Thermography Examination of Abdominal Area Skin Temperatures in Individuals With and Without Focal-Onset Epilepsy

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Early osteopathic theory and practice, and the work of the medical intuitive Edgar Cayce suggested that the abdominal areas of individuals with epilepsy would manifest "cold spots." The etiology for this phenomenon was thought to be abdominal adhesions caused by inflammation and viscero-somatic reflexes caused by adhesions or injury to visceral or musculoskeletal system structures. Indeed, until that advent of electroencephalography in the 1930s, medical practice regarding epilepsy focused on abdominal neural and visceral structures. Following two hypotheses were formulated to evaluate any abdominal temperature phenomena: (1) an abdominal quadrant division analysis would find one or more quadrants "colder" in the focal-onset epilepsy group (ICD9-CM 345.4 and 345.5) compared to controls. (2) Total abdominal areas of individuals with focal-onset epilepsy wound be colder than a control group.

Methods: Overall, 50 patients with the diagnosis of focal-onset epilepsy were recruited from the office of the Epilepsy Foundation of Florida and 50 control subjects with no history of epilepsy were recruited through advertising to the public. Under controlled room conditions all subjects had infrared thermographic images made and recorded by Med-Hot Model MH-731 FLIR equipment.

Results: There were no significant demographic difference between experimental patients and control subjects, though the control group tended to be younger and more often male; however, these were controlled for in all analyses. In the quadrant analysis, there were significant differences in that more epileptic patients had colder left upper abdominal quadrant temperatures than the control group (66.8% versus 44.9%; $P = .030$). In the total abdominal analysis, however, there were no significant differences.

Discussion: The results support the hypothesis that individuals with focal-onset epilepsy have colder abdominal areas. If substantiated in further research, present study results will require further examination of the mechanisms of action for epilepsy, and suggest the need for re-examination of older formulations of abdominal epilepsy, including the place of abdominal injury, inflammation, and adhesions in epileptic pathology. The concept of somato-visceral and viscero-somatic neurological interactions is one of the possible mechanisms underlying the "cold spot" findings and warrants further consideration.

Keywords: epilepsy, Edgar Cayce, abdominal surface temperatures

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INTRODUCTION

Epilepsy is the fourth most common neurological problem in the United States, only migraine, stroke, and Alzheimer's occurring more frequently.[1] One recent estimate of the prevalence of active epilepsy in the United States is 2.2 million people, and the incidence estimated over a lifetime is that 1 in 26 people will develop epilepsy at some time in their life.[1]

Given the high prevalence and devastating impact on individuals, neuroscience research is constantly examining possible avenues for increased understanding of the etiology and pathophysiology of epilepsy. The present study extended the search for answers by combining modern medical technology with consideration of certain theories from outside the conventional mainstream of medical scientific endeavor.

The present study was formulated based on information and experience derived from early osteopathic and integrative/holistic medicine literature.[2–4] The suggestion from these sources is that individuals with epilepsy manifest cold areas in their abdominal regions due to neurobiological dysfunction. Edgar Cayce (1877–1945) was one of the early proponents of holistic/integrative medicine, whose work as a medical intuitive, utilizing what is currently referred to as remote viewing, brought him some measure of notoriety as early as 1910.[5] In a JAMA editorial in 1979 John Callan, MD said, "The roots of

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present day holism probably go back 100 years to the birth of Edgar Cayce in Hopkinsville, KY."[6] Cayce's perspective on health practices also was influential in the creation of the American Holistic Medical Association (AHMA) in 1978.

The mechanism of action suggested by the healthcare theories of Edgar Cayce involves abdominal adhesions caused by inflammation, fevers, and abdominal injury, as well as nerve dysfunction caused by spinal injury affecting the abdominal sympathetic ganglia, in what is called a viscero-somatic interaction.[7,8] The Cayce theories also suggest an abdominal surface cold area phenomenon transmitted from cooler areas of intestines caused by intestinal blockage of lymphatic channels, which can be detected by external palpation.[9] The Edgar Cayce health readings were given before the advent of virtually all the medical practices employed in healthcare today, and relied on recommendations of available natural substances. Specific foods, applications of poultices, and recommendation for specific osteopathic treatments were typical of the general holistic/integrative advice given in the Cayce readings.

The Cayce readings and early osteopathic literature both describe the neurological conditions known as visceral-somatic interactions resulting in colder areas in the abdominal region.[4,10,11] Somato-visceral and viscero-somatic interactions are based on autonomic neuroanatomy and explain how musculoskeletal conditions can affect organ or visceral functions and the reverse how visceral dysfunction can affect musculoskeletal condition or function. Spinal malalignment or dysfunction can cause uncoordinated visceral function and the reverse is also possible in that visceral disorders can cause spinal manifestations of pain or somatic dysfunction. A common example is cardiac ischemia, which can cause the sensation of pain in the left jaw or arm, signaling a possible impending myocardial infarction.

Prior to the development of modern pharmacological and surgical interventions for seizure disorders, early osteopathic physicians reported success in the treatment of epilepsy.[12,13] These treatments were based on the theory of dysfunction of nerve and ganglion structures in the "abdominal brain," concepts found in both early allopathic as well as the osteopathic medical literature.[14,15] In current medical terminology, the "abdominal brain" is referred to as the enteric nervous system.[16] In fact, 100 years ago "gastric and intestinal disturbances" were viewed as primary etiological factors for epilepsy by allopathic physicians.[17] The invention and clinical application of the electroencephalographic (EEG) technology during the 1920s shifted the focus of medical attention of epilepsy from the abdomen to the brain where, for the most part, it has remained to the present time.

Review of these and other older medical and neuroscience concepts may be productive and have heuristic value in light of modern research on autonomic nervous system (ANS) mediated viscero-somatic interactions including vagus nerve function.[18] The successful utilization of vagus nerve stimulation in some types of seizure disorders also lends support for further consideration of enteric nervous system functions in the evaluation and treatment of epilepsy. Stimulation of the vagus nerve has reduced or eliminated seizure activity in some treatment-resistant patients.[19–21] The therapeutic effect is thought to be produced by calming "hyperexcited" nerve cells and reverting brain activity to its normal patterns.[22]

Formulation of the present study was also derived from the possible relationship between the nature of the focal-onset epilepsy and the infrequently occurring diagnosis of "abdominal epilepsy."[23–25] Neuroscience literature describes the common clinical features of abdominal epilepsy to include abdominal pain, nausea, bloating, and diarrhea with nervous system manifestations such as headache, confusion, and syncope.[26] "Although its abdominal symptoms may be similar to those of the irritable bowel syndrome, it may be distinguished from the latter condition by the presence of altered consciousness during some of the attacks, a tendency toward tiredness after an attack, and by an abnormal EEG."[27] Some neuroscientists regard cyclic vomiting as a primary symptom of abdominal epilepsy manifesting as simple partial seizures.[28] Although abdominal epilepsy is diagnosed most often in children, the research of Peppercorn and Herzog[26] suggests that abdominal epilepsy may be much more common in adults than is generally recognized.

Peppercorn and Herzog also state, "The pathophysiology of abdominal epilepsy remains unclear. Temporal lobe seizure activity usually arises in or involves the amygdala. It is not surprising, therefore, that patients who have seizures involving the temporal lobe have GI symptoms, since discharges arising in the amygdala can be transmitted to the gut via dense, direct projections to the dorsal motor nucleus of the vagus. In addition, sympathetic pathways from the amygdala to the GI tract can be activated via the hypothalamus. On the other hand, it is not clear that the initial disturbance in abdominal epilepsy arises in the brain. There are direct sensory pathways from the bowel via the vagus nerve to the solitary nucleus of the medulla, which is heavily connected to the amygdala. These can be activated during intestinal contractions."[26(p1296)] These comments certainly suggest a connection between the brain and ANS activity in the abdominal area.

Though intriguing, the preceding formulations of a relationship between intestinal dysfunction (lymphatic blockage and/or inflammation) and ANS dysfunction-related abdominal temperature manifestations and focal-onset epilepsy require empirical exploration utilizing technology, which can assess possible abdominal area temperature and ANS activity, such as state-of-the-art infrared thermography. Abdominal area surface temperature reflecting ANS-mediated abdominal muscle vascular function as well as possible underlying intestinal temperature effects on overlying tissues, can be measured by infrared thermography assessment.

The present study examined the abdominal skin temperatures in individuals with focal-onset epilepsy compared with individuals with no history of epilepsy or any other kind of seizure disorder. Previous attempts to carry out such comparisons were done by the Meridian Institute in early 1990s, and published in 2006.[29] While indicative that there was indeed significant variation in abdominal area skin temperatures and apparent cold spots in a given individual, the Meridian Institute research did not find differences in abdominal area