LIGHTNING DATA CENTER
MINUTES
July 10, 2009
ST. ANTHONY CENTRAL HOSPITAL, DENVER, CO
www.stanthonyldc.org

"I have issues with removing the 30-30 rule entirely. (But), for the lay person with no lightning data available, "When thunder roars, go indoors" is excellent."
~Ron Holle, *via email*, 4/8/09

1. Meeting was held in Auditorium A, began at 11:45 AM and adjourned at 1:05 PM. Moderated by Ken Langford.

2. Members present: Block, Cherington, Collier, Elder, Gift, Cui-Gift, Glancy, Langford, Mendez, Wachtel, Wallace, Wells, Yarnell. New member Bart Block is a retired biologist and anatomy instructor.

3. I would like to begin these minutes with a plea to the members who attend future meetings in person. If possible, please try to arrive by 11:45am. The stream of late arrivals tends to break up the flow of the meeting, and is not considerate of the speaker or participants. Thanks!

4. Several early arrivals at the meeting watched or listened to a laptop presentation of a Good Morning America video featuring a lightning injury scenario. A Dallas Texas woman was at the sink in her home preparing to wash a metal pan she was holding when lightning struck and injured her. Her son called 911 to ask for assistance. As is typical of such coverage, the story focused on the 9 year old and his 911 call. But there is much of interest in this case for the lightning injury observer. In brief, the family thought the lightning came from an overhead light and passed out of her foot. More than one LDC observer has suspected that the current came via the plumbing, to which she had close proximity. The video link is here:

   http://www.mefeedia.com/entry/son-saves-mom-struck-by-lightning/20507159

5. Phil Yarnell gave a case presentation of a 40-year-old male heavy construction worker from a small town in Texas. He was out in his yard with his dog, cleaning up fallen branches following a storm. The sun was shining, but the grass was still wet from rain. As he picked up a downed branch, lightning struck a tree 40 feet from his location. The branch in his hand was shattered, and both he and the dog were knocked over. There were no burns apparent on the man.

   Following the incident the man experienced aches and pains in his legs, which got worse as weeks progressed. His ability to work his job was gradually diminished by the pain to the point where he could only work a maximum of 4 hours daily. He is on disability, and takes narcotics (Demerol and one other) for his pain. He also reports disturbed sleep patterns, forgetfulness, and temperature dysregulation. The patient had two EMG leg tests done, which showed normal, and the Mayo Clinic performed a muscle biopsy which showed "tubular aggregates," although these are non-specific in origin. The patient and his wife drove all the way from Texas to Colorado to have Dr. Yarnell conduct a

neurological exam, which was normal. However, the sequelae noted in the patient interview are consistent with lightning strike injury.
Along with this case presentation, Phil posed two questions:
1. Can a patient experience a physiologically progressive dysfunction after lightning injury?
2. Might the noted sequelae be tied to the function or degeneration of the hypothalamus?

The latter question is particularly pertinent to the temperature dysregulation symptom, as body temperature should be regulated by the hypothalamus. A post-meeting Google search uncovered the following interesting link:

http://www.majidali.com/temperat.htm

One other anecdote from the incident concerned the man's dog. The dog was a healthy, active 7 year old at the time of the incident. Following the strike, the dog was less active, and died within a year. The family veterinarian examined the dog post mortem, and reported: "his insides were matted up," to quote the patient exactly.

A lively discussion followed Phil's presentation. Ken Langford asked if Phil had ever seen a case of temperature dysregulation associated with any injury or disease other than lightning strike. Phil said he had not. Michael suggested that stroke or hemorrhage affecting basal ganglia may lead to a similar outcome. In any case this would still be related to the hypothalamus. Here is an interesting link on the hypothalamus:

http://en.wikipedia.org/wiki/Hypothalamus

Perhaps we should seek an expert speaker on the hypothalamus. Possible questions for such a speaker would be:
Can the hypothalamus be regenerated? Using stem cells?

Howard Wachtel observed that the primary mechanism of injury was ground current, although Rich Collier suggested that since the branch in his hand was shattered, perhaps a side-flash was involved. Howard suggested that maybe the man was directly in the surface current path, as suggested by the following illustrative photo:

http://www.thunderbolts.info/tpod/2006/image06/060309lightning.jpg

Howard wondered if a fulgurite might be found under the ground near where the patient was standing. Ken suggested this would likely have more to do with the soil composition than any other factor. Bob Glancy asked if lightning tended to follow tree roots. Howard suggested that perhaps accident investigators could look for fulgurites. It was also noted that the patient was wearing work boots. Several wondered if the boots might help to insulate the wearer from ground currents. It was noted that the dog had no foot coverings and four ground contact points, and thus might be more prone to ground current injury.

The muscular damage aspect of the case was discussed. Michael mentioned that the literature on lightning and electrical shock patients suggests several forms of muscle damage. These include a.) some patients who have been reported to develop a progressive degeneration of the motor neurons, similar to that which occurs in ALS (Lou Gehrig's Disease); and b.) some who develop myglobinuria from muscle cell damage. He notes that a common form of muscle damage in lightning strike is damage to the heart muscle. Howard reminded us that Raphael Lee has published on membrane breakdown leading to myopathy. Michael suggested that an impact on the endocrine system might lead to muscular changes. A summary of a Journal article entitled "Takotsubo cardiomyopathy following lightning strike" was circulated. The summary can be read here:

http://casereports.bmj.com/cgi/content/abstract/2009/apr29_2/bcr0320091646

Michael asked if the patient had undergone a brain MRI. And, if not, would Phil think it to be worth obtaining an MRI of the brain?

The postal patient injury case from our June 2009 meeting was compared and contrasted to this case.

Phil observed that there is no "testing proof" in any of these cases that conclusively proves a lightning injury. He says that Parkinson's disease was the same, but the incidence was high enough to establish common parameters, even if physiological testing cannot offer proof. Michael said that a neurological profile *is the test* in those lightning strike cases where there are no laboratory or radiological abnormalities. Robert Gift pointed out that people can easily claim these symptoms. Michael suggested that corroboration with meteorological data would provide compelling evidence.

This led to a discussion of NLDN data. The question was posed: what is the geographic accuracy of the NLDN location data? Member Steve Hodanish's excellent study series provided the answer via internet:

http://www.crh.noaa.gov/pub/ltg/ltg_24aug03_parkcnty_biker_fatal.php

The relevant text says: "According to Vaisala Inc. (the organization which runs the national lightning detection network), as of 1998, the accuracy of location of the cloud to ground lightning flash data has a median location accuracy of 500 meters, or a little over (sic) 1/3 of a mile (.31 miles or 1637 feet)." Michael asked about satellite detection of lightning, and no one was sure of what such methodology could contribute to detecting individual CG events.

The discussion turned to the harmful effects of induced vs. direct contact current. Ken suggested that in our model of lightning and people, current flow has similar characteristics no matter how it is generated. Howard described the physioelectrical character of defibrillation.

6. Dr. Cherington briefly discussed an article he published on Sherlock Holmes. In his 1987 article he proposed that Sherlock Holmes was, in spirit, a neurologist. Cherington M. Sherlock Holmes: neurologist? Neurology 1987;37:824-5.

7. Ken Langford presented an email from Ron Holle relating to the June 2009 discussion of the so-called “30/30 Rule” for lightning safety. The 30/30 Rule states that people should seek shelter if the "Flash-To-Bang" delay (length of time in seconds between a lightning flash and its subsequent thunder), is 30 seconds or less, and that they remain under cover until 30 minutes after the final clap of thunder. Several LDC members and many in the lightning safety community have been debating the continued value of this rule. Here is what Ron had to say on the topic: “I have issues with removing the 30-30 rule entirely. For the layperson with no lightning data available, “When thunder roars, go indoors” is excellent. But there are lots of higher-end users of lightning data around the world who base their actions on 30-30. We have done extensive studies of cloud-to-ground data and found it’s actually close to the optimum. For airports and similar applications, something similar to 30-30 is the statistically correct balance between detecting as many events as possible, but issuing as few false alarms as possible. Major safety and financial impacts are involved in these decisions for a number of users. We have published extensively on these issues.”

   A study addressing the statistical basis of the rule will accompany these minutes as a pdf attachment.

   Bob Glancy related that the official position of the National Weather Service is “When thunder roars, go indoors.”

8. These minutes do not represent official positions of LDC or its members. They simply reflect the comments made at the meeting.

9. Next meeting: Friday, August 14, 2009 at 11:30 AM in the Main Auditorium of St. Anthony Central Hospital. Speaker: Richard Collier “Lightning Threat To Above Ground And Below Ground Structures – Modeling And Testing.”

Respectfully Submitted,

Ken Langford