

Various aspects of cigarette smoke induced vasoconstriction of peripheral arteries assessed by synchrotron radiation micro-angiography

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Introduction

Cigarette smoking is known to constrict peripheral vessels; however details were not clarified due to limitation of spatial resolution in conventional X-ray angiography systems. Synchrotron radiation micro-angiography (SRMA) can identify small arteries down to 50 μm (micrometer) in diameter. And it can expect to show various aspects of cigarette smoke induced vasoconstriction.

Manuscript preparation

Male Wistar rats (n=9) were made to smoke one cigarette by a modified Griffith snout exposure system. Angiography of rat hindlimb was performed at before-, during-, and 15 minutes after smoking. Arteries were classified into three groups based on their diameters in pre-smoking angiography (Group I: < 100 μm , Group II 100-200 μm , Group III: > 200 μm).

Results

In Groups II and III, arteries were constricted with smoking (mean diameter 140 to 106 μm ; $p < 0.00001$, 260 to 162 μm ; $p < 0.00001$, respectively), whereas no constriction was noted in Group I (82 to 83 μm). Constricted arteries in Groups II and III returned to pre-smoking levels at 15 minutes after cessation of smoking. Extrinsic NO administration after smoking caused vasodilation only in Groups II and III (140%, 141%, respectively) in the same manner as observed with smoking.

Conclusion

Cigarette smoking constricted arteries exclusively greater than 100 μm in diameters, which meant vessel-size dependency of the impairment, possibly due to NO depletion. It can not be realized in vivo without SRMA.

Reference

Akishima S, Matsushita S, Sato F, Hyodo K, Imazuru T, Enomoto Y, Noma M, Hiramatsu U, Shigeta O, Sakakibara Y: Cigarette-smoke-induced vasoconstriction of peripheral arteries —Evaluation by synchrotron radiation microangiography—. *Circ J* 71:418-422, 2007

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