressurized jet of liquid containing nicotine diluted in a propylene glycol solution. This design produced a smoke-like vapor that could be inhaled while delivering nicotine into the bloodstream through the lungs.

Honø invention was first introduced to the Chinese domestic market in May 2004 as an aid for smoking cessation and replacement. The company that Hon Lik worked for, Golden Dragon Holdings, changed its name to Ruyan, which translates to "Resembling Smoking", and started exporting its products in 200562006 before receiving its first international patent in 2007. Today there are many brands of E-cigarettes; all advertising (no TV addsí .yet) such benefits as: having no toxins (touting no hydrogen cyanide or carbon monoxide), a complete reduction of smokerø cough, non-destruction of taste buds (even though taste buds, once destroyed do not recover), no annoying cigarette smell (as they are odorless), no accidental burns (no more holes in clothing and furniture), cheaper than conventional cigarettes (as their cartridges can last longer than a pack of cigarettes ó although there appears to be some room for disagreement here) and, since one is not really smoking, they are not banned from indoor use. Miracle product? Maybe yes; maybe no. But let us not forget that at one time asbestos and PCBs were looked at as wonder products.

An electronic cigarette consists of three essential components: 1) a plastic cartridge that serves as a mouthpiece and a reservoir for liquid, 2) an "atomizer" that vaporizes the liquid, and 3) a battery. The first component, the cartridge, is a small plastic, glass or metal container with openings at each end, serves as both a liquid reservoir and mouthpiece. A single cartridge can have the same number of puffs as 20 cigarettes.

Next, is the atomizer which contains a small heating coil that vaporizes the liquid, and generally consists of a simple filament and wicking metal mesh or silica wick to draw the liquid in. It is positioned in the center of the three components that make up the entire electronic cigarette

cylinder: the cartridge attaches to one end, and the power unit to the other. The atomizer's filament will lose efficiency over time due to a build-up of sediment, or it "burns out" entirely, requiring replacement.

The third component of the e-cigarette is the battery section, which is generally a lithium-ion rechargeable battery. The battery may contain an electronic airflow sensor, whereby activation is triggered by drawing a breath through the device. Other models have a power switch, which must be held during operation. Batteries are usually charged via an AC outlet, car charger socket or USB.

The liquid for producing the vapor, often referred to as e-juice or e-liquid, is a solution of propylene glycol (PG), vegetable glycerin (VG) and polyethylene glycol 400 (PEG400) mixed with concentrated flavors, and optionally, a variable percentage of a liquid nicotine concentrate. The solution is often sold in a bottle or in disposable cartridges. Many manufacturers offer dozens of flavors which resemble the taste of regular tobacco, menthol, vanilla, coffee, cola and various fruits, but nicotine concentrations vary by manufacturer. The standard notation to denote the amount of nicotine that an e-cigarette has is "mg/ml" and is often used in labeling, sometimes shortened to a simple "mg" (milligram). Nicotine-free solutions are also common.

So are e-cigarettes a healthier choice from traditional cigarettes? The Food and Drug Administration (FDA) has joined other health experts to warn consumers about potential health risks as they can increase nicotine addiction among young people, and in spite of current marketing ploys, these products may contain ingredients that are known to be toxic to humans, such as nicotine, polypropylene and diethylene glycol (aka anti-freeze). One study, conducted by the German Cancer Research Center has acknowledged (in addition to chemicals already mentioned) that such organic compounds as ðglycol (the main ingredient), nitrosamines, acetone, formaldehyde, acetaldehyde, benzo(a)pyrene, silicate and various metal particles are associated with the use of e-cigarettes.ö FDA acting director Kenneth Hartigan-Go said: ðElectronic cigarettes are not emission-free... Second-hand exposure to e-cigarette emission which may lead to adverse health effects cannot be excluded. If several people are using e-cigarettes in a room at the same time, considerable indoor air pollution will accumulate and may result to harmful second-hand exposure.ö In addition to chemical exposure, the e-cigarette atomizer produces ultrafine liquid particles of less than 2.5 micrometers. These particles are classified as *respirable*, meaning they have the ability to reach to deepest regions of the lungs and cause damage to the very delicate alveoli sacs where gas exchange takes place, allowing oxygen to enter the blood stream while releasing carbon dioxide during normal exhalation.

As e-cigarettes are sold without any legal age restrictions, and because they are available in a variety of flavors (chocolate, strawberry and mint) they would be appealing to young people (However, I recently tested this out by having my 16-year daughter try to buy an E-cigarette ó and she was asked for ID!). Currently, they are sold without any health warnings comparable to FDA-approved nicotine replacement products or conventional cigarettes.

### **Life is not merely being alive, but being well.**

Marcus Valerius Martialis (circa 40 AD ó 103 AD) – *Poet from Hispania (the Iberian Peninsula)*