LIGHTNING DATA CENTER
MINUTES
JUNE 11, 2004
ST. ANTHONY HOSPITAL
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Quote of the Month:

"The celebrated painter Gainsborough got as much pleasure from seeing violins as from hearing them."
Georg Christoph Lichtenberg, 1787 (Translated by R.J. Hollingdale)

1. Meeting began at 11:30 am and adjourned at 1:30 pm.

2. Members present: Cherington, Clark, Gift, Foley, Hodanish, McDonough, Middleton, Nibbe, Russon, Sanders, Stewart, Wells.

3. I brought the following article from the literature (:abstracted in part here):
   a. Freeman CB, Goyal M, Bourque PR. MR Imaging findings in delayed reversible myelopathy from lightning strike.

      "While sleeping in a tent a 58 year old man was struck by lightning six weeks after the initial electrical injury, the patient began to notice numbness, tingling, and dysthesia in both hands. MR imaging revealed hyperintense signal within the cord on T2-weighted..images extending from C1 to C3. Axial images localized the hyperintense signal to the posterolateral region of the spinal cord bilaterally. Follow-up MR Imaging 6 weeks later demonstrated resolution. The clinical, CSF, and MR imaging findings in this case would be in keeping with a focal demyelinating cervical myelopathy."

4. Some lightning casualties in Colorado in the past few years have been either "bolts from the blue" or first strikes of the day. Greg Stewart asked: how many of these cases were the result of positive lightning strikes. Steve Hodanish stated that all first strikes of the day that he has studied were negative strikes. Greg suggested that "bolts from the blue" are often positive strikes. He will report on the literature at a future meeting.

5. Gil McDonough's presentation today was entitled: Lichtenberg Figures, Part 2. His presentation was superb and elicited many questions and discussion. Gil distributed handouts that summarized his talk. For some time, Gil has speculated on the pathophysiology of LF. I cannot do justice to his talk in these minutes, but I shall present what I wrote in my notebook.

a. Lichtenberg figures (LF) are seen only in lightning strike patients; not found in generated electrical trauma patients.
b. LF appear after a delay (minutes to hours).
c. LF are flat on the skin surface; not elevated.
d. LF blanches with pressure.
e. No pathologic changes seen on biopsy.
f. LF not usually seen on the face or hands.
g. LF might be the result of induced "free space electron charge" on the skin (see Rick Russon's talk last month).
h. Burns always show tissue damage on histology; LF do not.
i. Does lightning-induced space charge in the epidermis evoke a negative charge in the dermis which activated melanocytes to produce red pheomelanin? Melanin is a chain polymer. Ultraviolet light breaks chemical bonds and give energy to molecular electrons.
j. Could urocanic acid (present in the epidermis) be activated by the space charge induced by lightning? A red color would develop with vasodilatation.
k. Another source for LF coloration may reside in hemoglobin. Heme is formed by a porphyrin ring with iron attached. Porphyrins reflect red light.

6. Greg asked what practical experiments might be undertaken to study LF. Gil suggested the following: Frozen tissue biopsy be obtained as soon as possible after the appearance of the ferning pattern; in vivo skin biopsy be studied with Tesla Coil. Both would require approval by appropriate hospital committees and patient consent. Gil suggested that for LF on limbs, a blood pressure cuff be utilized to see if LF disappears. This would be consistent with a vascular component. Steve Clark suggested special photographic equipment (ultraviolet, infrared) be used.

7. Karen Wells brought two articles by Gabriel et al. on <u>The Dielectric properties of biologic tissue</u> in Phys Med Biol 1996, Vol 41. pp. 2231-49 and 2251-69.

8. Greg asked what percentage of lightning patients have LF? Gil remarked that data from Dade County suggests that 30% of fatal cases have LF.

9. Mike Foley announced that he will be attending the Annual Colorado Coroner's Conference next week. He will report to us next month about that meeting.

10. Four members volunteered to be on a committee to revisit the plans for the Annual Colorado Lightning Conference. Those members are: Mike Foley, Steve Hodanish, Vicki Middleton, Greg Stewart.

11. Mike Foley sent the following reminder: June 20-26 is Lightning Safety Awareness week sponsored by the National Weather Service (NWS). The web site is: http://www.nws.noaa.gov/om/wcm/lightning/.

12. These minutes are not official positions of LDC or its members, but reflect the comments made at today's meeting.

13. Next meeting: Friday, July 9 at 11:30 am in the Main Auditorium of St. Anthony Central Hospital.

Respectfully submitted,
Michael Cherington, MD