

Effects of heat-not-burn compared to combustible cigarettes on coronary flow, myocardial work index and vascular function

Ikonomidis I.¹; Katogiannis K.¹; Vlastos D.¹; Kostelli G.¹; Kourea K.¹; Tsoumani M.²; Parissis J.¹; Thymis J.¹; Andreadou I.²; Alexopoulos D.¹

¹National & Kapodistrian University of Athens, 2nd Cardiology Department, Athens, Greece

²National & Kapodistrian University of Athens, Faculty of Pharmacology, Athens, Greece

Funding Acknowledgements: Type of funding sources: None.

Aim/Introduction:

Heat-not-burn cigarette (HNBC) constitutes a non-combustible smoke product.

Purpose: We compare the effects of heat-not-burn and conventional cigarettes on coronary flow, myocardial and vascular function, platelet activation and oxidative stress.

Methods: We compared the effects of HNBC to those of tobacco cigarette (TCig), on arterial stiffness, oxidative stress, and platelet activation, acutely and after 1 month of switching to HNBC, as well as on endothelial, myocardial, and coronary function after 1 month of switching to HNBC. In the acute study, 50 smokers were randomized into smoking a single TCig or an HNBC and after 60 minutes were crossed over to the alternate smoking (HNBC or TCig). For the chronic phase, 75 smokers were examined. Of those, 50 were switched to HNBC and 25 continued TCig for 1 month. Pulse wave velocity (PWV) and biomarkers [malondialdehyde (MDA), protein carbonyls (PC), and thromboxane B2 (TXB2)] were assessed in the acute and chronic study. Myocardial deformation [global longitudinal strain (GLS), myocardial work index (GWI) and wasted myocardial work (GWW)], coronary flow reserve (CFR) by Doppler echocardiography, total arterial compliance (TAC), and flow-mediated dilation (FMD) were additionally assessed in the chronic study.

Results: Compared to baseline, TCig smoking acutely increased exhaled CO, PWV, MDA, and TxB2 ($p < 0.05$), while no changes were observed after HNBC. Compared to resuming TCig smoking, switching to HNBC for 1 month improved CO (mean change: -55% vs -2.4%), FMD (+55% vs +15%), CFR (+46% vs +4%), TAC (+9% vs -0.5%), GLS (+6% vs +1%), GWW (-19% vs +0.5%), MDA (-19% vs 1%), and TxB2 (-12% vs 4%) ($p < 0.05$ for all comparisons).

Conclusions: HNBCs exert a less detrimental effect on vascular, cardiac and platelet function than combustible tobacco.