

Quote of the Month:

"In almost all human interactions, humility and grace work best."

William DeMyer, *Seminars in Neurology* 1998

1. Meeting began at 11:30 am and adjourned at 2:00 pm.
2. Members present: Bergschneider, Breed, Cherington, Clark, Foley, Glancy, Hodge, Kithil, M. Kummerfeldt, P. Kummerfeldt, Langford, Moore, Olson, Toler, Yarnell.
3. The Administrative Committee (AC) met this morning prior to the General LDC meeting. Those attending were: Cherington, Foley, Glancy, Kamin, Kithil. We met with Mike Foley reported on the AC discussions. Ms. K.Holly Shiflett who has helped organized our Web Page was present at the meeting. Mike will register LDC web page with various search engines. We can currently be found at:

[www.centura.org/services/lightning\\_data\\_center/lightning\\_data\\_center.htm](http://www.centura.org/services/lightning_data_center/lightning_data_center.htm)

We decided to list our local and out-of-state members and their email addresses on a roster on the web page, unless anyone instructs us not to do so.

We request that **everyone send their name + email address** to Cheryl Toler at our email address:

[lightningdatacenter@centura.org](mailto:lightningdatacenter@centura.org)

We shall also organize lists of our members by specialty or profession (e.g. physician, meteorologist, engineer). We also plan to highlight a "picture of the month" of lightning pictures supplied by our photographers and others. The web page will include the LDC logo that was created by Kevin Bergschneider.

4. This is the 3rd Friday the 13th of the year 1998 (February, March, November). As Rich Keen stated in the March minutes: "Since LDC meets on the second Friday of each month, our meetings will always occur on Friday the 13th when there is a Friday the 13th."
5. I brought to the members two subjects that were sent to me by two individuals that climb mountains:
  - a.) One climber received as a gift an aluminum hiking walking stick; and asked: Is that safe during lighting storms? Answer from the group: No. It should not be attached to the hiker's wrist by a strap during lightning storms, so that it can be quickly discarded.
  - b.) A second climber has had experience in Nepal and has climbed Mt. Everest. He stated that he has not seen lightning there, and knows of no lightning strikes or incidents to climbers of Mt. Everest. How big a problem is lightning there? Lightning can be a major problem for people who climb in the Rocky Mountains. We ask the readers of the minutes to contact us with information they may have about lightning and Mt. Everest. The discussion here included statements that

people above 20,000 feet may be above lightning producing clouds; the temperature is colder there than in the Rocky Mountains during mountain climbing season. Please contact us if you have more information.

6. I brought the following articles from the literature (selected parts are abstracted here):

a.) Lyons WA, Nelson TE, Williams ER, et al. Enhanced positive cloud-to-ground lightning in thunderstorms ingesting smoke from fires. *Science* 1998;282:77-80.

"Smoke transported from massive fires in Mexico during spring 1998 appeared to have a substantial influence on the electrical characteristics of thunderstorms over the central United States...Once considered rare, +CGs have been found to make up about 10% of all NLDN flashes, though there is considerable seasonal and geographical variability...Higher +CG percentages occur during the cool season along the West Coast and in New England and southern Canada...A growing body of evidence suggests that natural lightning production may be perturbed by changes in contaminants, aerosols, and possibly the space charge characteristics of the air ingested by the storm...Electric charge generated by small forest fires has been implicated in the production of thunderstorms producing exclusively +CG flashes."

Dan Breed, who spent the summer on a research project in Mexico commented that the water and ice droplets are smaller in clouds in the vicinity of smoke from fires. These smaller droplets decrease the precipitation efficiency of clouds.

b.) Jacome DE, Risko M. Lightning artifact in the EEG. *Clin Electroenceph* 1986;17:105-109.

"The artifact caused by lightning was recorded during performance of standard EEGs...The laboratory was located on the third floor of a general community hospital...Power outlets were triphasic with a ground pin...The artifact was characterized as brief, variable duration, abrupt, high amplitude deflections of the pen, synchronous to lightning flashes...Indirect effects through horizontal electric fields generated by lightning...cause severe voltage upsurges in...hospital supplies and indirectly in the EEG lab. Lightning also generates radio waves and electromagnetic noise, properties that besides producing AM radio and TV statics, are used in meteorology for thunderstorm localization...We concluded the artifacts observed are results of hospital Mains voltage maximum fluctuations during lightning, as they were accompanied by light flickering around the hospital and were recorded outside of the lab independent of machine location and orientation, instead of having been effects of electromagnetic or radio wave interference...Protection from lightning is achieved by several standard elements: roof lightning rods no more than 20 feet apart, main aluminum or copper cable conductors, especially designed to soil kind copper clad rod grounds, bindings to metal bodies to avoid side flashes, and lightning arresters to protect wires and electrical powered equipment. Hospitals should be built with large steel conducting frames or non-conductive floors."

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Howard Wachtel has reminded us on several occasions that there is no proven causal relationship between exposure to EMFs from power lines and disease. He has said that EMFs might be markers for other factors (e.g. traffic, noise, exposure to light, pollutants, etc.). With this in mind, I brought the following recent article.

c.) Prasher D. Traffic noise increases stress by driving up cortisol. *Lancet* 1998; 352:1201.

"Chronic exposure to traffic noise can lead to a chronic increase in norepinephrine and cortisol which can be harmful, said Hartmut Ising..co-organizer of a meeting in Berlin, Germany, Oct 1-3...Noise affects the neuroendocrine patterns in sleep, said Jan Born...Early sleep is characterized by inhibition of ACTH, cortisol and catecholamines, and by increased growth-hormone release."

7. I just received via email a communication from Dr. Elisabeth Gourbiere of Electricite de France = EDF. She described the two lightning incidents that occurred on the soccer fields in Africa in October: a.) October 25 at the George Goch Stadium in Johannesburg. Players were stunned and had cardiac arrhythmias but there were no fatalities. b.) October 28 at Bena Tshadi stadium in the Congo. Eleven players on the same team were killed. I distributed Elisabeth's email with her excellent discussion.

The members felt more information was needed to explain why 11 patients on one team were killed. For example: Were these 11 players on or off the soccer field? Were they in the same location in a shed or bleachers? Did one team have metal cleats on their shoes? Were the players standing together in a "huddle" formation? We await more information on these matters from Dr. Gourbiere.

Several of us (Cherington, Glancy, Hodge, Langford, Moore, Olson, Yarnell) had a prolonged discussion about how unusual for 11 fatalities during one storm. We all know of situations where there may be a single fatality and several injuries during a lightning storm (e.g. 6 golfers under a tree, with one fatality). Sheryl and Phil discussed the two children who were holding hands when lightning struck their umbrella and one child died. Why when 2 people are apparently exposed to the same lightning, does one die and one survive?

We speculated that the fatal situation may occur in the patient whose cardiac cycle happens to be in the repolarization phase. Ken Langford suggested that the soccer players might have had a pulse rate much higher than their resting rate, and therefore, they may have had 2 to 3 times more periods of cardiac repolarization per minute. Larry Moore informed us that the duration of the T-wave on the ECG would not be shorter by a comparable time during tachycardia due to exercise.

8. Phil Yarnell provided showed a videotape of a patient with involuntary movements of her trunk and limbs developing 1 week after a lightning strike. The patient is a woman in her 40's who was in her office next to her computer, when lightning struck a tree next to the building. The computer exploded. The patient was stunned. She suffered a ruptured tympanic membrane. The involuntary movements now occur as often as once per day and last for about 20 minutes. She remains conscious during these episodes. Normal studies include: Brain MRI and EEG. This patient is not the only example that Phil has seen who developed involuntary movements as a sequelae to lightning strikes.
9. George Hodge reported that he gave a slide presentation at the Museum of Science & Injury in Florida. The presentation deals with property damage second to lightning strikes.
10. Rich Kithil donated a videotape on his Seminar on Lightning Safety to our library. Rich told us about ball lightning witnessed by a 747 commercial airline pilot. The

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ball of fire began at the nose cone, entered the cockpit, traveled down the aisle of the entire plane. It was estimated to be about 18 inches in diameter.

11. Peter Kummerfeldt reported that he gave a talk on Lightning Safety at the Wilderness Conference sponsored by the University of California, San Diego.
12. Sheryl Olson brought slides of the scene in Lamar, Colorado where lightning produced 5 human casualties, including one fatality, last month. The site was a pig farm. The only structures visible on the plains were metal sheds for the pigs. Since these sheds were open on one side, Rich Kithil observed that they were not Faraday cages. It is apparent from the pictures of the terrain, that there was no safe shelter in the vicinity. This may be a situation where the "baseball catcher" position would be a prudent action to take during a lightning storm.  
  
Sheryl showed pictures of her patient who had skin lesions on his thorax and abdomen. These lesions had a fern-like pattern. But, in addition, there was a regularity to them with parallel horizontal skin burns that appeared to coincide with the ribs of his chest.
13. Steve Clark brought an article from the October 27, 1998 issue of the Denver Post entitled, Hospital data goes online, written by S. Raabe. "The data compares mortality rates at U.S. hospitals...for medical procedures and diagnoses at about 5000 American hospitals, including 49 in Colorado...The information is available on the Internet at HealthCareReport Cards.com. There is no charge to access the data...Data now available covers coronary bypass surgery, other heart procedures such as angioplasty and artherectomy, and the outcome from diagnoses including heart attack and heart failure."
14. I was told about an incident where CPR was administered to a lightning victim. The person giving mouth-to-mouth resuscitation suffered a burn from the hot metal braces on the teeth of the lightning victim. It is conventional wisdom that it is safer to give CPR to a lightning victim because the patient is not "charged" as might be the case in an electrical trauma situation. The unusual circumstances described here is an example of where CPR might be responsible for some injury to the rescuer.
15. Ken Langford spoke to us about a subject that was discussed at an earlier meeting, the chances of catching a stepped leader on a videocamcorder. Ken provided data that suggests it is most unlikely to capture the leader on standard equipment because the stepped leader would be overcome by a return stroke on a single frame. Ken's graph and explanation are attached to these minutes.
16. These minutes reflect the comments of the members present and do not represent official positions of LDC.
17. Next meeting: Friday, December 11, 1998 at 11:30 am in the Main Auditorium of St. Anthony Central Hospital.

Happy Thanksgiving, everyone.

Respectfully submitted,

*M.C.*

Michael Cherington, MD

Chair, LDC Scientific Committee

LDC's minutes are now available on the Internet at:

[www.centura.org/services/lightning\\_data\\_center/lightning\\_data\\_center.htm](http://www.centura.org/services/lightning_data_center/lightning_data_center.htm)

Let us know if you still want to receive the minutes by mail.

Yes Name: \_\_\_\_\_

No I shall read the minutes on the Internet

Please let us know if you do not wish your e-mail address and name to be listed on our Internet roster.

Yes, place my name on the roster.

No, do not place my name on the roster.

Return this notice to: Lightning Data Center / Centura Health  
4231 West 16<sup>th</sup> Avenue, Denver, Colorado 80204  
303-629-4258 Fax 303-595-6217  
E-mail: [LightningDataCenter@Centura.Org](mailto:LightningDataCenter@Centura.Org).

## Step leader on Video?

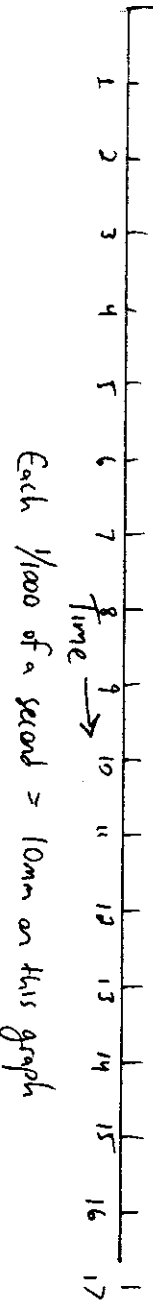
This is a pictorial representation of the time-line during which a step leader occurs, referenced to the duration of  $\frac{1}{2}$  of a recorded video frame. This representation shows how it would be difficult to capture a step leader event on a standard video recording. In essence, the return stroke would overlay the step leader before the recording of a single field (the shortest video time unit) is completed. The leader event would be obscured by the return stroke event.

Please consider this hypothesis and send ideas to the Lightning Data Center!

Ken Langford  
11/13/98

Duration: 1 video field 16.66 ms  
( $\frac{1}{2}$  video frame)

Duration: leader  $\rightarrow$  Return stroke Total Time (2.5ms)



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WWWWeb : <http://www.lightningsafety.com>

## NEWS FROM NLSI

1. NLSI contributed to the LDC Library the following publications:
  - A. Effects of Magnetic Fields on Cardiac Control Mechanisms, EPRI RS-108251.
  - B. Effects of Electromagnetic Field Stimulation on Cellular Signal Transduction Mechanisms, EPRI RS-109489.
  - C. Real Time Studies on the Calcium Response of Cells to Low Level, Extremely Low Frequency, Electric Field Exposure, EPRI RS – 109488.
  - D. Relation Between Residential Magnetic Fields, Light-at-Night, and Nocturnal Urine Melatonin Levels in Women, EPRI RS – 107242-V1-2.
  - E. Evaluation of the Possible Copromoting Effect of a 60 Hz Magnetic Field During Chemically Induced Carcinogenesis in Skin of SENCAR Mice, EPRI RS-109471.
  - F. Large Granular Lymphocytic (LGL) Leukemia in Rats Exposed to 60 Hz Magnetic Fields.
  - G. Proceedings, 23<sup>rd</sup> Intl Conference On Lightning Protection, Florence Italy September 1996.
  - H. Lightning Injuries: Electrical, Legal & Medical Aspects, Andrews et al, CRC Press 1992.
  - I. Lightning Safety 101, 58 Minute Video, National Lightning Safety Institute, 1998.
  
2. Lightning in the news:
  - A. CNN (July 8 10:24PM EDT) characterized the July 1998 forest fires in Florida as:  
“... random and violent... 1500 fires since Memorial Day burning some 350 homes and business... destroying some 484,000 acres... cost to fight these fires was placed at \$104 million and the damage by the fires at \$276 million... 90% of the fires were caused by lightning...”  
NLSI Note: The headline of this article described Florida as the “lightning capital of the world.” Florida has about 90-110 thunderstorm days/yr. Kampala, Uganda has about 280 TD/yr.
  - B. On Sept. 9 lightning hit the Charlottesville VA house of Pulitzer Price winner Rita Dove. (1988 poetry prize for “Thomas and Beulah.”) Bolt threw her husband across the study before starting fire. House suffered \$250,000 damage. Three firemen injured.
  - C. BBC (Oct. 26 01:34 GMT) reported 22 soccer players in Johannesburg South Africa struck by lightning. All survived.
  - D. Reuters (Oct. 28) reported lightning killing an entire eleven man soccer team in eastern Kasai Province in the Democratic Republic of the Congo. Players were ages 20-35. Local newspaper L’Avenir said that it is common for various fetishes to be employed in soccer matches.
  
3. NLSI Activities.
  - A. NLSI conducted a one day workshop on October 9 at the DOE Rocky Flats Environmental Test Site (RFETS). Twenty two fire safety employees graduated from NLSI’s “Inspection, Maintenance, and Testing of the Lightning Protection System.”
  - B. NLSI conducted a two day Certified Lightning Safety Professional Workshop in Louisville CO on Oct. 22-23. Graduates included employees from Lockheed Martin, DOE RFETS, DOE Westinghouse SRS, DOE Pantex, Bath Iron Works, US Army Sierra Depot, L. Dreyfuss Co., ERICO, and KCCI-TV Des Moines.
  - B. NLSI released a 58 minute lightning safety education video. It is intended as a safety training program for large audiences. Content includes: 1) History of Lightning; 2) Early Science; 3) Science of Lightning Today; 4) Effects of Lightning; 5) How to Achieve Lightning Safety. The video illustrates classroom and outdoor situations, both in recreation and in work environments. For more information, contact NLSI.

# JACKSONVILLE FL TIMES

## LETTERS FROM READERS

Sunday Nov 1st 1998

### WEATHER

## Lightning is random and unpredictable

In Colorado, we have been reading recent Florida newspaper articles about lightning safety issues at Jacksonville's football stadium.

Since our Broncos beat your Jaguars, this information from Denver may be unwelcome. But in the name of safety, we offer a few observations about lightning.

First, some general comments about lightning. It has its own agenda. It is entirely capricious, random and unpredictable.

Man's attempts to fit lightning into a convenient box, with codes and standards to describe its behavior, are a best guess.

The system of conventional lightning rods as commonly employed does represent the best method for providing a preferred pathway to ground.

Second, lightning safety in outdoor recreation events is very difficult — maybe impossible — to accomplish.

The recent injuries at a summer rock concert at the stadium in Baltimore are a good example. Some

lightning rods can control lightning (unconfirmed/sheer advertising).

Fourth, a warning to Floridians about voodoo vendors of promised solutions. As with products such as used cars and undeveloped swampland, some merchants make claims that are too good to be true. The lightning rod fraternity has its science, non-science and nonsense categories, too.

So how to achieve lightning safety? It is a personal decision. Your decision.

At the first sign of lightning or thunder, seek shelter. Good shelters are substantial buildings or fully enclosed metal vehicles. We suggest you remain in the shelter for 30 minutes after the last observed thunder or lightning.

"If you can hear it, clear it. If you can see it, flee it."

**RICHARD KITHIL,**  
president, National  
Lightning Safety Institute,  
Louisville, Colo.

*Lightning safety in outdoor recreation events is very difficult — maybe impossible — to accomplish.*

56,000 people were there. Lightning rods were there. Still, about 13 people were badly injured by incoming lightning.

Third, the myths about lightning persist: Lightning never strikes twice. (It hits the Empire State Building about 25 times a year.) Rubber tires will insulate me from lightning. (It has traveled miles through space, so a few inches of rubber mean nothing at all.) Lightning can be prevented (unconfirmed/sheer advertising). First strikes from lightning can be predicted (unconfirmed/sheer advertising). New high-tech types of