CASE STUDY

Upper Cervical Chiropractic Care For A Nine-Year-Old Male With Tourette Syndrome, Attention Deficit Hyperactivity Disorder, Depression, Asthma, Insomnia, and Headaches: A Case Report

Erin L. Elster, D.C.

ABSTRACT

Objective: To review the effectiveness of chiropractic care using an upper cervical technique in the case of a nine-year-old male who presented with Tourette Syndrome (TS), Attention Deficit Hyperactivity Disorder (ADHD), depression, asthma, insomnia, and headaches.

Clinical Features: This nine-year-old boy suffered from asthma and upper respiratory infections since infancy; headaches since age 6; TS, ADHD, depression and insomnia since age 7; and neck pain since age 8. His mother reported the use of forceps during his delivery. His medications included Albuterol, Depakote, Wellbutrin, and Adderall.

Intervention: During the patient's initial examination, evidence of a subluxation stemming from the upper cervical spine was found through thermographic and radiographic diagnostics. Chiropractic care using an upper cervical technique was administered to correct and stabilize the patient's upper neck injury. Diagnostics and care were performed in accordance with the guidelines of the International Upper Cervical Chiropractic Association.

Outcome: Evaluation of the patient's condition occurred through doctor's observation, patient's and parents' subjective description of symptoms, and thermographic scans. After six weeks of care, all six conditions were no longer present and all medications were discontinued with the exception of a half-dose of Wellbutrin. At the conclusion of his case at five months, all symptoms remained absent.

Conclusion: The onset of symptoms soon after the boy's delivery; the immediate reduction in symptoms correlating with the initiation of care; and the complete absence of symptoms within six weeks of care; suggest a link between the patient's traumatic birth, the upper cervical subluxation, and his neurological conditions. Further investigation into upper cervical trauma as a contributing factor to Tourette Syndrome, ADHD, depression, insomnia, headaches, and asthma should be pursued.

Key Indexing Terms: *upper cervical spine, chiropractic, Tourette Syndrome, depression, asthma, Attention Deficit Hyperactivity Disorder, headaches, trauma, thermography*

INTRODUCTION

The following case report describes the symptoms of a nine-year-old male with Tourette Syndrome (TS), Attention Deficit Hyperactivity Disorder (ADHD), depression, asthma, insomnia, headaches, and neck pain; the intervention of upper cervical chiropractic care; and the patient's symptomatic response. Reports depicting the use of chiropractic care with patients with the aforementioned diagnoses are extremely limited. This paper serves to establish a foundation for future research.

B.J. Palmer, D.C., reported upper cervical chiropractic management of patients with headaches, asthma, insomnia, tics, and depression as early as 1934.[1] Palmer's chiropractic care included paraspinal thermal scanning using a neurocalometer (NCM), a cervical radiographic series to analyze upper cervical misalignment, and a specific upper cervical adjustment performed by hand. Positive results (symptoms were improved and/or eliminated) were achieved in hundreds of patients whose upper cervical subluxations were corrected.

General chiropractic (adjustments throughout a patient's spine) management of asthma, headaches, and ADHD has been reported only occasionally and has shown varied results.[2-5] In controlled studies using spinal manipulation therapy (SMT), results either were inconclusive or showed a slight percentage improvement in the SMT group compared to the control group.

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During the past several decades, no references were found linking upper cervical chiropractic and the six conditions discussed in this report, except for an asthma study, in which the results were overwhelmingly positive.[6-7] While that study was uncontrolled, approximately 47 asthma patients were treated with specific upper cervical chiropractic care aided by upper cervical radiographs and thermal imaging. The upper cervical chiropractic care administered was based upon the original upper cervical work performed by Palmer.[1,8] The care was implemented as taught by the International Upper Cervical Chiropractic Association (IUCCA) through their Applied Upper Cervical Biomechanics (AUCB) program.[9] The author reported that in all 47 cases, upper cervical subluxations were discovered and all patients showed improvement and/or correction of asthma symptoms after the intervention of upper cervical chiropractic care.

To the author's knowledge, the case discussed in this report is the first documented for TS, ADHD, depression, insomnia, or headaches using specific upper cervical care (cervical radiographs, thermal imaging, and knee-chest adjustments) since Palmer's research seventy years ago. The rationale for the use of upper cervical chiropractic care in this case was to correct the patient's upper cervical subluxation that was discovered during cervical radiographic and thermal imaging procedures. Similar upper cervical subluxations were found in patients with neurological conditions such as Parkinson's disease, Multiple Sclerosis, epilepsy, and fibromyalgia, who responded favorably after upper cervical chiropractic intervention.[10-15] This report's purpose is to document the symptoms in the nine-year-old patient before and after the intervention of upper cervical chiropractic care and to detail the upper cervical chiropractic procedure and technologies employed.

Figure 1: A patient being scanned with the Tytron C-3000 system

CASE REPORT

At this nine-year-old male's initial chiropractic evaluation, his medical history was recorded. His history was recalled by both parents and was confirmed by his medical records (obtained from his physicians who treated him since birth). His mother reported that his birth occurred six weeks prematurely, required forceps, and rendered her son "extremely bruised." When discussing the boy's medical history, his mother described her son as being "constantly sick since birth." He was hospitalized for 10 days after birth for respiratory distress and jaundice. At age 8 months, he began wheezing and was diagnosed with Reactive Airway Disease (RAD) and prescribed robitussin and ventolin. At age 1, he fell down the stairs. In addition, he was hospitalized at age 1 for Respiratory Syncytial Virus (RSV) pneumonia. His mother indicated that he suffered multiple infections during his first several years including chronic ear infections, frequent tonsillitis, and pneumonia every year for 5 years and concluded that perhaps he had a weak immune system. He was prescribed many doses of antibiotics (amoxicillin, pediazole). Each time he suffered an infection, wheezing returned, so frequently he was prescribed ventolin, proventil, and phenergan with codeine.

By age 2, he was diagnosed with asthma and prescribed albuterol. The asthma attacks occurred during infections, weather changes, humidity, and physical activity. Eventually, he was prescribed claritin to assist in his allergic/asthmatic symptoms.

At 6 years, he began suffering with migraine headaches approximately every two weeks. His mother said he awakened in the night screaming, complaining of headache and sensitivity to light. She routinely gave him Tylenol and rubbed his back until he resumed sleep.

By age 7, his parents noticed that their son was becoming increasingly emotional, that he cried more often than normal, and that little things seemed to bother him more. They also noticed that he developed facial and hand contortions before beginning handwriting and was unable to write properly. Eventually, tics occurred continuously on a daily basis from head to toe and involved his eyes, neck, voice, tongue, rolling of his toes and ankles, flinching of his side, and lifting of his arms overhead. His mother stated that the tics worsened during periods of stress or fatigue. In addition, he was overly aggressive, irritable, and prone to outbursts of five or ten minutes of mean, rude, belligerent, sassy and surly behavior. He also made many guttural clicking sounds but no inappropriate corpora alalia (swearing).

Because of his physician's concern over possible Tourette Syndrome and Attention Deficit Disorder, the boy was referred to a neurologist who evaluated him using an attention deficit profile worksheet. The positive findings were as follows: he had a short attention span; he was slightly impulsive; he was easily upset emotionally; he had a frenetic tempo; he bounced around; he fidgeted; he rarely sat still; he was easily distracted; he could not remember his original purpose for many activities; he was inconsistent in his school performance in that he performed well one week and missed the same material the following week; he was demanding; he had problems working toward goals; he interrupted group discussions; he lacked fine motor skills for writing; he exhibited significant anxiety including separation anxiety and some anxiety about school; and he had difficulty coping with transitions and could become irate. Consequently, he was diagnosed with Tourette Syndrome, Attention Deficit Hyperactivity Disorder (ADHD), finger agnosia (graphomotor problems with writing), and a mood disorder at age 7. His physician prescribed Klonopin to treat anxiety and recommended therapy for his writing problems.

After three weeks of Klonopin, the boy showed some improvement in his attention span and tics but began suffering from insomnia, fatigue, and increased irritability. He became belligerent and his hyperactivity worsened so his Klonopin prescription was discontinued and was replaced with Wellbutrin. The Wellbutrin helped the boy's moods but had no effect upon

the tics and worsened the insomnia. He would go to bed at 8 and rarely fall asleep before 10. Consequently, the Wellbutrin dosage was decreased, which helped the insomnia somewhat but aggravated his behavior.

By age 8, the boy's mood swings became severe, his self-esteem decreased, and his mother reported that he was being picked on by other kids in school. His physician prescribed Adderall in addition to Wellbutrin but his behavioral problems continued. His mother described behavioral flare-ups, which occurred approximately every three weeks and lasted 5 to 7 days, and involved aggressive behavior, with some manic-depressive swings, as well as overemotional, crying episodes. His obsessive-compulsive behaviors became dramatic, and he suffered recurrent fears and anxieties. Because of the aggressive behaviors, he was prescribed Depakote.

His mother also reported that her son complained to her of neck pain and headaches approximately three times per week since age 8.

While recording the patient's medical history, the author was able to note the boy's frequent tics involving his eyes, neck, face, and speech. Wheezing was apparent. In addition, the patient was fairly morose and lacked any observable personality. He only spoke when asked a question and looked quietly at the floor while his parents described his history. When ask where he felt the pain in his neck, he pointed to the left side of his neck under his skull and stated that he currently had a headache.

The chiropractic care described below is based upon the original work performed by Palmer from the 1930's through the 1950's in the Palmer Research Clinic.[8] The care was administered as taught by the International Upper Cervical Chiropractic Association (IUCCA) through their Applied Upper Cervical Biomechanics (AUCB) program (as was the care depicted in the asthma study in the introduction of this paper).[9]

Figure 2
Tytron C-3000 Thermographic Protocols

Environmental Controls —

- The temperature of your office should be held around 70 degrees Fahrenheit.
- No direct cooling or heating vent drafts should bear on the scanner.
- The scanner should not be placed in direct sunlight.
- Place the scanner holder away from the computer monitor and CPU.

Patient Preparation —

- 15 minutes of office acclimation time must occur before scanning the patient.
- The patient's spine must be disrobed or loosely gowned during acclimation.
- The patient must remain free from direct heating or cooling drafts.
- No direct sunlight should bear on the patient while in the office.
- No EMS, TENS, US, hot or cold packs, or acupuncture before scanning.
- The patient must be free from sunburn.

After the patient's medical history was recorded, a paraspinal thermal analysis was performed with the Tytron C-3000 (Titronics Research and Development, Figure 1) from the level of C7 to the occiput according to thermographic protocol.[16-18] (Figure 2) Paraspinal digital infrared imaging, which measures cutaneous infrared heat emission, is a form of thermography, a neurophysiological diagnostic imaging procedure. Thermography has been established in chiropractic as a practical and sensitive test for spinal nerve root irritation, articular facet syndromes, peripheral nerve injuries, sympathetic pain syndromes, and the vertebral subluxation complex.[19-21] Since the amount of blood passing through the skin is directly controlled by the sympathetic nervous system (through control of dilation or constriction of blood vessels), the temperature of any one area of the skin reflects the neurological control of that area. Normal or abnormal skin temperature then becomes an indicator of normal or abnormal neurological function. In blind studies comparing thermographic results to that of CAT scan, MRI, EMG, myelography, and surgery, thermography was shown to have a high degree of sensitivity (99.2%), specificity (up to 98%), predictive value, and reliability.[22-24] Thermography has been effective as a diagnostic tool for breast cancer, repetitive strain injuries, headaches, spinal problems, TMJ conditions, pain syndromes, arthritis, and vascular disorders, to name a few.[25-34] A limited number of articles have been published demonstrating the use of paraspinal thermal imaging as an integral part of upper cervical protocol, including reports of patients with Parkinson's Disease, Multiple Sclerosis, seizures, and fibromyalgia, to name a few.[6-7,10-15] Of the six conditions suffered by this subject, thermal imaging had been previously used with headaches and asthma.[6-7,27,33] This is the first case reporting use of paraspinal thermal imaging for a patient with TS, ADHD, depression, and insomnia.

Compared to established normal values for the cervical spine, the nine-year-old subject's paraspinal scans contained thermal asymmetries of 0.5ºC. (Figure 3) According to cervical thermographic guidelines, thermal asymmetries of 0.5ºC or higher indicate abnormal autonomic regulation or neuropathophysiology.[35-38]

In addition to revealing thermal asymmetries, the subject's scans displayed static thermal differences. (Figure 4) Thus, a thermal "pattern" was established. "Pattern analysis" of paraspinal temperatures, first developed by Palmer, has received increased attention in chiropractic research.[8,38-48] Pattern work, in conjunction with upper cervical chiropractic care, recently has been used with Parkinson's disease, Multiple Sclerosis, fibromyalgia, epilepsy, and asthma.[6-7,10-15]

Because upper cervical misalignments were suspected in this patient, a precision upper cervical radiographic series was performed.[51] The x-ray equipment included a laser-aligned frame (American X-ray Corporation) to eliminate image distortion. To maintain postural integrity, this subject was placed in a positioning chair using head clamps. In addition, the patient was aligned to the central ray using a laser (Titronics Research and Development) mounted on the x-ray tube. The four views (lateral, anterior-posterior, anterior-posterior open mouth, and base posterior) enabled examination of the upper cervical spine in three dimensions: sagittal, coronal, and transverse.

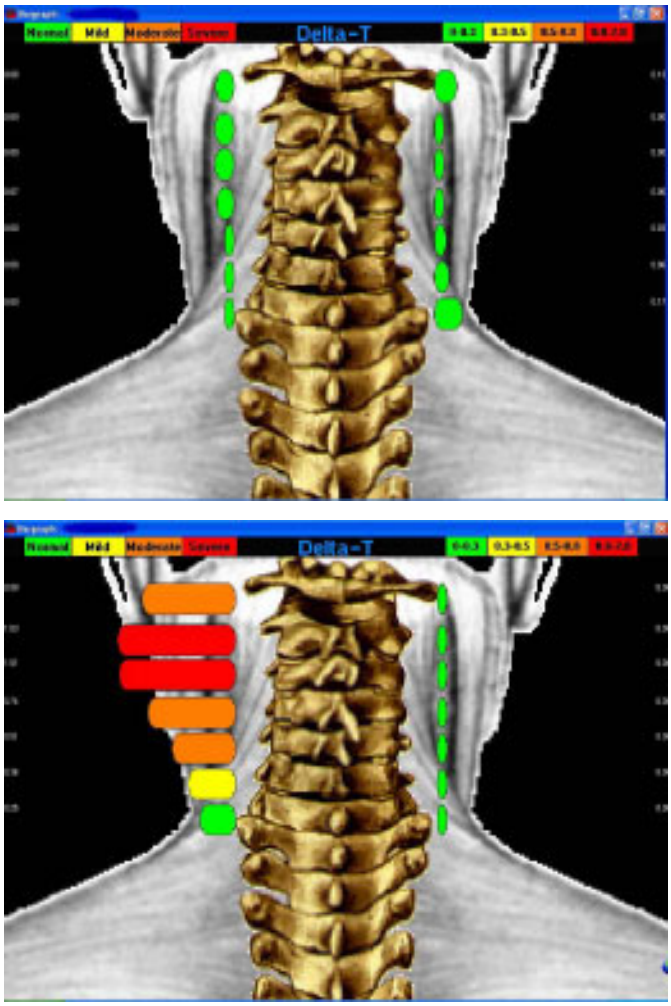


Figure 3: Example of cervical side to side thermal comparison. Normal scan (top), Thermal Asymmetries at multiple levels (bottom).

Analysis of the four views was directed towards the osseous structures (foramen magnum, occipital condyles, atlas, and axis) that are intimately associated with the neural axis. Laterality and rotation of atlas and axis were measured according to each vertebra's deviation from the neural axis.[51] (Figure 5) Left laterality of atlas was found. (Figure 6)

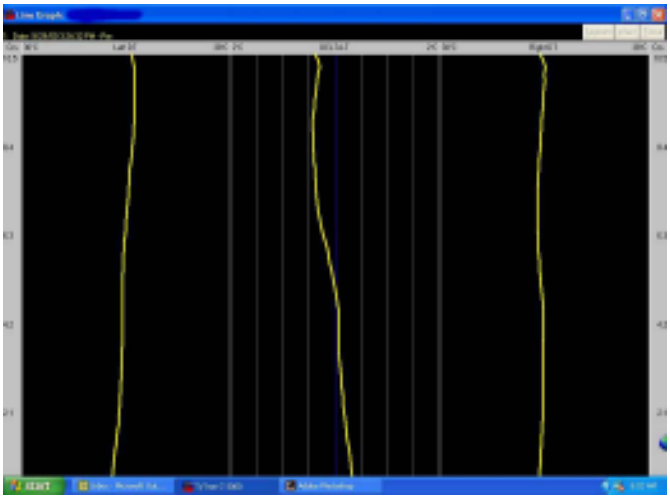
In accordance with AUCB upper cervical protocol, the two criteria used to determine subluxation in this case were thermal asymmetry (measured by paraspinal thermal imaging) and vertebral misalignment (measured by cervical radiographs). Because both criteria (0.5ºC thermal asymmetry and left laterality of atlas) were met, a treatment plan was discussed with the patient and his parents. In addition, it was recommended that the subject continue his medical treatment and medications unless otherwise advised by his physicians.

After the subject and his parents consented, chiropractic care began with an adjustment to correct the left laterality of atlas. To administer the adjustment, the patient was placed on a knee-chest table with his head turned to the left. (Figure 7) The knee-chest posture was chosen because of the accessibility of the anatomy to be corrected. Using the left posterior arch of atlas as the contact point, an adjusting force was introduced by hand.61 The adjustment's force (force = mass X acceleration) was generated using body drop (mass) and a toggle thrust (acceleration).

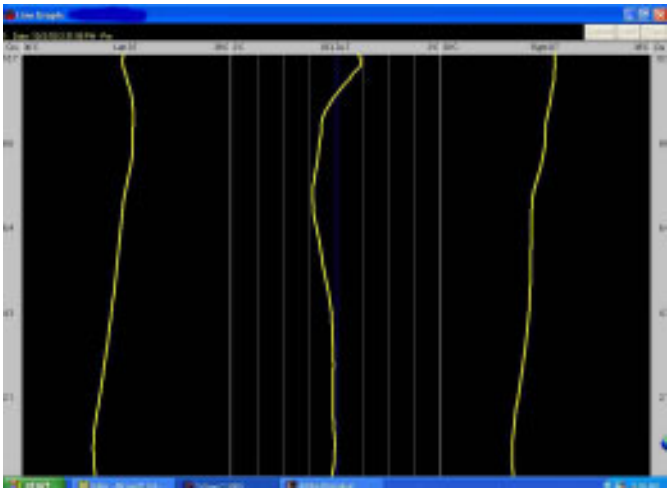
Then, the patient was placed in a post-adjustment recuperation suite for fifteen minutes as per thermographic protocol.[16-18] (Figure 2) After the recuperation period, a post-adjustment thermal scan was performed. The post-adjustment scan revealed a thermal difference of only 0.1 ºC, which was considered normal according to established cervical thermographic guidelines (compared to the pre-adjustment differential of 0.5 ºC). Therefore, resolution of the patient's presenting thermal asymmetry (elimination of the thermal "pattern") was achieved. (Figures 8 & 9, pages 7 & 8)

All subsequent office visits began with a thermal scan. An adjustment was administered only when the patient's presenting thermal asymmetry ("pattern") returned. If an adjustment was given, a second scan was performed after a fifteen-minute recuperation period to determine whether restoration of normal thermal symmetry had occurred. This subject's office visits occurred two times per week for the first two weeks of care, one time per week for the following two weeks, and one time per month thereafter. After the initial adjustment, only one other adjustment was administered to the patient during five months of upper cervical chiropractic care.

Figure 4: Establishment of static pattern.



Scan 1



Scan 2

Figure 5, Drawing Lines of Mensuration
(See Figure 6, page 6)

To determine laterality from the anterior-posterior open mouth film, a horizontal line was drawn across the upper one-third of the foramen magnum's arch from cortex to cortex. The foramen magnum line was bisected with a vertical median line from the film's top to bottom.

Using a compass's point on the vertical line, arcs were drawn through each lateral mass of atlas. Using the left lateral mass as the constant, if the right lateral mass stayed within the right arc, the atlas was listed as "left". If the right lateral mass extended beyond the right arc, the atlas was listed as "right".

Axis laterality was determined by locating the position of the odontoid and spinous processes according to the vertical median line. To determine atlas rotation from the base-posterior film, an atlas plane line was drawn through the transverse foramen of atlas. The next line was drawn horizontally across the cortical borders of the clivus (ossification center of the skull) from cortex to cortex. This skull line was bisected.

Atlas rotation was determined by using a protractor to measure the difference between the bisected skull line and the atlas plane line. An angle less than 90 degrees represented "anteriority". An angle more than 90 degrees represented "posteriority".

Outcome of Care

The following discussion describes the symptomatic changes observed by the boy's family members and the author and reported by the patient himself throughout the five months of upper cervical chiropractic care. Incidences of tics, asthma attacks, headache complaints, neck pain complaints, irritability, inattention, inability to sleep, etc. were observed by the author, the patient's parents and/or were reported by the patient and were recorded at each office visit.

Two days after the patient's first adjustment, the subject's mother reported observing a 50% reduction in tics. The boy had not complained of headaches, neck pain, or wheezing the past two days. During the office visit, the boy stated that his neck was feeling better. His mother reported that he easily had fallen asleep the past two nights and had slept through the night. His mother also commented that he displayed a happier, more excited mood overall. During that office visit, it was apparent to the author that the boy's tics occurred less frequently and the patient appeared more engaging and communicative than on his previous visit.

During the second week of care, his mother reported that the subject fell on his head while playing and experienced a slight reoccurrence in tics. Tics were observable by the author. A thermal scan was performed indicating a return in the patient's presenting thermal asymmetry ("pattern") so an adjustment was administered. The post-adjustment thermal scan indicated restoration of normal thermal symmetry.

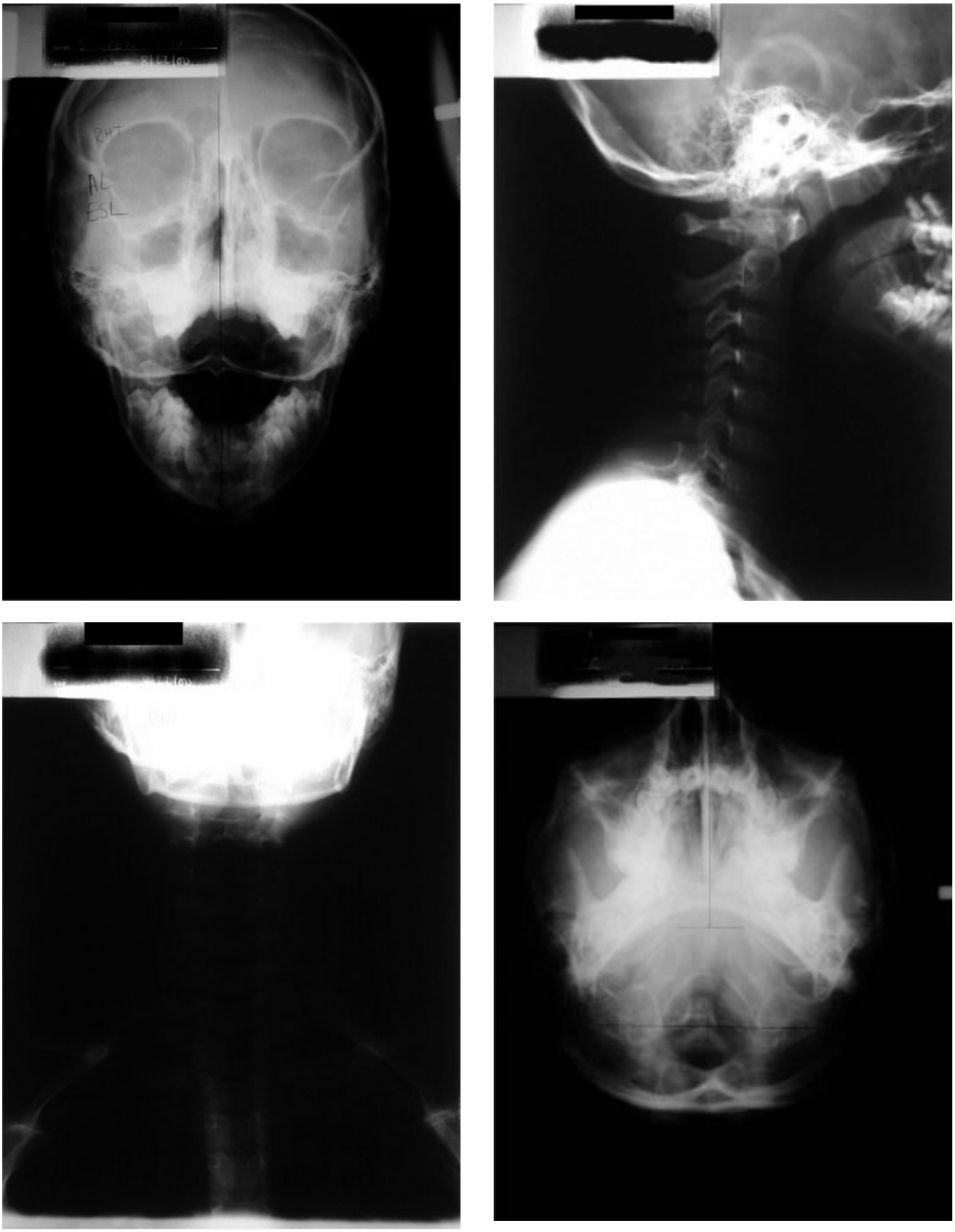
Two and one-half weeks after the first adjustment and a week after the second adjustment, the patient entered the treatment room with a big smile and a loud greeting of hello to the author. His mother stated that her son's personality and mood had improved substantially. She also reported observing an 80% reduction in tics. During the office visit, no tics were observed by the author. His mother also commented that even with weather changes during the past week, her son had not experienced any wheezing or asthma attacks. Likewise that lack of wheezing as compared to visible breathing difficulty at the boy's initial evaluation was apparent to the author. His mother reported that he had not needed his inhaler since upper cervical care began. Besides the absence of wheezing, the boy also had not complained of any headaches or neck pain and he confirmed that when asked. His mother said he continued to sleep well and seemed to have better energy and less fatigue. He was beginning to show greater emotion and affection with family members and had a much happier disposition overall. His improved temperament prompted his mother to consult with her son's physician in order to discontinue his Depakote and Adderall prescriptions.

Three weeks after the first adjustment, the boy's mother reported the absence of all motor tics except an occasional verbal tic while eating. No tics were observed by the author at that visit. Due to continued improvement in the boy's behavior, personality, and mood, his mother consulted with her son's physician and cut his Wellbutrin dosage in half. The boy's improved temperament continued to be observed by the author at this office visit in that the boy participated in conversation, showed happiness, and gave warm greetings. His mother reported that he continued to sleep well and was sleeping longer than he had in years. In addition, she commented that he would awaken easier and faster and she had little difficulty getting him out of bed in the morning. He confirmed that he still had no complaints of wheezing, headaches, or neck pain. No wheezing was observed by the author. All thermal scans performed during the third week of care showed normal thermal symmetry. Therefore, no adjustments were administered.

Six weeks after the first adjustment, the subject's mother reported complete absence of tics, asthma, insomnia, hyperactivity, headaches, depression, and neck pain. When questioned, the patient also did not recall experiencing any neck pain, headaches, or asthma attacks. No tics or wheezing were observed by the author during the office visit. There had been no use of inhalers for the entire six weeks. Changes in personality and behavior described by the subject's parents and grandparents included "he now shows a happy and excited mood; he has better eating habits; he shows more affection with family members; he shows greater emotion; and he exhibits better memory and more attention to school work and chores." All thermal scans performed during weeks four through six showed normal thermal symmetry. Therefore, no adjustments were performed.

Five months after the first adjustment, the patient remained asymptomatic (according to the family members' and patient's reports and the author's observations). No tics or wheezing were observed by the author. The patient had not reported any complaints of asthma, headaches, or neck pain since the first adjustment was performed. All family members remarked that he had become a completely different, happy, and healthy child. Since the third week of upper cervical care, all thermal scans showed normal thermal symmetry, so no adjustments were necessary during the past four and one-half months of care. Accordingly, since the patient's upper cervical subluxation had

Figure 6: Patient XRays with Lines of Mensuration



See Figure 5, page 5 for explaination of how lines of mensuration were drawn.

Figure 7: Example of patient positioning for knee-chest adjustment.

stabilized and the patient's symptoms had remained absent, upper cervical care was concluded.

One year after this patient's first upper cervical adjustment, he was re-examined using thermal imaging. Normal thermal symmetry was still present so an adjustment was unnecessary.

During the seven months since he had last been examined, no asthma attacks, headaches, neck pain, insomnia, behavioral trouble, or tics had occurred. He had not suffered any infections, nor had he used any medications other than his half-dose of Wellbutrin. His mother reported that her son's only "problem" was becoming accustomed to being a "normal" child who was required to complete chores, walk home from school by himself, complete school work during allotted time, etc.

During the upper cervical treatment period, no other intervention was reported that could have provided an alternative explanation for the dramatic improvement of the patient's conditions. Since this is the first case to be reported on this topic, it is necessary to confirm that this positive outcome could be replicated in additional patients. Therefore, it is recommended that a more extensive study with a large sample group and control subjects be performed.

DISCUSSION

Tourette Syndrome

Tourette Syndrome (TS) is a debilitating tic disorder characterized by frequent motor and phonic tics. Diagnostic criteria include onset before the age of 21; recurrent, involuntary, rapid, purposeless motor movements affecting multiple muscle groups; one or more vocal tics; variations in the intensity of the symptoms over weeks to months; and a duration of more than one year.[52]

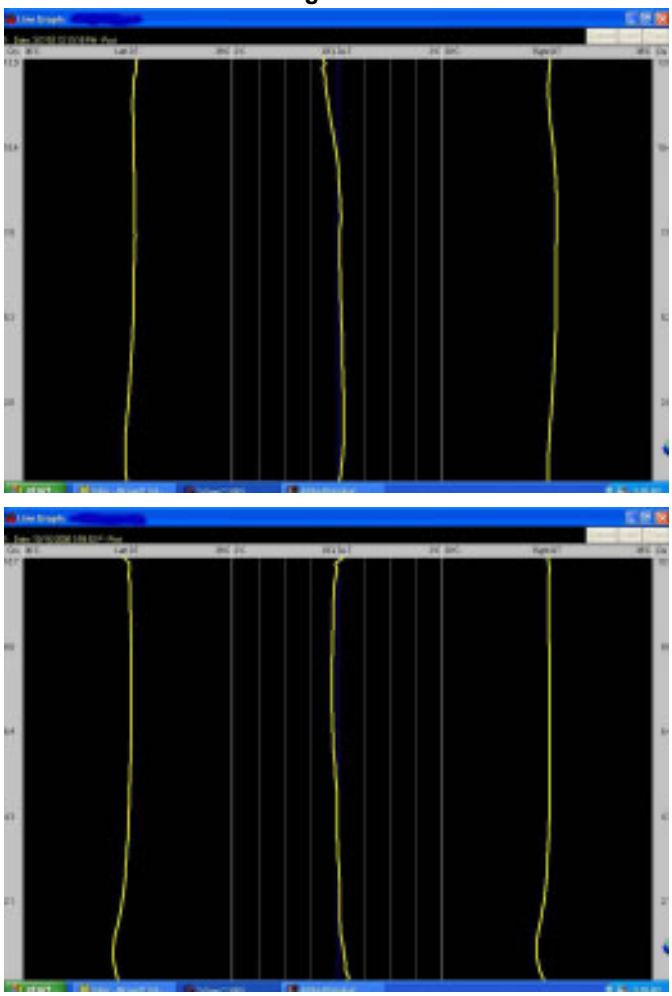
Tourette Syndrome sufferers commonly experience other behavioral and neurological complaints such as attention deficits, depression, self-injurious behaviors, obsessive-compulsive behaviors, and irritability.[52] In fact, 50% of all children with TS also have Attention Deficit Hyperactivity Disorder (ADHD) and/or Obsessive Compulsive Disorder (OCD).[52] These neurological symptoms are thought to be due to the same central nervous system malfunction that causes TS: neurochemical alterations in the brain.[52]

While researchers generally consider TS to be a genetic disorder (TS vulnerability is transmitted from one generation to the next), approximately 15% of TS patients do not show genetic susceptibility (no genetic links were found).[52] In addition, individual variations in character, course, and degree of severity of TS cannot be explained by genetic hypotheses alone.[52] Consequently, researchers have focused upon stressful events during perinatal or early life that may trigger the onset of TS. Traumatic head injury (in particular concussive injury to the head, neck, and upper back) has been implicated as a possible trigger not only of TS, but also for ADHD, depression, insomnia, and headaches.[53-90]

Attention Deficit Hyperactivity Disorder

Attention Deficit Hyperactivity Disorder (ADHD) is a behavioral disorder characterized by inattention, hyperactivity, and impulsivity. The ADHD diagnosis, based solely on an individual's behavioral history, is made when several of the following characteristics are detected: fidgeting with hands or feet or squirming in seat; difficulty remaining seated; running about or climbing excessively; difficulty engaging in activities quietly; acting as if driven by a motor; talking excessively; blurting out answers before questions have been completed; difficulty waiting in turn taking situations; interrupting or intruding upon others.[91] No definitive diagnostic test (lab test, blood test, physical exam) exists for ADHD. Attention Deficit Hyperactivity Disorder is thought to be caused by alterations in dopamine levels in the brain and frequently occurs following traumatic brain injury.[91,62-70] ADHD is typically treated with Ritalin,

Figure 8



These graphs demonstrate when the patient was not "in pattern" and no adjustment was given on those days.

or similar stimulant drugs, but Ritalin cannot be used with TS due to an increased risk of tics.[52]

Depression

Depression is thought to be caused by alterations in serotonin levels in the brain and also frequently occurs following head injury (concussive injury to the head, neck, or upper back).[71-77] Symptoms of depression include persistent sad or irritable mood; loss of interest in activities once enjoyed; significant change in appetite or body weight; difficulty sleeping or oversleeping; psychomotor agitation of retardation; loss of energy; feelings of worthlessness or inappropriate guilt; difficulty concentrating; and recurrent thoughts of death or suicide.[92] Depression is commonly treated with a combination of psychotherapy and medication to control alterations in brain chemistry.

Insomnia

Insomnia is the perception or complaint of inadequate or poor-quality sleep because of one of more of the following: difficulty falling asleep, waking up frequently during the night with difficulty returning to sleep, waking up too early in the morning, and/or unrefreshing sleep.[93] Insomnia is frequently associated with depression and has been linked to head trauma.[78-81] Common therapies for chronic insomnia include relaxation therapy (reducing anxiety and body tension); sleep restriction (restricting sleep time until a more normal night's sleep is achieved); and reconditioning (training a person's body to associate bed and bedtime with sleep).[93]

Headaches

Headache categories include migraine with aura, migraine without aura, tension, and chronic daily headaches.[94] While medical science has not determined the exact cause of headaches, recent research is pointing towards a likely trauma-induced origin for many types of headaches. Evidence supports that trauma (in particular mild concussive injury to the head, neck or upper back) increases the risk of headache onset.[82-90] In addition, researchers have labeled some headaches as being "cervicogenic" in origin (they are triggered by neck dysfunction).[95-105] Headaches are often treated with medication targeted to reduce the inflammation of nerves and blood vessels once the headaches have started.

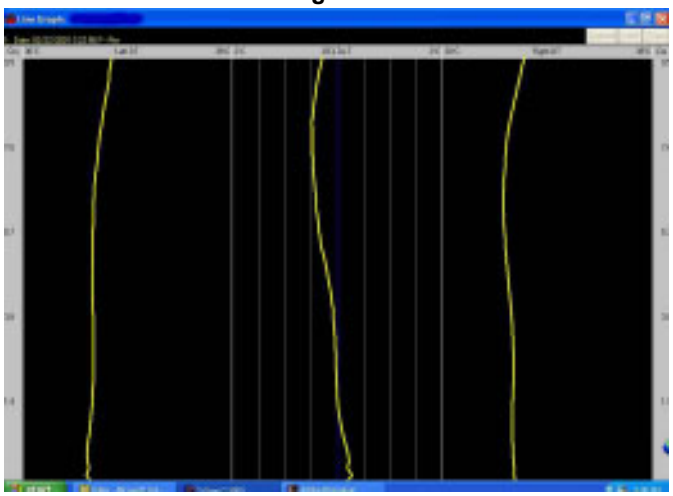
Asthma

Asthma is defined as a chronic inflammatory disorder of the airways causing recurrent episodes of wheezing, breathlessness, chest tightness, and coughing. The condition is characterized by airway obstruction, airway inflammation, and airway hyperresponsiveness to a variety of environmental stimuli. Studies into the pathophysiology of asthma have focused on immune, neurogenic, and vascular abnormalities.[106-109] Drug treatment targets the two main aspects of the disease: bronchospasm (fast-acting inhalers elicit bronchial smooth muscle relaxation) and inflammation (corticosteroids reduce airway inflammation).

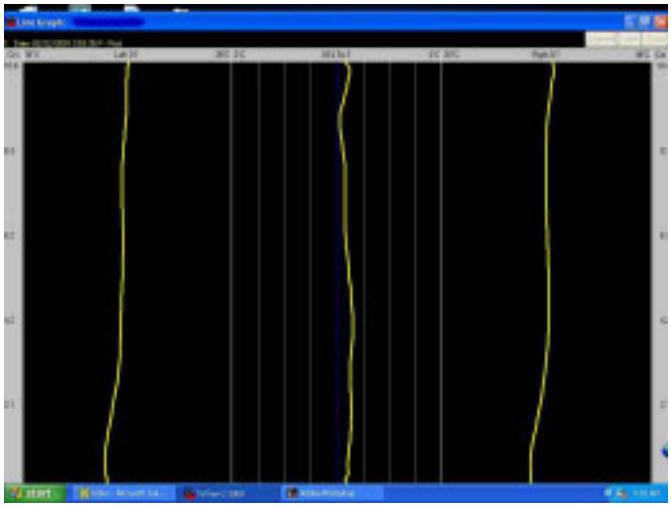
Trauma and Neurological Disease

Most of the conditions suffered by this patient were linked to traumatic head injury and/or whiplash in medical literature.[53-90] Not only did researchers name trauma (mild concussive injury to the head, neck, or upper back) as a risk factor for the onset of neurological conditions such as TS, ADHD, depression, insomnia, and headaches, but they also recognized that many of these conditions consequently arose from neurochemical alteration after the trauma.[52,91-94] However, researchers were unable to pinpoint the mechanism that caused trauma-induced brain malfunction. It is the author's hypothesis that the missing link is the trauma-induced injury to the upper cervical spine (upper cervical subluxation).

Figure 9



Example of pre-adjustment pattern.



Example of post adjustment scan with loss of pattern.

While the exact cause of this patient's upper cervical subluxation was impossible to determine, some speculation could be made from the boy's medical history. When questioned as to past traumatic events in their son's history, his parents recalled the forceps birth and the fall down the stairs, although other unreported traumatic incidences could have caused the cervical injury.[110]

Possible Mechanisms

Since neurochemical alteration (abnormal levels of dopamine, serotonin, etc.) has been identified as the pathological process involved in TS, ADHD, depression, and insomnia, it follows that normalization of chemical levels in the brain would eliminate these conditions and their symptoms. Since upper cervical care appeared to stimulate the boy's symptomatic improvements, then it would seem that upper cervical care gener-

ated improvement in the boy's neurochemistry. The exact mechanism for upper cervical chiropractic care's impact upon the patient's brain chemistry is unknown. Two possible theories, which have been proposed and published by upper cervical chiropractors to explain profound changes seen in their patients, are discussed below.[6-7,10-15]

The first mechanism, central nervous system facilitation, can occur from an increase in afferent signals to the spinal cord and/or brain coming from articular mechanoreceptors after a spinal injury.[111-115] The upper cervical spine is uniquely at risk for this problem because it possesses inherently poor biomechanical stability (lacks intervertebral discs and vertical zygapophyseal joints) along with the greatest concentration of spinal mechanoreceptors.

Hyperafferent activation (through central nervous system facilitation) of the sympathetic vasomotor center in the brainstem and/or the superior cervical ganglion may lead to the second mechanism, cerebral penumbra, or brain hibernation.[116-124] According to this theory, a neuron can exist in a state of hibernation when a certain threshold of ischemia is reached. This ischemia level (not severe enough to cause cell death) allows the cell to remain alive, but the cell ceases to perform its designated purpose. The brain cell may remain in a hibernation state indefinitely, with the potential to resume function if normal blood flow is restored. If the degree of ischemia increases, the number of functioning brain cells decreases and the disability worsens.

It is possible that this patient sustained an injury to his upper cervical spine (visualized on cervical radiographs) either during one of the traumatic incidences his parents recalled or some other episode. It is also possible that because of the injury, through the mechanisms described previously, sympathetic malfunction occurred (measured by paraspinal digital infrared imaging), potentially causing a decrease in cerebral blood flow. If blood supply to the patient's brain was compromised, it is possible that a certain percentage of brain cells were existing in a state of hibernation rather than cell death. Therefore, the combination of theories suggests that when blood supply was restored to the hibernating cells that produce dopamine and serotonin (from upper cervical chiropractic care), the cells resumed their chemical-producing function. Therefore, conditions such as TS, ADHD, depression, and insomnia (caused by abnormal levels of serotonin and dopamine) could have been reversed or at least improved when normal chemical levels were restored. A similar mechanism appeared to occur in patients with Parkinson's disease (caused by decreased dopamine levels) whose upper cervical subluxations were corrected with upper cervical chiropractic care.[11-12]

CONCLUSION

This case report details the medical history and symptoms of a nine-year-old patient suffering from Tourette Syndrome, Attention Deficit Hyperactivity Disorder, depression, asthma, insomnia, and headaches; the five-month intervention of upper cervical chiropractic care; and the patient's symptomatic response. At this patient's initial evaluation, evidence of an upper cervical subluxation was found using paraspinal digital infrared imaging and upper cervical radiographs. The upper cervical subluxation was corrected by performing a specific adjustment by hand to the first cervical vertebra according to radiographic findings. All six conditions were absent following six weeks of upper cervical chiropractic care and remained absent five months later at the conclusion of care. To confirm that this positive outcome could be replicated in additional patients, it is recommended that a more extensive study be performed. In addition, further investigation into upper cervical injury and resulting neuropathophysiology as a possible etiology or contributing factor to TS, ADHD, depression, asthma, insomnia, and headaches should be pursued.

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