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v i r t u a l

Electronic cigarettes containing nicotine increase thrombotic activity and impair microcirculation.

G. Lyytinen (Stockholm, Sweden), A. Bryndal (Umeå, Sweden), E. Anesäter (Stockholm, Sweden), L. Antoniewicz (Vienna, Austria), A. Blomberg (Umeå, Sweden), H. Wallen (Stockholm, Sweden), J. Bosson (Umeå, Sweden), L. Hedman (Umeå, Sweden), F. Mobarrez (Uppsala, Sweden), S. Tehrani (Stockholm, Sweden), M. Lundbäck (Stockholm, Sweden)

Background and aims: Electronic cigarette (EC) vaping is increasingly popular despite growing evidence of adverse health effects. To further evaluate the impact of EC use on vascular health we have investigated effects of acute EC inhalation on haemostasis and microcirculation in healthy volunteers.

Methods: The study was performed in a double-blinded randomised crossover fashion. Twenty-two healthy young occasional tobacco users inhaled 30 puffs of EC with or without nicotine with a wash-out period of one week. Blood samples were collected at baseline, 15 and 60 minutes following exposure and analysed with Total-Thrombus-formation analysis system. Two different chips, simulating fibrin-rich thrombus formation and platelet thrombus formation, were used. Microcirculation was assessed at baseline and 30 minutes after exposure by laser speckle contrast imaging and iontophoresis of acetylcholine and sodium-nitroprusside (SNP) to evaluate the endothelium-dependent and -independent pathways.

Results: EC exposure with nicotine had several impacts compared to non-nicotine EC: Platelet thrombus formation and fibrin-rich thrombus formation increased significantly after 15 minutes ($p=0.011$ and $p=0.035$ respectively) following exposure and normalized after 60 minutes. Moreover, peak SNP-mediated microvascular flux, i.e. endothelium-independent vasodilation, was reduced following EC vaping with nicotine ($p=0.009$).

Conclusions: Thirty puffs of EC vapour with nicotine have acute adverse effects on thrombotic activity and endothelial independent microcirculation in healthy volunteers. No compelling effects of EC vaping without nicotine was observed, indicating nicotine as the main culprit.