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Acute Effects of Passive Smoking on the Coronary Circulation in Healthy Young Adults

Ryo Otsuka, MD; Hiroyuki Watanabe, MD; Kumiko Hirata, MD; Kotaro Tokai, MD; Takashi Muro, MD; Minoru Yoshiyama, MD; Kazuhide Takeuchi, MD; Junichi Yoshikawa, MD

JAMA. 2001;286:436-441.

Context Recent studies have shown that **passive smoking** is a risk factor for ischemic heart disease and may be associated with vascular endothelial dysfunction. The **acute effects of passive smoking** on coronary circulation in nonsmokers are not known.

Objective To determine the **acute effects of passive smoking** on coronary circulation using coronary flow velocity reserve (CFVR), assessed by noninvasive transthoracic Doppler echocardiography.

Design, Setting, and Participants Cross-sectional study conducted from September 2000 to November 2000 among 30 Japanese men (mean age, 27 years; 15 healthy nonsmokers and 15 asymptomatic active smokers) without history of hypertension, diabetes mellitus, or hyperlipidemia.

Main Outcome Measures Coronary flow velocity reserve, calculated as the ratio of hyperemic coronary flow velocity induced by intravenous infusion of adenosine triphosphate and measured participant before and after a 30-minute exposure to environmental tobacco smoke.

Results Heart rate and blood pressure responses to adenosine triphosphate infusion were not affected by **passive smoking** exposure in either group. **Passive smoking** exposure had no effect on basal coronary flow velocity in either group. Mean (SD) CFVR in nonsmokers was significantly higher than that in smokers before **passive smoking** exposure (4.4 [0.91] vs 3.6 [0.88], respectively; $P = .02$), whereas after **passive smoking** exposure did not differ between groups ($P = .83$). **Passive smoking** exposure significantly reduced mean (SD) CFVR in nonsmokers (4.4 [0.91] vs 3.4 [0.73], respectively; $P < .001$).

Conclusions **Passive smoking** substantially reduced CFVR in healthy nonsmokers. This finding provides direct evidence that **passive smoking** may cause endothelial dysfunction of the coronary circulation in nonsmokers.

[http://jama.ama-assn.org/cgi/content/abstract/286/4/436?maxto=10&hits=10&... 6/5/2003](http://jama.ama-assn.org/cgi/content/abstract/286/4/436?maxto=10&hits=10&...)

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Letters

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Effects of Passive Smoking on Coronary Circulation

To the Editor: Dr Otsuka and colleagues¹ found that passive smoking has harmful effects on the coronary endothelial function in healthy young nonsmoking adults after as few as 30 minutes. We are disappointed, however, that the **secondhand smoke** exposure was not more clearly quantified. Apart from describing the size of the smoking room and the fact that some individuals were smoking, the authors did not estimate the amount of exposure to environmental tobacco smoke. They did not describe the number of **smokers** or the number of cigarettes smoked in the room before or when the subjects were exposed. They similarly gave no information about the ventilation system.

Furthermore, only air concentrations of carbon monoxide, not nicotine or particulate levels, were measured. To gauge the bioavailability of environmental tobacco smoke compounds, the authors measured the subjects' plasma carboxyhemoglobin level. Measuring other biomarkers such as nicotine could have provided additional useful information. In terms of public policy, it would be known how typical these exposures and results are.

Otsuka et al also found an apparent lack of effect of **secondhand smoke** on the endothelial function in **smokers**. Does this imply that passive smoking is not harmful to active **smokers** and that they safely accommodated in designated smoking rooms? More sensitive measures of vascular effect passive smoking in active **smokers** are needed. **Secondhand smoke** is a confirmed human carcinogen with no safe level of exposure for either **smokers** or **nonsmokers**.

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1. Otsuka R, Watanabe H, Hirata K, et al. Acute effects of passive smoking on the coronary circulation in healthy young adults. *JAMA*. 2001;286:436-441. [ABSTRACT/FULL TEXT](http://jama.ama-assn.org/cgi/content/full/287/3/316?maxto=10&hits=10&RES...)

To the Editor: Dr Otsuka and colleagues¹ showed that exposure to **secondhand smoke** with carbon monoxide (SSCO) levels of 6.02 ppm for 30 minutes induces endothelial dysfunction of the coronary circulation in nonsmokers. This exposure level can be related to actual **secondhand smoke** exposure by an equation relating SSCO to **secondhand smoke** respirable particulate matter (SSRSP)²:

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