CASE REPORT

The Positive Impact of Integrative Medicine in the Treatment of Recalcitrant Chronic Daily Headache: A Series of Case Reports

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ABSTRACT

People who suffer from recalcitrant chronic daily headache (CDH)—a primary, episodic headache occurring at least 15 days per month, and lasting four or more hours per day for at least three consecutive months[1]—have generally tried many pain relief medications with few positive results. These patients often continue to add more and more medications and travel from clinician to clinician seeking help, without relief. Patients with recalcitrant CDH are often caught in a vicious cycle of increasing pain which results in a substantial impact from their disease on productivity and quality of life. Studies in the United States and Europe indicate that four to five percent of the general population has recalcitrant CDH,[2] which encompasses transformed migraine and chronic tension-type headache.[3]

The disability associated with recalcitrant CDH is substantial, as patients have a significantly diminished quality of life and mental health, as well as impaired physical, social, and occupational functioning.[4,5]

Research shows that CDH may not be treated effectively with conventional medicine (CM). Integrative medicine (IM) offers a complex, personalized intervention necessary to treat CDH. Many integrative therapies have shown benefit, effectiveness, cost effectiveness and low side effect profile in patients with both chronic headache and chronic pain.[6-17] Yet even within the IM community, clinicians often struggle with the balance between providing evidence-based therapy and patient-centered, complex, personalized integrative approaches, which may use popular but unproven therapies.

In this article, we present a series of cases comprising patients with CDH who had previously been recalcitrant to CM approaches. In each case, employing a five-pronged treatment algorithm resulted in the successful IM treatment of CDH. By using this five-pronged approach, clinicians can offer the standardized protocols and scientific rationale they are accustomed to when employing CM options while additionally offering the benefit of IM possibilities.

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INTRODUCTION

Chronic daily headache (CDH) is a frustrating problem for physicians to manage and usually necessitates work to understand what is going on in the process and how best it can be alleviated. Conventional medicine (CM) approaches to the treatment of CDH often include pharmacological therapy, medication detoxification programs, psychological therapy including biofeedback, and educational and lifestyle medicine. Despite the use of conventional treatments, some patients continue to suffer from CDH. The four case studies in this article illustrate how the five-pronged approach targets different treatment algorithms. In one case study, patient IB experienced recalcitrant CDH for 8 months, preceded by frequent migraines for the prior 20 years. We describe how, by using this five-pronged approach, IB's recalcitrant CDH literally resolved overnight once the correct diagnosis was made and treatment outcomes were optimized.

Many types of therapy fall under the umbrella term *integrative medicine* (IM); however, the five-pronged, IM algorithm of care for management is a systems-biology approach that allows a good biomarker evaluation for each prong.[18] Viewing the patient as a complex organism allows clinicians to choose when and how to alter or treat different variables. While there may be some overlap, this system allows for adaptation of CM variables as well as the myriad of IM options that are available to patients.

The five-pronged approach used to treat the four patients in the following case studies includes

1. **Expanded CM options:** Patients are evaluated according to current CM best practices including examination of conventional targeted physiological pathways and medical treatments with determination of limitations. CM treatments may be used with the aim of minimizing side effects. Although not included in the cases discussed here, we also offer patients evaluation of genomic single nucleotide polymorphisms (SNPs) that may alter drug or nutritional supplement metabolism.
2. **Stress and neurotransmitter assessment and treatment:** The patient's adaptive stage of stress is evaluated. Diurnal salivary cortisol levels, salivary dehydroepiandrosterone (DHEA) levels, and

urinary neurotransmitter levels are evaluated. Treatment options include lifestyle and behavioral options; exercise programs including yoga, tai chi, and chi (qi) gong; supplements including stress adaptogens; and medications. Patients are divided into various stages of stress:

a. Exhilaration phase: Patient unlikely to seek treatment in this stage. Testing results are variable at this stage.
b. Wired and Tired phase: Cortisol generally drops in the morning ("tired") and increases at night ("wired"). Glutamate, epinephrine, and norepinephrine may be increased. Serotonin and/or gamma-aminobutyric acid (GABA) may be increased.
c. Exhausted phase: Cortisol levels are generally decreased throughout the day. DHEA levels are generally lower. Epinephrine, norepinephrine, serotonin, and/or GABA levels may be decreased.
d. Exhausted and Inflamed phase: Results are similar to the exhausted phase, but pro-inflammatory cytokines are increased, while anti-inflammatory cytokines are decreased. Insulin resistance increases.
e. Overwhelmed and Depleted phase: Cortisol diurnal rhythms are lost. Cortisol levels are low. Epinephrine, norepinephrine, serotonin, and GABA levels are generally low. Patients are usually clinically depressed. Autonomic testing reveals autonomic dysfunction including neurally mediated hypotension and reduced heart rate variability.

3. **Nutritional, metabolic, and immune status evaluation and treatment:** Patient diet diaries are reviewed. Assessment includes weight, body mass index (BMI), nutritional assessment including amino and fatty acid levels, vitamin and mineral levels, oxidative stress biomarkers (glutathione, Coenzyme Q 10; 8-hydroxydeoxyguanosine [8-OhDG]) levels and inflammatory markers (high-sensitivity C-reactive protein [hs-crp]; interleukin 6 [IL-6], tumor necrosis factor alpha [TNFα], etc).
4. **Hormonal evaluation and treatment:** Biomarkers include insulin resistance markers (fasting glucose, hemoglobin A1c [HbA1C], homeostatic model assessment [HOMA] score, leptin, ghrelin); DHEA levels, thyroid levels, salivary estrogen and progesterone levels to monitor cycle variability. Treatment includes lifestyle changes to reduce stress, optimize diet, targeted nutritional supplements, therapeutic exercise, and pharmaceutical hormone replacement as needed.
5. **Structural and bioenergic balance assessment and treatment:** Various healing systems such as chiropractic, osteopathy, acupuncture, bioenergy (healing touch, Reiki) and neuromuscular techniques (eg, Rolfing) are employed for both diagnosis and treatment.

CASE 1

Presenting Concerns

TA is a 55-year-old male computer salesman entrepreneur who presented with a complaint of CDH for 14 years. He described his headache pain as 4 to 10 on a pain scale where 10 is the most severe (Figure 1). He also complained of diffuse pain radiating from his jaw to the back of the right side of his head. He described the pain as constant and aggravated by eating, moving, and almost all activities of daily living. He stated that he is unable to function for 4 to 6 hours a day because of headache. He was using nonsteroidal anti-inflammatory drugs (NSAIDS) and analgesics on a daily basis.

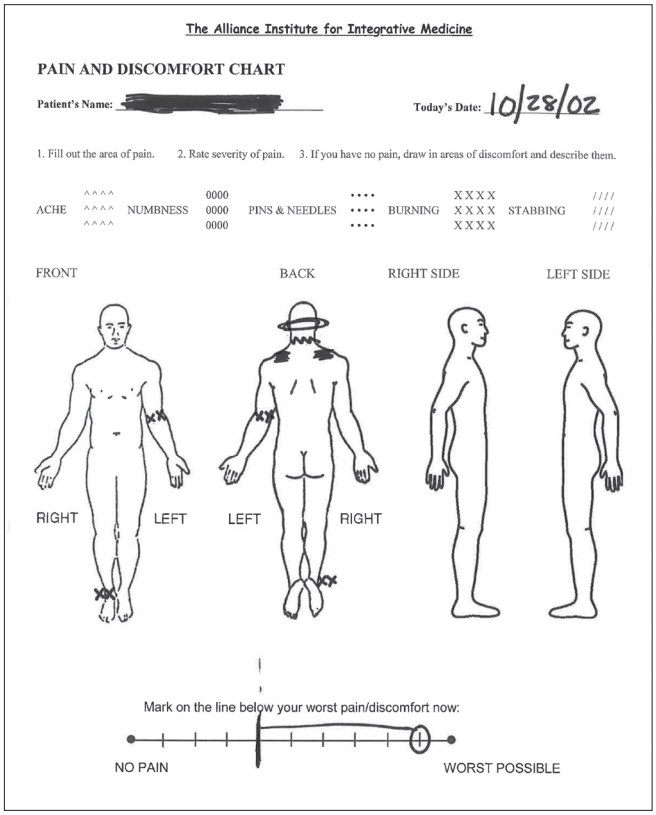


Figure 1 Pain chart on intake 2002.

Prior Medical History and Clinical Findings

TA reported that the pain began immediately after temporomandibular joint (TMJ) surgery; however, prior to the surgery, he was "hyper-stressed and suffered from tension headache." At the time of the TMJ surgery, he was told that his "trigeminal nerve was severely damaged" and that this affected a large portion of his face. TA had previously been seen by multiple physicians without any help. Treatment by chiropractors and physical therapists had yielded no positive results. TA has a history of significant cardiovascular disease, one heart attack and three angioplasties, L5/S1 discectomy, lateral epicondylar release, and arthroscopic shoulder surgery. He denied any depression but reported irritability and sleep problems. He described himself as "a Type A personality" who had failed in multiple business dealings.

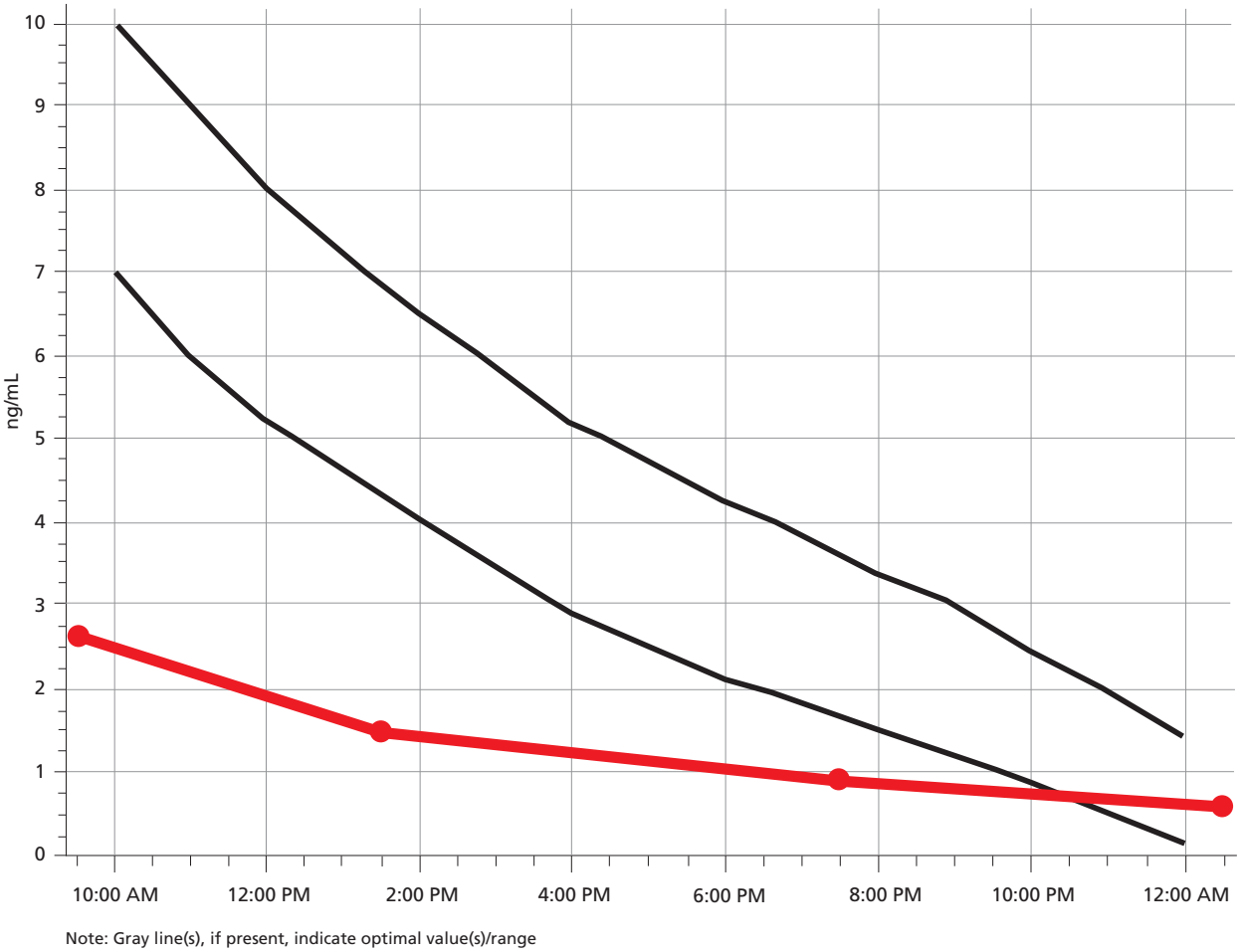
On presentation, he appeared extremely anxious with obsessive-compulsive tendencies. TA also had a history of medial epicondylitis, bicipital tendonitis, and rotator cuff syndrome of his shoulder.

TA's medication history includes atorvastatin calcium (Lipitor), aspirin/caffeine/orphenadrine (Norgesic Forte), flurbiprofen, hydrocodone bitartrate and acetaminophen (Vicodin) or oxycodone and acetaminophen (Percocet) as needed, aspirin, multiple nutritional supplements including vitamins B and C, multivitamins, and calcium. He also tried multiple medications that resulted in significant side effects or paradoxical effects. His regular diet consists of many high-fat, highly refined, "inflammatory" fast foods.

Physical examination was significant for multiple trigger points over the right side of his face. Tenderness was present over his TMJ although, he was able to open his mouth fully with no subluxation. Intraoral exam was normal except for some tenderness over pterygoid muscles on the right side. Structural examination noted constant, stooped position. Decreased range of motion of atlanto-axial joint and sacroiliac joint was noted, and he had multiple, tender trigger points over his right upper cervical area, occiput and shoulder, trapezius, and pectoral muscles. No trigeminal neuralgia was noted. Laboratory results included the following: HS C-reactive protein levels were marginally elevated at 5.2 mg/L, despite his being on a statin drug; vitamin D level was low at 17.8 ng/mL; and salivary cortisol levels were low throughout the day (Figure 2).

Diagnostic Focus and Assessments

1. CM diagnoses: Recalcitrant CDH precipitated by TMJ surgery; rebound headache; TMJ syndrome and dysfunction; cervicogenic headache; myofascial head, neck and shoulder pain; depression with anxiety; underlying obsessive compulsive disorder, somatization disorder and borderline personality disorder;
2. Stress and neurotransmitter evaluation: Salivary cortisol testing revealed the patient to be in the "Overwhelmed and Depleted" stage of stress. His cortisol levels were low, with flattening of his diurnal rhythm. Similarly salivary DHEA levels were low. Urinary glutamate, serotonin and GABA levels were low.
3. Nutritional, metabolic and immune status: Low Vitamin D level; low level inflammation (hs-crp 3-10); highly refined "inflammatory" diet; possible



Note: Gray line(s), if present, indicate optimal value(s)/range

Figure 2 Case 1: TA's salivary cortisol levels.

detoxification problems in phase I or phase II liver pathways resulting in medication side-effects; probably high level of oxidative stress.
4. Hormonal assessment: Thyroid, testosterone levels normal.
5. Structural issues and acupuncture: Chiropractic treatment focused on alanto-axial, cervical and lumbar dysfunction. Neuromuscular treatment aimed at re-educating patient on improving his head-forward, high-shoulder positioning, and ergonomic function. Acupuncture showed a predominance of symptoms along his Kidney/Heart/Small Intestine and Bladder meridian complex. His tendency to high "liver-fire" and "shen" (spirit) disturbance helped account for his symptoms.

Therapeutic Focus and Assessment

TA has a history of failed, multiple medications; distrust of physicians; a hyper-intense, difficult personality; borderline personality disorder; underlying depression; severe stress; and underlying cardiovascular problems. TA represents the so-called "difficult patient" often seen in both primary care and pain management offices, the "perfect storm" of somatization, myofascial pain, and true underlying pathology. By using an IM approach aimed at self-empowerment and lifestyle change, we developed a team of therapists around TA to aid him through his inevitable repeat bouts of pain and stress.

Treatment

Initial treatment: TA's rebound headache was treated with a course of abrupt analgesic medication withdrawal and high dose prednisone. For immediate relief during the first week he was treated with daily acupuncture as well as occipital neural blockade and trigger point injections around his head and neck if needed. He was also prescribed treatment with a series of antidepressants including: sertraline, followed by venlafaxine, herbal muscle relaxants, and education on the effects of stress. In addition, he utilized daily relaxation and stress management techniques and was taught to use his headache as a barometer for stress. Nutritional adaptogenic supplements targeting his low cortisol levels included Siberian ginseng and rhodiola. TA was educated on a Mediterranean diet with an emphasis on nutritionally dense foods, with vitamin D-3 supplementation. TA was also asked to continue weekly ACE Healing Treatments (a combination session of acupuncture, chiropractic, and energy healing) to address his TMJ, cervical dysfunction, and myofascial pain.

Subsequent visits: Once his pain was controlled, the frequency of treatments was reduced to monthly visits or symptomatic treatments as needed. He was taught to do stretching exercises for his neck and use self-massage and was encouraged to incorporate regular massage and/or chiropractic into his treatment protocol.

Follow-up and Outcomes

TA is maintained on a treatment plan with a combination of integrative medicine techniques such as chiropractic, massage and acupuncture, NSAIDs on a limited basis, and nutritional supplements for muscle spasm. He is generally headache-free (Figure 3). On occasion, he is treated with diazepam and even hydrocodone but will only take them for extremely short periods of time. Figures 1 and 3 show how at intake in 2002, TA reported 4-10/10 pain, with pain in multiple areas, whereas in 2013, he reported 0-4/10 pain, with just localized occipital pain.

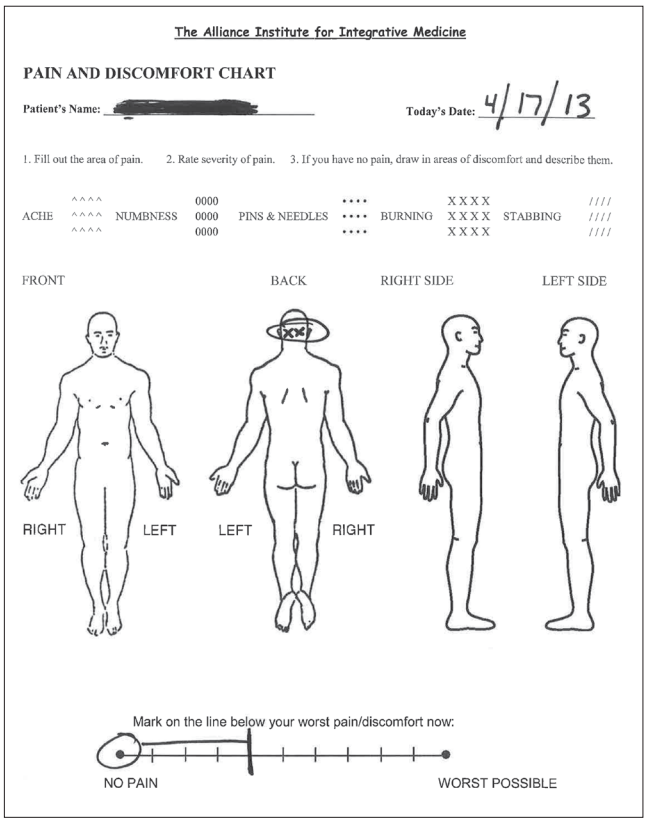


Figure 3 Pain chart at office visit 2013.

Timeline

Initial Treatment: TA was treated daily for the first week, weekly for the next several weeks.

Subsequent treatment: TA has been having regular treatments at our clinic for about 11 years.

CASE 2

Presenting Concerns

IB is a 36-year-old, female social worker, who presented with a complaint of CDH for 8 months, preceded by frequent migraine headaches for the prior 20 years. She described her headache as 7 to 9 on a pain scale where 10 is the most severe. She had seen multiple primary care physicians, neurologists, and alternative therapists without benefit. She tried triptan drugs, narcotics, and preventive headache medications without help. She also stated that she requires cold com-

presses and ice packs in order to sleep at night and that light aggravates her pain. She reports that her headache has been recalcitrant to all conventional medications including topiramate (Topamax), sertraline (Zoloft), duloxetine (Cymbalta), oral contraceptives, and other drugs. In addition, she tried acupuncture, chiropractic, and massage without help.

Prior Medical History and Clinical Findings

Prior to developing CDH, IB suffered from frequent migraines for the prior 20 years. The migraines typically originated at the back of her head, and radiated to her right eye. She also suffered from irritable bowel syndrome (IBS) that began at approximately the same time as her migraines. Gynecologic history included premenstrual syndrome (PMS), painful ovulation, and severe cramping during her periods. She also has a history of light-headedness with hypotension as well as allergic rhinitis. Her surgical history includes: TMJ surgeries for dislocated jaw, 1991 and 1995; shoulder surgery for dislocated shoulder; and C-section. Psychologically, she reports many traumatic events with death of family members and friends. She had previously been treated for depression, but denied any issues at the time of her visit. She learned meditation and relaxation techniques but these did not help her headaches.

IB's medication at the time of her initial consult included: cetirizne (Zyrtec) for allergies, mefenamic acid (Ponstel), venlafaxine (Effexor), calcium, probiotics, vitamins B and E, and multivitamins. She stated that she has allergies to codeine, sulfa, penicillin, and topiramate (Topamax).

IB's physical examination was significant for some mild tenderness of her cervical paraspinal muscles. The remainder of the physical exam was unremarkable.

Initial Diagnostic Focus and Assessments

1. CM diagnoses: recalcitrant CDH, transformed migraine headache, IBS, and premenstrual syndrome (PMS).
2. Stress and neurotransmitter evaluation: IB has a history of both depression and multiple previous life stressors. However, at the time of her visit, IB was not suffering from depression. She did not complain of stress.
3. Nutritional, metabolic and immune issues: initial workup incomplete. Further workup was done at a later date and is described below.
4. Hormonal balance: IB's history of PMS and painful periods pointed to an estrogen/progesterone imbalance. Initial workup incomplete. Further workup was done at a later date and is described below.
5. Structural and bioenergetic balance: chiropractic evaluation revealed some minor issues at C1/2. Neuromuscular evaluation was significant for some myofascial trigger points in the cervical paraspinal muscles. Bioenergetic exam significant for "spleen deficiency with liver yang excess."

Therapeutic Focus and Assessment

Initial treatment: IB was treated with a trial of acupuncture, trigger point injections, occipital nerve blocks, chiropractic, massage, energy healing, and mind-body approaches. Frustratingly, no positive results were noted.

Subsequent workup and treatment: In terms of our five-pronged algorithm, we decided to proceed with a nutritional, metabolic, and immune workup. Inflammatory markers were normal. Previous antinuclear antibody (ANA) test was negative. Subsequent functional and nutritional lab testing revealed significant deficiency of both essential and non-essential amino acids (Figure 4). (This was perplexing in that IB ate a nutritious diet that included eggs, chicken, and meat.) Functional lab stool testing revealed a significant dysbiosis (Figure 5). Salivary progesterone levels in the luteal phase of her cycle were low.

Subsequent assessment:

1. Metabolic status:
   a. Amino acid deficiency, possible amino acid malabsorption syndrome (as she was eating sufficient protein).
   b. Dysbiosis contributing to her IBS.
2. Hormonal imbalance: low progesterone contributing to her premenstrual syndrome.

Subsequent Treatment

IB was immediately treated with a customized blend of amino acids. She responded dramatically, and the following day—after 8 months of chronic daily headache and 20 years of frequent migraines—her headaches disappeared. The question remained, why did she need amino acids if her diet contained a good amount of protein?

Follow-up and Outcomes

On subsequent follow up, IB admitted that she suffered from (hitherto unreported) bulimia 20 years earlier. It was at this point that she had developed IBS and migraine. The bulimia from prior years disrupted her digestive process, possibly relating to her digestive enzymes, and presumably caused her to have a chronic subclinical protein malabsorption. Because zinc is necessary for duodenal microvilli regeneration, it was decided to supplement her regimen with oral zinc tablets. She continued on the amino acid blend, digestive enzymes, and zinc. During this time, IB remained fairly free of headache, but became more acutely aware of her IBS. We addressed her gut dysbiosis using the "4R Program"[19] (remove, replace, repair, reinoculate), a standardized program to restore gut health. IB was treated with a combination of an elimination diet, digestive enzymes, prebiotics (plantain, arabinogalactans, and L-glutamine) and probiotics. Ultimately, the amino acids were stopped. Her PMS was initially treated with Chaste tree berry during the luteal phase of her cycle because of its progestagenic effect. This was discontinued as she felt

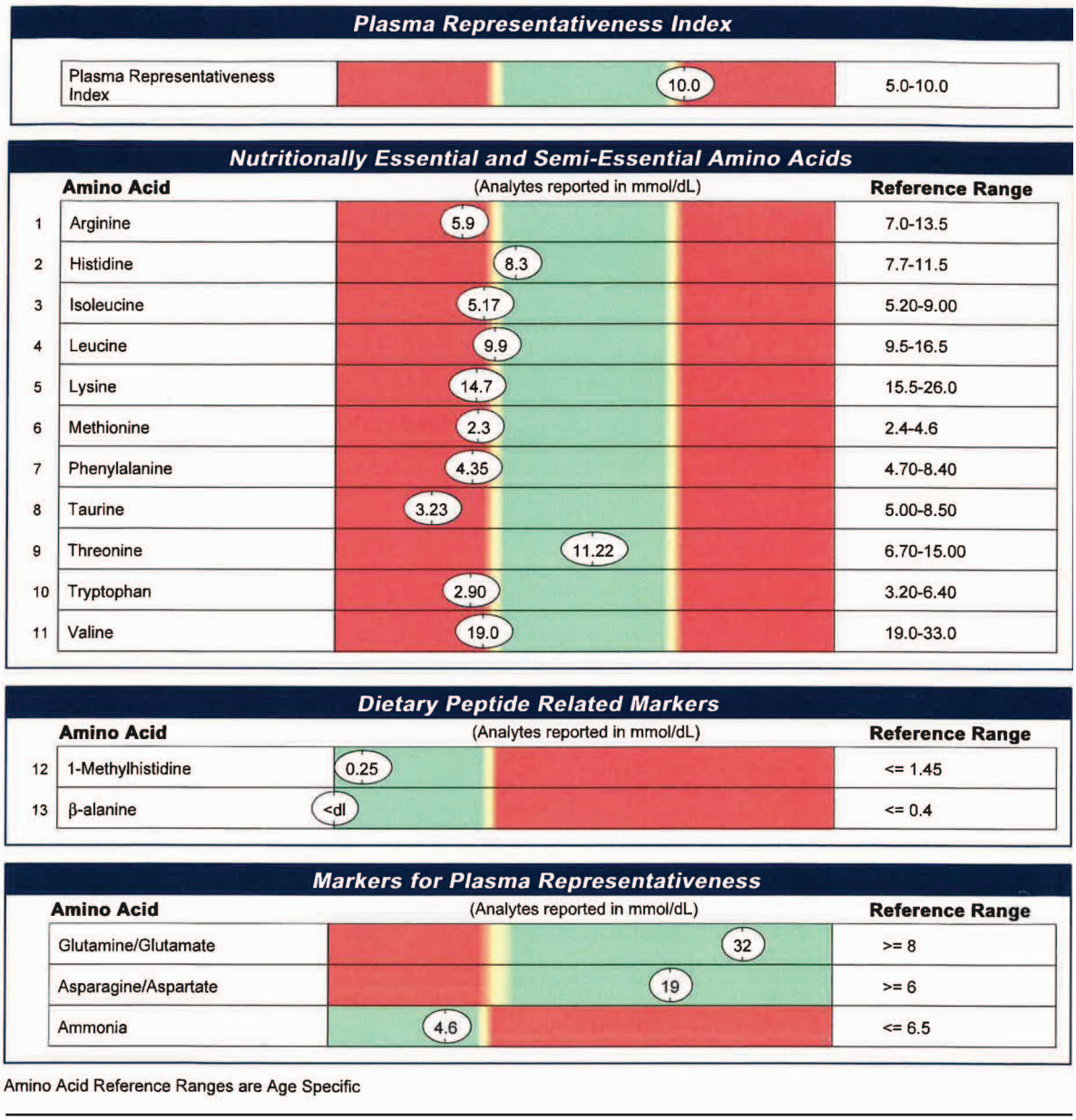


Figure 4 Amino acid screen.

better. IB was then treated only with acupuncture.

IB now remains headache free and she comes in quarterly for maintenance acupuncture to address minor symptoms of neck tension, as well as to prevent IBS and PMS flare-ups.

Timeline

IB has been seen at our clinic for more than 10 years. Her headaches were controlled after an initial treatment period of approximately 6 months. Her IBS symptoms were controlled over the following 6 months. She now comes in for "maintenance treatment" approximately quarterly.

CASE 3

Presenting Concerns

AN, a 24-year-old, female school teacher, presented with a complaint of diffuse CDH and a pain score of 3 to 10 on a pain scale where 10 is the most severe. No associated nausea, throbbing, or visual disturbances were reported. AN reported that when helping her husband to build a deck on their home, she stood up and bumped her head. She complained of daily headaches ever since that mishap. The headaches were constant and interfered with all aspects of her daily living. AN was previously seen by her primary care physician, as well as two neurologists, one of whom diagnosed her with "post-concussive headache." A previous computed tomography (CT) scan and a magnetic resonance imaging (MRI)/magnetic resonance angiogram (MRA) of her head were negative. All laboratory tests were normal. She stated that she previously had physical therapy, which did not help.

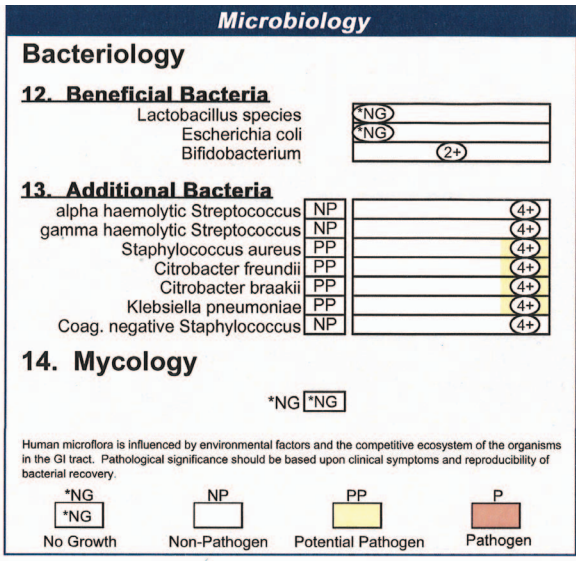


Figure 5 Bacteriology screen.

Prior Medical History and Clinical Findings

AN has a history of alopecia areata, TMJ syndrome, and anorexia. She denied depression but described herself as anxious. Menstrual periods were light but regular.

With regard to prior medications, narcotic and anti-inflammatory medications were only marginally helpful. Multiple anxiolytic and antidepressant medications had not proved to be of any clinical benefit. Physical examination was unremarkable.

Initial Diagnostic Focus and Assessments

1. CM diagnosis: recalcitrant CDH, post-concussive headache recalcitrant to treatment including alternative therapies, history of anorexia nervosa, anxiety.
2. Stress and neurotransmitter assessment: denied depression. No acute stress.
3. Nutritional, metabolic and immune assessment: incomplete.
4. Hormonal balance: no clinical indication; therefore, no testing done.
5. Structural and bioenergetic assessment: Chiropractic examination: unremarkable. Neuromuscular assessment: unremarkable. Bioenergetic/acupuncture assessment: low kidney chi.

Subsequent Therapeutic Focus and Assessment

The challenge to treating AN was that she failed conventional medical treatment and did not want acupuncture. A trial of occipital nerve block with trigger point injections and myoneural blockade failed to yield any benefits. Similarly, craniosacral therapy, energy healing, massage, and chiropractic treatments were of no help. Because of her history of anorexia, it was presumed that she might have a nutritional deficiency; therefore, functional nutritional lab testing, including amino acid analysis (first morning void; Figure 6) and essential and metabolic fatty acids markers (red blood cells), was completed. The results of the testing revealed an extremely low omega-3 index, indicating a lack of anti-inflammatory omega-3 fatty acids (Figure 7). Similarly, her anti-inflammatory omega-9 fatty acids were low. Her pro-inflammatory omega-6 fatty acids and her trans-fatty acids were high, consistent with a highly refined, low-fat diet. She was treated with a high dose of high-quality fish oil.

Follow-up and Outcomes

With the fish oil treatment, AN's headaches resolved completely within a few weeks.

Timeline

The patient was seen over a period of 4 months.

CASE 4

Presenting Concerns

LG is a 12-year-old, female student who presented with a complaint of CDH for 3 years. She described the headaches as poorly localized and diffuse, sometimes throbbing and sometimes dull. LG reported that she had been unable to attend school or concentrate since her headaches began. LG had an extensive workup at the local children's hospital headache center where she was also seen by a psychiatrist for 3 years of intense psychotherapy. Previously, she had been treated as both an inpatient as well as an outpatient at the local children's hospital headache center. She had no relief from her headaches.

Prior Medical History and Clinical Findings

The most significant thing in her history is that her estranged stepfather (her parents divorced many years ago) died in the one of the terrorist attacks of September 11, 2001. Her mother has since remarried. LG tells us that she barely knew her stepfather. Despite intensive antidepressant medication and psychotherapy, her headaches had not changed. Physical examination was unremarkable.

Timeline

LG was seen over a period of 2 months.

Diagnostic Focus and Assessments

1. CM diagnosis: recalcitrant CDH.
2. Stress and neurotransmitter assessment: Clearly, her stress had started after the loss of her estranged father in the 9/11 tragedy; however, conventional approaches failed to affect her presumed unresolved emotional conflict.
3. Nutritional, metabolic, and immune assessment: incomplete.
4. Hormonal Imbalance: Not necessary.
5. Structural and bioenergetic assessment: Chiropractic examination was unremarkable. Neuromuscular assessment: revealed myofascial

Figure 6 Amino acid analysis.

trigger points in both the anterior and posterior cervical musculature. Bioenergetic/acupuncture assessment: blocked "Windows of the Sky" acupuncture points resulting in chronic headache. Shen (spirit) imbalance.

Therapeutic Focus and Assessment

An initial trial of acupuncture, massage, craniosacral-therapy, and energy healing failed to show any positive benefits. The challenge to treating LG was that clearly there was unresolved emotional conflict that was not touched by conventional approaches. Ultimately, discussions with her mother and her grandparents occurred and the decision was made to get her a puppy. As soon as she bonded with her new puppy, her headache disappeared.

DISCUSSION

Since chronic pain of any form, including headache, amounts to a patient's report of a perceived noxious stimulus, clinicians are limited to patient-reported outcomes.

A systems-biology approach may allow clinicians an alternative, yet scientific way to both assess and treat a patient. Rather than simply viewing the patient as a uniform structure in which only one variable (eg, pharmacological intervention) is being altered, clinicians using a systems-based approach are able to view the patient as a complex organism, where a multi-system disruption manifests as a single symptom: CDH. Viewing the patient in this manner allows the clinician to choose when and how to alter or treat different variables. IM approaches offer such a systems-biology approach. In order to be successful, though, one must first understand the underlying pathophysiological mechanisms; where and how pharmacotherapies target various pathways; and where and how integrative therapies can target similar pathways.

The five-pronged IM algorithm of care for the management of CDH includes a five-pronged approach we refer to as the five rings of diagnosis and the five stars of treatment.[19] This systems-biology approach has shown positive outcomes for both chronic pain and CDH in a successful IM clinic for 15 years. It allows clinicians to divide therapies into different categories which are measured utilizing biomarkers where possible, and then treated with various therapies. While the five areas overlap to some degree, compartmentalizing them in this

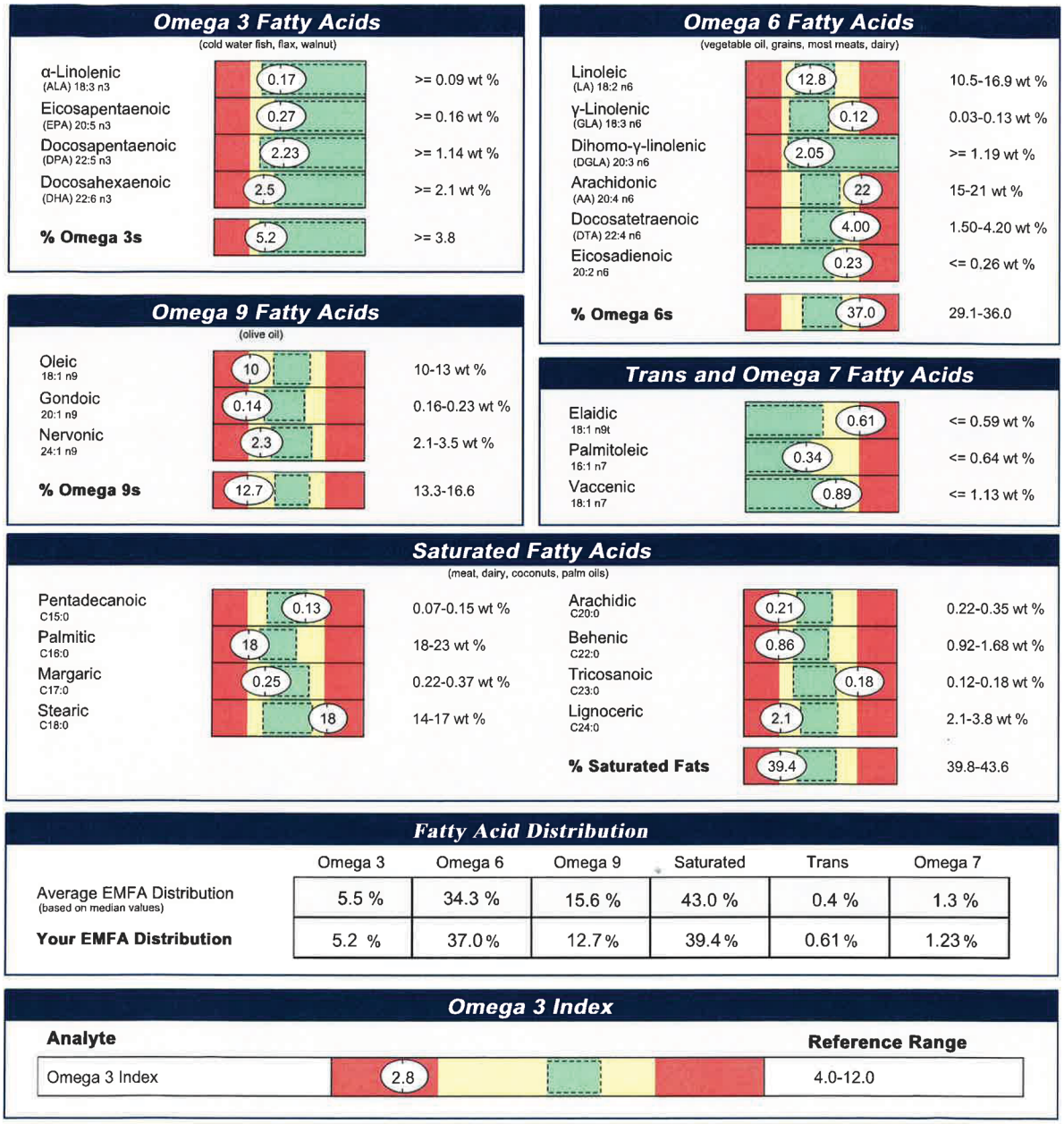


Figure 7 Essential and metabolic fatty acids markers.

manner helps by allowing a good biomarker evaluation for each prong, and complementary treatment approaches from the arena of IM.

The five-pronged approach to treatment was used in all four case studies (Table).

1. CM assessment and treatment.
2. Stress and neurotransmitter assessment and treatment.
3. Nutritional, metabolic, and immune status assessment and treatment.
4. Hormonal balance assessment and treatment.
5. Structural and bioenergic balance assessment and treatment.

In Case 1, we used all five prongs of the algorithm to bring balance to TA. TA embodies the constellation of factors of the "difficult patient" so often encountered in primary care, IM, and pain management offices. By creating a team of therapists who could help him cope with both pain and stress, empowering him to control various aspects of his health, we were, through the

Table Value of 5-pronged Algorithm in Resolving Chronic Daily Headache

	Case 1 (TA)	Case 2 (IB)	Case 3 (AN)	Case 4 (LG)
Conventional medicine approach	+	+	—	—
Stress/Neurotransmitter	++	—	—	++
Nutritional/Metabolic	+	++	++	—
Hormonal Balance	+	+	—	—
Structural/Bioenergetic	++	—	—	—

— = no benefit
+ = some benefit
++ = highly useful

combination of CM and IM, able to offer him the control and self-understanding he needed to manage his own well-being. The treatment in Case 1 represents what many would consider typical IM modalities using a team-based approach.

In Case 2, IB's CDH proved to be recalcitrant to both CM approaches as well as the typical IM approaches we used in Case 1. It was only after we employed functional lab testing to uncover first her amino acid deficiency and then her gut dysbiosis that we were able to get to the root of IB's issues. Case 2 shows us how we can provide a complex, personalized intervention and combine it with a standardized therapeutic protocol.

Case 3 reminds us once again of the importance of both the individualization of diagnosis and the personalization of treatment. One might consider that Case 2 and Case 3 were similar in that both patients were female, had eating disorders, and suffered from CDH recalcitrant to both CM and IM interventions. However, functional lab testing revealed differing root causes in each instance. Thus, the CDH resolved in Case 2 with amino acid supplements and in Case 3 with fish oil supplements.

In Case 4, we are prompted to think outside the box (once again). Although we identified the emotional conflict that LG was experiencing and ruled out any physical issues, it was simply a matter of giving her something to become attached to and love. Fulfilling this primal need proved superior to the best therapy we had to offer.

In this series of cases, we attempted to show an approach that is inclusive of the best of both CM and IM and with excellent long-term outcomes. Improved outcomes with IM can be measured not only by specific results such as reduced headache intensity and frequency, but also by improved quality of life. Other incidental benefits include the concomitant resolution of a myriad of non-specific symptoms such as fatigue, poor sleep quality, and other poor quality of life symptoms as a "side effect."

One might argue that in general, CM approaches to treating CDH have higher specificity, but also the potential for more significant side effects. CM treatment tends to be more costly, with low generalized benefit. IM approaches generally have low to moderate specific effects with greater generalized effects and are less costly. Theoretically, IM contains the best of both CM and CAM approaches. We believe that an ideal approach offers an optimal combination of a rigorous CM approach together with benefits offered by other IM modalities. This approach must be patient-centered, highly effective, and personalized. At the same time, the approach should empower the patient to alter lifestyle, stress, and structural and nutritional root causes that ultimately will impact his or her illness. The five-pronged approach we suggest here allows the clinician to achieve all of the above. Additional case series and clinical trials are warranted to further evaluate this approach.

REFERENCES

1. Bigal ME, Lipton RB. The differential diagnosis of chronic daily headaches: an algorithm-based approach. J Headache Pain. 2007;8(5):263-72.
2. Silberstein SD. Chronic daily headache: classification, epidemiology, and risk actors. Johns Hopkins Advanced Studies in Medicine Proceedings. 2006;6(9C):885-90.
3. Pascual J, Colas R, Castillo J. Epidemiology of chronic daily headache. Curr Pain Headache Rep. 2001;5(6):529-536.
4. Silberstein SD. Chronic daily headache. J Am Osteopath Assoc. 2005;105(4):235-295.
5. Lantéri-Minet M, Duru G, Mudge M, Cottrell S. Quality of life impairment, disability and economic burden associated with chronic daily headache, focusing on chronic migraine with or without medication overuse: a systematic review. Cephalalgia. 2011 May;31(7):837-50.
6. Vickers AJ, Cronin AM, Maschino AC, et al. Acupuncture for chronic pain: individual patient data meta-analysis. Arch Intern Med. 2012 Oct 22;172(19):1444-53.
7. Tepper S, Bigal M, Rapoport A, Sheftell F. Alternative therapies: evidence-based evaluation in migraine. Headache care. 2006;3(2-1):57–64.
8. Söderberg EI, Carlsson JY, Stener-Victorin E, Dahlöf C. Subjective well-being in patients with chronic tension-type headache: effect of acupuncture, physical training, and relaxation training. Clin J Pain. 2011;27 (5):448-56.
9. Vickers AJ, Rees RW, Zollman CE, et al. Acupuncture for chronic headache in primary care: large, pragmatic, randomised trial. BMJ. 2004; 328:744-747.
10. Witt CM, Reinhold T, Jena S, Brinkhaus B, Willich SN. Cost-effectiveness of acupuncture in patients with headache. Cephalalgia. 2008 Apr;28(4):334-45.
11. Yang C-P, Chang M-H Liu, P-E, et al. Acupuncture versus topiramate in chronic migraine prophylaxis: a randomized clinical trial. Cephalalgia. 2011;31(15):1510-21.
12. Kristoffersen ES, Grande RB Aaseth K, Lundqvist C, Russell MB. Management of primary chronic headache in the general population: the Akershus study of chronic headache. J Headache Pain. 2012;13(2):113–20
13. Voigt K, Liebnitzky J, Burmeister U, et al. Efficacy of osteopathic manipulative treatment of female patients with migraine: results of a randomized controlled trial. J Altern Complement Med. 2011 Mar;17(3):225-30.
14. Anderson R, Seniscal C. A comparison of selected osteopathic treatment and relaxation for tension-type headaches. Headache. 2006 Sep;46(8):1273-80.
15. Hoyt WH, Shaffer F, Bard DA, et al. Osteopathic manipulation in the treatment of muscle-contraction headache. J Am Osteopath Assoc. 1979 Jan;78(5):322-5.
16. Schabert E, Crow WT. Impact of osteopathic manipulative treatment on cost of care for patients with migraine headache: a retrospective review of patient records. J Am Osteopath Assoc. 2009 Aug;109(8):403-7.
17. Abrams DI, Dolor R, Roberts R, et al. The BraveNet prospective observational study on integrative medicine treatment approaches for pain. BMC Complement Altern Med. 2013;13:146. http://www.biomedcentral.com/1472-6882/13/146. Accessed June 4, 2014.
18. Amoils S, Amoils S. Get well & stay well—optimal health through transformational medicine. Cincinnati, OH: Integrative Medicine Foundation; 2012.
19. Jones D, editor. Textbook of functional medicine. Federal Way, WA: Institute for Functional Medicine; 2010:462-8.