

Electronic cigarettes do not damage the heart - ESC Press Release - ESC Congress

Electronic cigarettes have no acute adverse effects on cardiac function, according to research presented today at an ESC Congress 2012 press conference by Dr Konstantinos Farsalinos from Greece

Smoking is the most preventable risk factor for cardiac and lung disease and is expected to cause 1 billion deaths during the 21st century. Electronic cigarettes have been marketed in recent years as a safer habit for smokers, with several millions of people already using them worldwide.

Electronic cigarettes simulate the effect of smoking by producing an inhaled vapor. The device consists of a battery, a cartridge containing liquid and a heating element which gets warm and evaporates the liquid. Laboratory analyses of the liquids show that they are less toxic than regular cigarettes. Most studies have found no nitrosamines, but even in studies where nitrosamines were found, the levels detected were 500-1400 times less than the amount present in one tobacco cigarette. This means that electronic cigarettes must be used daily for 4-12 months to get the amount of nitrosamines present in a single tobacco cigarette.

Since heart disease is the main cause of morbidity and mortality in smokers, with 40% of deaths in smokers due to coronary artery disease alone, the research team decided to perform the first clinical study of the acute effects of electronic cigarettes on cardiac function.

They decided to compare their results with the acute effects of regular cigarettes on cardiac function since electronic cigarettes are marketed to smokers only, as an alternative habit.

Previous studies from the research group and several others have shown that acute smoking inhalation produces significant defects in myocardial function. This indicates that subclinical dysfunction is already present in apparently healthy asymptomatic young people who smoke tobacco cigarettes. The goal was to evaluate whether these signs of preclinical disease appear in a similar population after using electronic cigarettes.

The researchers measured myocardial function in 20 healthy young daily smokers aged 25-45 years before and after smoking one tobacco cigarette and 22 daily electronic cigarette users of similar age before and after using the device for 7 minutes.

Experienced users of electronic cigarettes were studied because they use the device more intensively than first-time users. Although both groups were of equal age, users of electronic cigarettes had a 44% higher lifetime tobacco smoking exposure compared to current smokers.

For the electronic cigarettes, a commercially available liquid with a nicotine concentration of 11mg/ml was used (NOBACCO USA Mix). This was tested by an independent toxicology laboratory and found to contain no nitrosamines or polycyclic aromatic hydrocarbons.

Myocardial function was examined using cardiac ultrasound (echocardiography) and hemodynamic measurements (blood pressure and heart rate).

The researchers found that smoking one tobacco cigarette led to significant acute myocardial dysfunction but electronic cigarettes had no acute adverse effects on cardiac function. Smoking a tobacco cigarette had important hemodynamic consequences, with significant increases in systolic and diastolic blood pressure and in heart rate. In contrast, electronic cigarettes produced only a slight elevation in diastolic blood pressure. Dr Farsalinos said: "This is an indication that although nicotine was present in the liquid used (11mg/ml), it is absorbed at a lower rate compared to regular cigarette smoking."

The echocardiography examination focused on the function of the left ventricle, the part of the heart that receives oxygenated blood from the lungs (filling or diastolic phase) and then delivers the blood to

the whole body (pumping or systolic phase). The investigators found significant defects in the diastolic phase of left ventricular function after smoking one cigarette, with four echocardiographic parameters indicating worsening function. In contrast, none of the echocardiographic parameters showed any significant worsening in subjects after using the electronic cigarette. "Diastolic dysfunction is very important because it is usually the first defect that is detected before any clinically-evident cardiac disease develops," said Dr Farsalinos.

He added: "It is too early to say whether the electronic cigarette is a revolution in tobacco harm reduction but the potential is there. It is the only available product that deals with both the chemical (nicotine delivery) and psychological (inhaling and exhaling 'smoke', holding it, etc) addiction to smoking, laboratory analyses indicate that it is significantly less toxic and our study has shown no significant defects in cardiac function after acute use."

Dr Farsalinos continued: "More clinical studies need to be done before suggesting that this is a revolutionary product. However, considering the extreme hazards associated with cigarette smoking, currently available data suggest that electronic cigarettes are far less harmful and substituting tobacco with electronic cigarettes may be beneficial to health."

Dr Farsalinos will also present his results during an ESC Congress 2012 scientific session tomorrow.

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Notes to editors

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More information is available from the ESC Press Office at press@escardio.org.

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