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## Close Call Leads to Solution of Mysterious Maladies

In June 1987, the previously healthy 2-year-old son of a Fairbanks couple began to experience "spells." His mother described these as episodes during which the boy appeared to be drunk and said that during a spell he was very uncoordinated, unable to walk, and glassy-eyed. Initially, episodes lasted about 15 minutes, but during July they increased in frequency and duration. Episodes began to occur daily and one lasted over an hour. The boy was taken to his physician 3 or 4 times and also to the hospital emergency room. On each occasion his behavior appeared normal by the time he was examined. An extensive neurologic work-up including a CT scan, electroencephalogram, and metabolic screen was normal.

In mid-July, the boy was diagnosed as having an idiopathic seizure disorder and was started on valproic acid. For awhile, the episodes stopped but when they returned he was switched to phenytoin. The "spells" continued.

The boy's parents complained of recurrent headaches during the summer of 1987. In early August, two days following delivery of her second child, the boy's mother developed an extremely severe headache accompanied by dizziness. After passing a fist-size clot and nearly losing consciousness she was taken to the emergency room. The workup was normal except for chronic anemia. A few days later the family moved out of Fairbanks.

In mid-August, a 33-year-old single father and his 3½-year-old daughter moved into the residence. Immediately thereafter the father began having severe throbbing headaches which he thought might be a muscle strain. His physician prescribed a muscle relaxant. The headaches often occurred in the morning, and after taking the muscle relaxant and going to work, he usually felt better. On the morning of September 1, after taking a shower, he lost consciousness for approximately 1½ hours. When he came to he was groggy and unable to walk. He called an ambulance and was taken to the ER. Upon arrival his condition had improved considerably. Electrolytes and blood sugar were normal, and he was discharged.

During September the headaches continued. In addition, his daughter began complaining of abdominal pain. In October, both were away from the house on vacation and neither had any symptoms. With their return, symptoms resumed. A few days after Christmas his daughter woke up vomiting. Earlier that night, he had experienced an extremely severe headache. Two days later he suddenly began to feel very weak and light-headed. He was unable to walk and had diplopia. His daughter was groggy and unable to stand. After crawling to the front door and opening it, he called a friend for help. When his friend arrived, she developed a headache and everyone went to the hospital. In the ER his carboxyhemoglobin (COHb) level was 29%. Back calculations show that 1½ to 2 hours earlier (when the exposure stopped), his COHb level may have been as high as 35% to 45%.

The following day, the exhaust vent for an on-demand propane hot water heater was found to be completely plugged with insulation material. The plug was cleared and the father and his daughter are now both completely asymptomatic. The boy of the first family is off phenytoin and is asymptomatic.

Carbon monoxide is one of the most common causes of death by poisoning. It has an affinity for hemoglobin which is 200-300 times greater than that of oxygen. High concentrations of COHb sometimes impart a bright pink color to the skin and mucous membranes. Symptoms are dependent upon COHb levels and can vary significantly from one person to another. The following rough guidelines may be followed:

1. 10%-20% - Mild throbbing headache.
2. 30%-50% - Severe headache, irritability, nausea and vomiting, confusion, dizziness, visual disturbance, fainting.
3. 50%-80% - Coma, convulsions, respiratory failure, and death.

These cases illustrate both typical and atypical presentations of carbon monoxide poisoning, and also demonstrate how easy it can be to miss the diagnosis unless a high level of suspicion is maintained.

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