

**Lightning Data Center**  
**August 9, 2002**  
**Minutes**  
**St. Anthony Hospital, Denver, CO**

Quote of the Month:

“I like a storm, but this is more than enough...”

E. Annie Proulx, *The Shipping News*

1. Meeting began at 11:30 am and adjourned at 1:30 pm.
2. Members present: Bradley, Cherington, Kozak, Langford, Larson, Lines, McDonough, Olson, Rackley, Russon, Stewart, Winograd, Yarnell.
3. I brought the following articles from the literature (abstracted in part here):
  - a. Cankaya H, Egeli E, Evliyaoglu Z. Hearing loss caused by lightning strike: Case report and review of literature. *J Otolaryngol* 2002;31:181-183

“This study presents a case of hearing loss and injury to the right ear following a lightning strike...Symptoms related to the inner ear following lightning strike may be cochlear...vestibular..and endolymphatic hydrops...In patients who had severe bilateral sensorineural hearing loss and died...absence of the organ of Corti, Reissner’s membrane rupture and collapse, striae degeneration, and a decrease in the spiral ganglion cell population were detected.”

- b. Karger B, Suggeler O, Brinkmann B. Electrocution – autopsy study with emphasis on “electrical petechiae.” *Forens Sci Int* 2002;126:210-213.

“Fatalities caused by electrocution (n= 37) were re-examined...Accidents including two lightning deaths caused 2/3 and suicides 1/4<sup>th</sup> of the fatalities and there were two homicides...Electrical burns or current marks were detected in 81%...Petechial haemorrhages were present in 74% of the cases and the favourite sites were the skin of the eyelids, conjunctivae, visceral pleura, and the epicard...“electrical petechiae” represent a non-specific but typical finding in electrocution.”

4. Ron Holle sent the following two articles (abstracted in part here):
  - a. Orville RE, Huffines GR, Burrows WR, Holle RL, Cummins KL. The North American Lightning Detection Network (NALDN) – First Results. *Monthly Weather Rev* 2002;130:2098-2109.

“Cloud-to-ground lightning data have been analyzed for the years 1998-2000 for North America...a total of 8817 million flashes divided among the three years...Over the waters surround the North American continent, the maximum lightning is principally at night..”

- b. Latham D. Lightning flashes from a prescribed fire-induced cloud. J Geophy Res 1991;96:17, 151-7.

“A prescribed fire was ignited.. western Ontario, Canada on.. August 10, 1989. The fire.. burned vigorously over a period of 3 hours.. generating a plume cloud structure including a portion resembling an anvil...four flashes out of a total of 37 flashes.. were the only flashes perceived as lowering negative charge; all the others lowered positive charge..”

5. Both Sheryl Olson and Gene Lines brought similar articles with information from the Petroleum Institute regarding static electricity at gas pumps. The PEI researched 150 fires as a result of static electricity. “Almost all cases involved the person getting back in their vehicle while the nozzle was still pumping gas. When finished, they went back to pull the nozzle out. The fire started then as a result of static discharge...Never get back into your vehicle while filling it was gas. If you absolutely have to get in your vehicle while the gas is pumping, make sure you get out, close the door touching the metal, before you touch the nozzle. This way the static from your body will be discharged before you ever remove the nozzle.”
6. Dr. Philip Yarnell brought a patient (Jeff) who was kind enough to relate his medical problem. The patient is a grocery store manager who has hypokalemic periodic paralysis. In the past cortisone injections produced bradycardia. The paralysis of his muscles was treated with liquid potassium. His symptoms became worse 7 weeks ago after he suffered an electric shock in the crawl space of a house. The trunk wires were exposed and the “130 volt” wires came in contact with his head. He immediately lost consciousness. Since that event he has more muscle weakness and pain; and he requires more potassium. He brought information from the Periodic Paralysis Association website. Included in this handout was the information that the clinical presentation of hypoKPP affects proximal limb muscle more that distal ones; and rarely ocular, bulbar or respiratory muscles. Several members asked questions and speculated about causes and treatments. Gil McDonough suggested that electroporation might explain the worsening symptoms. Damage to cell membranes and their ionic channels could interfere with the passage of electrolytes and water. Larry Winograd asked why the heart was not equally affected. Gil suggested that heart muscle was more dependent on calcium channels than potassium channels. Gil speculated that the symptoms may improve in time. He believes that the damaged lipid membranes might repair with cholesterol and fat. Larry Winograd wondered if a high carbohydrate diet might be considered as that diet increases triglycerides. On the other hand, Gil and others

suggested that such a diet might worsen the potassium situation. Sheryl Olson raised a question about the patient's daily water intake. He had stated that he drank 3 liters of water per day (while avoiding alcohol and caffeine drinks). Sheryl wondered, and others agreed, that this amount of water intake might have a diluting effect on serum potassium. The patient reported that stress, as well as exercise, made his symptoms worse. Gil provided two explanations for the negative effects of stress: 1.) with stress there is increased levels of cortisol and lowering potassium levels; 2.) with stress there is increased renal flow and excretion of potassium. I, and others, told that patient that he should not make any changes in his diet or behavior based on today's discussion. The patient stated that he understood this. Any change in diet or activity should be done under supervision of his primary physician and Dr. Yarnell. It was felt that it might be appropriate to see a nephrologist about evaluating fluid and dietary changes and treatment options. We thanked the patient and Dr. Yarnell for attending the meeting and sharing this clinical problem. We asked Dr. Yarnell to provide us with a follow-up report.

7. Sheryl Olson gave us a preliminary case report. She will have more information about the case at our next meeting. The patient is 13 years old. He was struck by lightning on July 4, 2002. He was given CPR for 2 minutes. He had loss of vision for more than 24 hours. There were first degree burns on his thorax.
8. Gene Lines, Henry Rackley, Ken Langford, Ron Larson, and Ernest Kozak discussed an issue that seems to have more questions than answers. That issue is how to provide lightning protection to houses. What is the role of lightning rods? The group stated that most houses have a ground bar service panel near the entrance. The panel is connected to ground rods or wires. Henry stated that in many houses the current path starts at the furnace exhaust vent at the top of the structure, and travels a route to pipes in the ground. We asked Gene to arrange to have a panel of experts discuss this issue at a future meeting. We (LDC) received a letter from William De Ford of Lyncole Industries, Inc. dealing with their grounding products and services. Gene knows Mr. De Ford and other people in this industry. He will work on gathering a panel of people to debate these issues.
9. These minutes do not represent official positions of LDC and its members. The minutes reflect the comments of members present at the meeting.
10. Next meeting will be held in our usual setting: the Main Auditorium of St. Anthony Central Hospital at 11:30 am on September 13, 2002. Our scheduled speaker for this Friday the thirteenth meeting will be Professor Richard Keen.

Respectfully submitted,

Michael Cherington, MD