

LIGHTNING DATA CENTER
Minutes
March 11, 2005
St. Anthony Hospital, Denver, CO
www.stanthonyldc.org

Quote of the Month:

"The Cause of Colds: Although germs and viruses had yet to be discovered, Franklin was one of the first to argue that colds and flu 'may possibly be spread by contagion' rather than cold air."

Walter Isaacson in Benjamin Franklin: An American Life

1. Meeting began at 11:30 am and adjourned at 1:20 pm.
2. Members present: Beckwitt, Black, Cherington, Collier, Flanders, Foley, Gift, Keen, Mains, McDonough, Mendez, Mullen, Nibbe, Olson, Pence, Russon, Stewart, Yarnell.
3. We received several interesting email messages in regard to last month's minutes and the presentation by Howard Wachtel (Subluminous lightning currents can be lethal). Here are some of the comments:
 - A. Tom Resignolo wrote:
 - a. AEDS {Automatic External Defibrillator} will only shock v-tach and v-fib.
 - b. AED will not recognize mechanical pumping, i.e. a pulse. Therefore, AEDs will shock v-tachers with a pulse and can indeed send the patient into v-fib.
 - c. Paramedic level field training allows medic to shock with a synchronized shock that can be given on crest of the R wave in v-tachers with a pulse, and will most likely NOT induce v-fib.
 - d. Depending on what study you go with, AED use has brought the save rate in the field from 1-2% to 30-33%."
 - B. Mike Foley found a typographical error in paragraph 7- G. It should read 100 milliamperes (mA) not 100 amps. The correct wording: "Current (60 Hz) across the torso of 100 mA could produce ventricular fibrillation."
 - C. Ryan Blumenthal quoted an abstract from Knight's Forensic Pathology 3rd edition text on the subject of how much current can produce ventricular fibrillation:

"..the passage of 50-80 mA across the heart for more that a few seconds is likely to cause death. The most that can be tolerated voluntarily by most people is 30 mA applied to the hand, which results in painful muscle contractions. Consciousness is likely to be lost at about 40 mA and

currents sustained for some seconds for some seconds at over 50-80 mA carry a substantial risk of death.”

4. I brought the following articles from the literature (abstracted in part here):

- a. Blumenthal R. Lightning fatalities on the South African Highveld. Am J Forensic Med Pathol 2005;26:66-69.

“Of the 58,927 deaths referred to the 6 large mortuaries on the South African Highveld between 1997 and 2000, 38 fatal lightning strike victims were identified. This suggests an incidence of 64.48 per 100,000 unnatural deaths, or 6.3 per million general population. Australia, on the other hand, has an average of 0.21 lightning-related deaths per million population. Of the 38 cases identified, 52% (20/38) were witnessed lightning strikes. The ages of victims ranged from 5 to 61 years, and the average age was 36 years.”

- b. Hecht J. Lightning linked to gap in radiation belts. Newscientist.com. March 9, 2005.

“Lightning bursts in clouds are responsible for clearing the enigmatic ‘safe zone’ for satellites, lying between two doughnut-shaped radiation belts surrounding the Earth, say NASA researchers. The discovery, announced on Tuesday, surprised space physicists who had not expected an atmospheric phenomenon to affect a region 10,000 kilometres above the Earth’s surface. The Van Allen radiation belts US Explorer satellites discovered them in 1958.”

5. We frequently discuss neurologic and cardiovascular complications of lightning strikes. Less frequently do we discuss gastrointestinal complications of lightning strikes. The following two articles from the literature relate gastrointestinal injuries after lightning. The articles are abstracted in part.

- a. Aslan S, et al. Lightning: an unusual etiology of gastrointestinal perforation. Burns 2005;31:238-239.

“A 12 year old boy was admitted to the emergency department after being struck by lightning in an open field. Cardiac and pulmonary examinations were within normal limits. On abdominal examination, there was severe tenderness and pain particularly in the right side of the abdomen. Abdominal exploration showed two perforations in the terminal ileum. The perforations were closed primarily. The postoperative course was uneventful. Although the cardiovascular and central nervous systems in lightning strikes are the most frequently affected, serious signs and symptoms were not detected in this case.

Gastrointestinal complications caused by lightning strikes include paralytic ileus, gastric dilation, stress ulcers, and gastrointestinal bleeding.

- b. Taylor PH, et al. The intriguing electrical burn. J Trauma 1962;2:309-326.

“A 43-year old female was playing golf during a lightning storm. While standing beneath a tree, she was struck by lightning. She was rendered unconscious immediately and remained semicomatose and confused. During the second day, the patient developed nausea, vomiting, abdominal tenderness and distention with no bowel sounds. A serum amylase of 4,250 units was reported. The patient expired on the fourth post-accident day. At autopsy, the following pathologic lesions were observed: hemorrhagic necrosis of the descending and sigmoid colon; acute fibrinous peritonitis; infarcts of the liver, spleen and kidneys. Her uremic state could have caused the elevated level of serum amylase. Other diagnostic possibilities included acute pancreatitis, pancreatic damage, perforated viscus.”

6. Steve Clark proposed we look into collecting electrical data along with the medical data for lightning strike cases. He stated that the National Lightning Detection Network (NLDN) contains information about the location of lightning strikes. He believes that merging the medical and electrical data could be very useful. Steve Hodanish has already started such a study. Steve Clark and Mike Foley will meet to discuss this proposal and report back to us.
7. Sheryl Olson read a paragraph about a lightning injury that occurred on Long's Peak in the early 1930s. The injured woman had transient muscle weakness. The source of this information is from the book, The Magnificent Mountain Women by Janet Robertson. The book is a publication of the University of Nebraska Press (1991).
8. Phil Yarnell presented a patient who suffered electrical trauma. The patient had several subsequent medical/neurological sequelae. Among those problems was the development of a progressive peripheral neuropathy with asymmetric weakness. Motor nerve conduction velocities were reported to be slow. Gil McDonough pointed out that peripheral neuropathies are often present difficult diagnostic and therapeutic challenges. Al Nibbe will be speaking to LDC in May on the spectrum of low/high voltage electrical injuries. The patient will schedule further neurologic and electromyographic evaluations. Phil will report on the results.

9. Today's presentation was entitled: Life and Lightning in Ireland and Scotland. The speaker was Noel Mullan. It is not a coincidence that Noel's presentation was given just days before St. Patrick's Day. Noel was born and educated in Ireland. He has degrees in Electrical and Mechanical Engineering from University College Dublin. He gave a delightful presentation that included personal experiences from his times in Ireland, including a recent visit.

Noel stated that there is a low incidence of lightning flashes and lightning injuries in Ireland. He mentioned that average altitude of Ireland is 230 feet above sea level. The highest point is 3400 feet. He said the average humidity is high. Why then so little lightning in Ireland? These altitude and humidity features are similar to Florida that has high lightning flash density. Rich Keen and Greg Stewart provided an answer: the cool temperature of the surrounding ocean water. Rich pointed out that as regards lightning conditions, Ireland resembles California more than Florida.

10. These minutes do not represent official positions of LDC or its members. It simply reflects the comments made at the meeting.

11. Next month's meeting : Friday April 8, 2005 at 11:30 am in the Main Auditorium of St. Anthony Hospital.

Scheduled guest speaker: Dan Breed of NCAR

Respectfully submitted,

Michael Cherington, MD