Carboxyhemoglobin Levels in Smokers vs. Non-Smokers in a Smoking Environment.

Light A., Grass C., Pursley D., Krause J. *Respir Care* 2007; 52(11): 1576.

Background

Carbon monoxide, found in cigarettes, has 245 times more affinity for hemoglobin than oxygen. Carboxyhemoglobin (COHb) is hemoglobin combined with carbon monoxide. A normal COHb level for non-smokers is <1.5%. Cigarette smokers can have COHb levels between 3-15%.[1] We were curious to see how non-smokers exposed to cigarette smoke were affected by this affinity of hemoglobin for carbon monoxide.

Method

We visited four establishments where cigarette smoking was not prohibited and measured COHb levels in both smokers and non-smokers. Because none of the locations had a "No Smoking" section, the smell of cigarette smoke was very noticeable. We used the Rad-57 Pulse CO-Oximeter (Masimo Corporation, Irving, CA) for all of our measurements. This is a fairly new and popular device that measures COHb in whole numbers. Using the Rad-57, we tested 15 people at each location and at the end of the study we had measured COHb levels on 33 smokers and 27 non-smokers. Each COHb level was measured for one minute using a digital sensor while the participant was seated and resting comfortably. Prior to starting our study, we obtained a control value by measuring COHb levels on fifty non-smoking college students and professors in a well-ventilated, non-smoking environment. All fifty subjects in our control group had a COHb level of one percent.

Results

The average COHb of the 33 smokers was 5.04%, while the average value for the 27 non-smokers in a smoking environment was 2.49%. COHb levels ranged from 1-6 % in the non-smokers and 1-14% in the smoking group.

Conclusion

Non-smokers in a smoking environment had a COHb level that was nearly two and one half times higher than that of our control group, indicating that non-smokers are not exempt from the effects of cigarette smoke in the atmosphere. We found it interesting that there was an increased disparity in COHb levels between smokers and non-smokers at the third and fourth locations compared to the first two locations. There are many variables that could have caused the greater disparity, including how long the non-smoker was at the location, cubic footage of the establishment, whether or not there was an adequate ventilation system, proximity of the smoker to the non-smoker, and total number of smokers at the site.

1. Pearce AC, Jones RM. Smoking and anesthesia: preoperative abstinence and perioperative morbidity. Anesthesiology 1984;61:576-584.