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NEWS

ACUTE EFFECTS OF SMOKING AND VAPING ON MARKERS OF VASCULAR FUNCTION VIA QUANTITATIVE MRI

PURPOSE

To assess the acute effects of a smoking or vaping challenge with tobacco cigarettes (t-cigs), nicotinized e-cigarettes (e-cigs+) and non nicotinized e-cigarettes (e-cigs-) on vascular function via quantitative MRI.

METHODS AND MATERIALS

The blood flow velocity waveform in the femoral artery was measured at rest and in response to cuff occlusion, generating parameters illustrating hyperemia (arterial peak velocity, time to peak, duration of monophasic forward flow, hyperemic index and peripheral flow reserve, PFR, which is the ratio between peak and baseline velocity within the cardiac cycle. Also, the dynamics of venous oxygen saturation (SvO2) in the superficial femoral vein were computed, in terms of washout time of oxygen-depleted blood, upslope (rate of resaturation), and overshoot (peak SvO2). Central arterial stiffness was assessed using aortic pulse wave velocity (aPWV). Cerebrovascular reactivity was evaluated at the superior sagittal sinus (SSS) through a breath-hold challenge. Cerebral metabolic rate of oxygen (CMRO2) was also evaluated at SSS. Neurovascular compliance (NVC) was computed at the common carotid arteries. The MRI protocol was run before and after a smoking or vaping challenge. Participants underwent three study visits with a different challenge at each visit: t-cig, e-cig+ or e-cig-. Mixed effects models were used to compare effects of challenges on MRI markers. Comparison was made with non-smokers/vapers controls who underwent the MRI protocol once.

RESULTS

There were largely parallel acute responses across the three challenges for many of the parameters. At the femoral artery, across users, markers that decreased post challenge included Baseline SvO2: e-cig+: 12% ($P< 0.05$). In dual-users, it decreased post e-cig+ challenge by 23% ($P<0.01$). There was no significant acute effect on aPWV, NVC and CMRO2 and no significant difference between controls and trial participants at baseline.

CONCLUSIONS

This MRI protocol detected acute effects of smoking and vaping on markers of vascular function.

CLINICAL RELEVANCE/APPLICATIONS

The data show the potentially deleterious acute effects of one episode of smoking and vaping.