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## Carbon Monoxide Concentrations Induced by Cigarette Smoking Outdoors in Typical Smokers

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**Background:** Non-invasive screening of carboxyhemoglobin saturation (SpCO) in the emergency department (ED) to detect occult exposures is increasingly common. The threshold for non-toxic SpCO levels in non-smokers is <2%, and for smokers up to 9%. The literature supporting this baseline SpCO among smokers is inadequate, and the impact of active smoking on SpCO concentration is unclear.
**Research Question:** The primary objective was to characterize baseline SpCO in a cohort of typical smokers in outdoor public spaces. Secondary objectives were to explore how SpCO changes during and after smoking, and to compare SpCO levels between smokers and non-smokers.
Methods: This was a prospective cohort study in two outdoor urban areas in the United States, in a convenience sample of adult smokers enrolled consecutively. SpCO concentrations were assessed non-invasively before, during, and after cigarette smoking with a pulse CO-oximeter. Analyses include descriptive statistics, two-sample t-test, sensitivity analysis, and correlations.
**Results:** Eighty-five smokers had mean SpCO concentrations before, during, and after smoking, of 2.7 (SD 2.6), 2.7 (SD 2.5), and 3.1 (SD 2.9) respectively. Fifteen controls had SpCO 1.3 (SD 1.3). There was a significant difference in baseline SpCO between the two groups of 1.4 (95% CI for difference: 0.6-2.2; P <0.01, t-test). There was correlation among individual smokers' SpCO levels before and after smoking (r 0.8; P < 0.01, Pearson coefficient), but no clear trend. There was no relationship between time since last cigarette and SpCO (P = NS, Pearson coefficient). Only 20% of smokers reached an SpCO >5%.
**Discussion:** Cigarette smokers had a mean peak SpCO of 3.1% --far below the generally accepted 'normal' of up to 9%. In contrast to the expected pattern, there was not a significant trend in SpCO during active smoking.
**Conclusion:** Our findings suggest that while some smokers have SpCO concentrations >5%, most do not. Elevated levels in smokers should not routinely be accepted as normal and CO exposure from another source should be considered.