"Exhausted on Dauphin Steet?"

From the October 2001 Port City Pacers PaceLetter

At the recently contested National 5K Racewalk in Kingsport, TN, two parked church-group tour buses belched exhaust all over the course non-stop before and during the races. I mentioned to several people beforehand that they should expect slow times since carbon monoxide (CO) binds to hemoglobin with 20 times the affinity of oxygen. I was wrong. After returning home (after a predictably slow race for me and just about everyone else...) I read that the figure is actually 200 - 230 times! The following is taken from www.ispub.com/IJAPA/1/2/6437

I. Hypoxia and cellular asphyxia
CO combines preferentially with hemoglobin to produce COHb, displacing oxygen and reducing systemic arterial oxygen (O2) content. CO binds reversibly to hemoglobin with an affinity 200-230 times that of oxygen. Consequently, relatively minute concentrations of the gas in the environment can result in toxic concentrations in human blood. Possible mechanisms of toxicity include:

** Decrease in the oxygen carrying capacity of blood.*
** Alteration of the dissociation characteristics of oxyhemoglobin, further decreasing oxygen delivery to the tissues.*
** Decrease in cellular respiration by binding with cytochrome a3.*
** Binding to myoglobin, potentially causing myocardial and skeletal muscle dysfunction.*

The most clear-cut mechanism by which CO toxicity occurs is competitive binding to the hemoglobin heme groups. ...The net result is a hemoglobin molecule that is poorly equipped to release oxygen at the tissue level. The decreased oxygen delivery is then sensed centrally, stimulating ventilatory efforts and increasing minute ventilation.... The mean half-life of COHb is 320 minutes (128- 409) in young healthy volunteers on room air. Administration of one hundred percent O2 at one atmosphere reduces the half life to 80.3 minutes, while 100% O2 at three atmospheres will reduce the half life to 23.3 minutes. CO binds to cardiac and skeletal myoglobin as well as hemoglobin (Hb). Cardiac myoglobin binds three times more CO than skeletal myoglobin....

By now, if you're still reading, you may be wondering just what the heck this all means. Well, in a nutshell, it means that if you like training along Dauphin Street or Old Shell Road, you're not going to be able to run as fast as you could run somewhere where you aren't forced to breathe lungs full of car exhaust, and that these ill-effects last for several hours.

As endurance athletes, we need to have a great deal of oxygen supplied to the leg muscles when training and racing. Getting oxygen into your lungs isn't good enough. It needs to get to your working muscles, and it does so bound to the hemoglobin within your blood. Training increases the amount of hemoglobin in your blood (as well as increasing your blood volume, the stroke volume of your heart, and the amount of capillaries that supply your muscles with blood) but if those hemoglobin molecules are latching onto carbon monoxide they can't carry oxygen. If there's a lot of CO in the air you can easily become asphyxiated and die. But even a small amount of CO in the air you breathe will diminish your oxygen-carrying capacity and slow you down. And the more CO, the slower you'll be able go.

Obviously it's not practical for most people to commute to the mountains every day to train, but it is possible to train early in the morning before traffic gets too bad, or to train in quieter locations around Mobile. Places like Cottage Hill, Langan and Chickasabogue Parks, Spring Hill College, and any number of quieter

neighborhoods and tracks around the city offer less "exhausting" places to train than the popular Dauphin, Government and Old Shell Road routes.

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