



RETROSPECTIVE SURVEY

# The use of CranioSacral therapy for Autism Spectrum Disorders: Benefits from the viewpoints of parents, clients, and therapists



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## KEYWORDS

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Autism Spectrum Disorders (ASD);  
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Experiential treatment

**Abstract** *Objectives:* The objectives of this preliminary study were to explore: the use of CranioSacral Therapy for persons with Autism Spectrum Disorder, the demographics of participants, and the retrospective interpretation of reported changes related to the intervention. Participants included therapists, parents, and clients.

*Methods:* Recruitment of participants was conducted through electronic social and professional networks. Online questionnaire surveys were provided. Demographic questions were posed to understand both the extent of clinical use and the rationales for such treatment, and surveys were unique to each subject groups. All participants were given a 20-item functional behavior checklist as a means to measure their perception of change attributed to this intervention. Open-ended comments were also encouraged to explore perspectives from their experiential treatments. The Qualitative data collected was analyzed via Inductive Content Analysis. The data was stored on excel and analyzed manually and independently by all 3 authors.

*Results:* A total of 405 people responded to the recruitments and of the participants who completed surveys, 264 were therapists and 124 parents. Only a small sampling of clients responded. The demographics of professionals using CST for ASD, their level of CST training, and their qualifications to work with ASD were reflected. Demographics and referral sources of parents, and other details of their experiences, were surveyed. Perceived changes to the use of

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CST were explored through analysis of responses to both the Likert scale as well as the open comments.

*Conclusions:* This preliminary study introduces the concept of CranioSacral Therapy as a treatment option for symptoms associated with ASD. Its clinical use has been available for three decades but few empirical studies exist. The results of the survey suggest that CST is already being professionally recommended as a treatment. This study found that there were positive responses observed by all 3 targeted groups leading to the authors concluding that there is worthy cause to further investigate how CST benefits Autism Spectrum Disorders (ASD).

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## Introduction

There is a wide array of treatments with differing professional viewpoints available for Autism Spectrum Disorders (ASD) (Murphy and Pichichero, 2002; Prizant et al., 2003; NIH, 2015; CDC.gov, 2016). Craniosacral Therapy (CST) is one treatment option for the symptoms of ASD first introduced by Upledger in the 1970s following extensive research of the meningeal fascia system (Upledger and Vredevoogd, 1983; Upledger, 1990). Hospitalized children with severe autism formed part of Upledger's initial treatment group in which CST methods were trialed (Upledger, 1978, 1990). Through many years of clinical experience treating ASD, plus a research project involving 26 subjects, Upledger showed that with regular CST treatments these children showed a reduction or total cessation of self-abusive or self-destructive behaviors, began to express affection, and improved in social behaviors spontaneously (Upledger, 1978, 1990). Upledger carried out a further pilot study comparing CST (meningeal) tissue assessment findings in blind comparison to Rimland's autism diagnostic rating scale on 63 children (Rimland, 1968). Findings suggested the more classic and severe the autism behavioral symptoms, the more profoundly the meningeal tissue restrictions of the craniosacral system presented (Upledger, 1978, 1990).

Cranial therapies date back to the nineteenth century originating in A.T. Still's philosophy of osteopathic medicine (Ward, 2003). W.G. Sutherland expanded Still's work in the 1920's into what is now known as Cranial Osteopathy (Bordoni and Zanier, 2015). Cranial Osteopathy suggests that the placement and flexibility of cranial bones and sutures may be etiological factors in the evolution of dysfunction (Upledger, 1990; Bordoni and Zanier, 2015; Sills and Kern, 2011; Milne, 1995; Upledger, 1995). Upledger was a student of Cranial Osteopathy in the late 1960's. Upledger and his research team went on to describe what is now referred to as the craniosacral system (Upledger and Vredevoogd, 1983; Giaquinto-Wahl, 2009; Shea, 2007; Upledger, 2003). This system attempts to describe the role of the meningeal layers and the cerebral spinal fluid, as well as the physiological phenomenon believed to be a semi-closed hydraulic mechanism within the confines of the skeletal structures (Upledger and Vredevoogd, 1983; Downey et al., 2006).

'CranioSacral Therapy' (CST), was created to directly treat this system of fascia and fluids. CST embodies the essential concepts of Still and Sutherland but it has since evolved into a more holistic therapy encompassing body

work aimed at assisting the body's self-regulating capabilities. The premise of the Upledger CST training begins with a basic gentle, non-invasive treatment protocol (The 10-Step Protocol) that is harmless to the client if performed as instructed (Upledger and Vredevoogd, 1983; Upledger, 1995; Giaquinto-Wahl, 2009). This protocol is the foundation of clinical competence in the work and is prerequisite for technique certification in CST. More qualified and experienced practitioners however evolve their CST skills into improvisation interventions during each unique therapy session (Upledger, 1990; Giaquinto-Wahl, 2009). The objective of the 10 step protocol is to gently mobilize restricted connective and meningeal tissues by following a progression that aims to identify structural restrictions. In doing so the therapist becomes familiar with the various tensions, vibrations, and natural rhythms of the client's body. The craniosacral rhythm is one such feature which has been suggested to exist by visual inspection in neuro-surgical encounters (Upledger, 1995, 2003). This rhythm is a reverberation of the normal inflation and deflation of the brain and spinal cord, which is presumed to reflect the production, movement and reabsorption of cerebral spinal fluid (Upledger and Vredevoogd, 1983, 1990; Podlas et al., 1984; Rennels et al., 1985; Greitz et al., 1993). The quality of this bodily rhythm is one guide for the therapist to determine where restrictions may exist (Upledger and Vredevoogd, 1983; Upledger, 1995; Shea, 2007). It has been suggested that a multitude of symptoms could occur when the free movement of cerebral spinal fluid is impeded, hypothetically including neurobehavioral dysfunction (Upledger, 1990; Whedon and Glassey, 2009; Bradstreet et al., 2014; Rossignol et al., 2014). A clinical account of diseases of abnormal CSF flow dynamics such as hydrocephalus, syringomyelia, and other conditions surveyed through medical imaging modalities used to observe intracranial dynamics in vivo have been used as predictive models of CSF dynamics. (Linninger et al., 2016). Fluid models of the physiology of the central nervous system as well as studies on the effects of gentle sustained stretch on tissues provide theoretical foundation to justify such manual techniques as CST (Moskalenko et al., 2001; Chikly, 2005; Downey et al., 2006).

## Cerebral inflammation and Autism Spectrum Disorders

Post-mortem studies of brain tissue lend supportive evidence of neuro-inflammation as pathogenesis specific to

ASD. Neuro-glial activation and neuro-inflammation markers in the brain of patients with ASD were first reported in 2005 (Vargas et al., 2005). A recent post-mortem study revealed patches of neuronal disorganization in the neocortex of children with autism (Stoner et al., 2014). Another study of a large sample of brain tissue analysis discovered perpetual hyper-activation of micro-glial cells and genes regulating an inflammation response (Gupta et al. 2014). Other studies concern the role of the immune system, auto-immune activation, and implied systemic inflammation in ASD (Goines and Van der, 2010; Al-ayadhi and Mostafa, 2011; Onore et al., 2012; Matthew and Sestan, 2012; Theoharides et al., 2013).

The recent discovery of the fluid pathway structures of the human lymphatic system's interface with the blood brain barrier (Louveau et al., 2015), combined with a study of ultrasound images of brains affected by ASD, offers a hypothesis that meningeal lymphatic drainage deficits due to peripheral chronic infection or inflammation may account for [some] symptoms of ASD (Bradstreet et al., 2014). There is also a growing amount of research regarding the presence and levels of environmental toxicants in the bodies of people with ASD, though the overall effect of these toxins upon the nervous system is still unknown (Rossignol et al., 2014).

Given this current body of scientific research suggesting cerebral inflammation is present in ASD, it is not surprising that Upledger showed an apparent correlation between meningeal tissue restrictions of the craniosacral system and severity of ASD (Upledger, 1990, 2000). The structural impact of inflammation upon the body is well known in the physical medicine professions, but the impact of inflammation upon the brain and its physiology, and subsequent behavior and function, remains a novel consideration.

Much has been studied on subject of the parental choices of complementary and alternative (CAM) treatments for ASD (Green et al., 2006; Goin-Kochel et al., 2007; Levy and Hyman, 2008; Christona et al., 2010). Specific clinical studies suggest improvements following CST for brain injury (Haller et al., 2015a, b); attention deficit (Gillespie, 2009); migraines (Curtis et al., 2011); asthma (Mehl-Madrona et al., 2007; Gillespie, 2008); chronic pain (Tsao et al., 2007; Haller et al., 2015a, b); dementia (Gerdner et al., 2008); urinary incontinuity in multiple sclerosis (Raviv et al., 2009); and various pediatric issues (Low et al., 2008; McManus and Gliksten, 2007). CST was shown to have a favorable effect on autonomic nervous activity in patients with subjective complaints (Girsberger et al., 2014); and the quality of life of clients seeking CST (Harrison and Page, 2011). The use of various other manual or movement therapies has demonstrated having positive effects for ASD (Silva et al., 2011; Silva and Schalock, 2013; Burke, 2014). A clinical review of pediatric massage therapy found varying levels of evidence for the benefits of pediatric MT in children who have diverse medical conditions with anxiety reduction has shown the strongest effect (Beider et al., 2007). One single case study indicates specific behavioral changes directly correlated to isolated use of CST for a 10 year old boy with ASD (Kratz, 2009). These and other studies show

some improvements and clinical significance but do not stand up to rigorous empirical standards. The authors agree that a high risk of bias exists in most reported low quality studies about CST. One systematic review of a small body of clinical evidence concurred with this position (Ernst, 2012), and we assume that the best methodologies for researching CST have yet to be used.

### Purpose of this study

The purpose of this preliminary, retrospective study was to survey the extent of anecdotal outcomes observed by therapists who utilize CST clinically for patients with ASD and by the parents and clients who participated in this experiential intervention. The aim of the survey was to explore the current use of CST for ASD, though not to test the validity or reliability of any specific CST protocol. Reference to the competence in the Upledger 10-step protocol was made as a common frame of reference as inclusion criteria for therapists. The study also surveys the demographics of the therapist participants and the various backgrounds and qualifications for using CST for their clients with ASD. In an attempt to guide a description of the observed outcomes, the participants were also asked to retrospectively and subjectively rate a level of change to key ASD behavioral changes attributed to the intervention.

### Method

Online recruitment of participants was completed through:

- Upledger Institute International (source of CST training) alumnae data-base.
- CST study group members and social media sites for practitioners.
- International parent support networks for ASD.

Recruiting advertisements were disseminated four times over the span of 12 months. Three groups of respondents were formed (THERAPIST, PARENT, and CLIENT) and were asked to complete an online survey specific to their group. Each survey sought demographic information as well as explored the levels of understanding of both CST and ASD. We inquired of the frequency and duration of utilizing or receiving CST, and the numbers of sessions before observable changes were noticed.

### Inclusion criteria

#### THERAPISTS

All therapists were recruited through the alumnae roster of the Upledger Institute International, the original source for CST training. Alumnae status implies therapists have the minimal knowledge of the introductory protocol to practice Upledger CST. The actual protocol administration was not investigated since the true nature of mature CST treatment is one of improvisation during live treatment sessions. The therapists acknowledged having treated at least one client with ASD and were encouraged to recruit parents and clients, directing them towards the survey. Therapists were allowed to report on a maximum of five clients.

## PARENTS

One parent (or caregiver) of a child in their family with a confirmed diagnosis of ASD who participated in any form or length of CST.

## CLIENTS

These were directed towards the survey by either the parent or the therapist to pursue self-reporting of personal experiences if they were able. Clients were allowed to have assistance in completing the questionnaires on the honor system that their own opinions were expressed.

## Evaluating the perception of changes

Therapists were invited to return case study information on a maximum of 5 individuals. The author found the simplest way to measure the experiences gained with CST was to rate 20 characteristic behavioral or functional features of ASD. These were then grouped into significant behavioral categories for the purpose of graphical analysis. There are many diagnostic rating scales in detecting or quantifying manifestations of ASD (Lord et al., 2000; NIH, 2015). A list of common functional behaviors used in therapy practices was cross referenced with the CARS-2 (Schopler and Van Bourgondien, 2000). A Likert scale was devised for each of these features with a forced-choice answer (indicating a degree of either worsening or improvement) on a 7-point rating scale option to quantify a Value of Change observed in each The behavioral features included:

1. Anxiety (worry, restlessness)
2. Emotional stability (irritability, tantrums, mood swings)
3. Sleeping (falling and/or staying asleep)
4. Eating
5. Bodily functions (bowel, bladder, awareness of inside self)
6. Sensory Processing (aware/tolerance of, or reactions to, sensations)
7. Flexibility of thought or actions
8. Obsessions or compulsions
9. Ability to make transitions in activities
10. Verbal expression
11. Other forms of communication
12. Social engagement with other people
13. Emotional engagement with other people
14. Interest or engagement with environment
15. Ability to participate in educational program
16. Self-control
17. Pain (headaches, stomach aches, other pain)
18. Self-injurious behaviors
19. Aggression towards other people
20. Behaviors in general

## Data analysis

The Qualitative data collected was analyzed via Inductive Content Analysis. The data was stored on Excel and analyzed manually. The data was analyzed independently by all 3 authors.

## Results

### Number of participants and demographics

A total of 405 participants initially responded with surveys. Each individual question from every survey was included in the final analysis regardless of the thoroughness of completion.

### Therapists

264 participants were therapists, though only 184 completed the survey questions that addressed Value of Change to 20 areas of function and behavior. More therapists answered questions regarding demographics. Each therapist was allowed to report on a maximum of 5 clients with ASD for whom they provided direct treatment. The perception of change from the therapists' view point was based upon their documented clinical observations of their clients. The total number of clients represented by the therapist group totaled 292.

### Demographics

Location of therapists' practices included: 88% – North America; 3% – Asia and 3% – Europe; 2% – United Kingdom; .5% – Australia/New Zealand.

Several different professions were represented by the group. All therapists were alumnae of Upledger CST training (Fig. 1).

### Parent and client groups

In the parent group, 124 parents responded to the recruitment, while only 84 parents completed the questions that addressed Value of Change. In the client group, 17 responded to the recruitment, but only 6 clients completed the survey questions that addressed Value of Change.

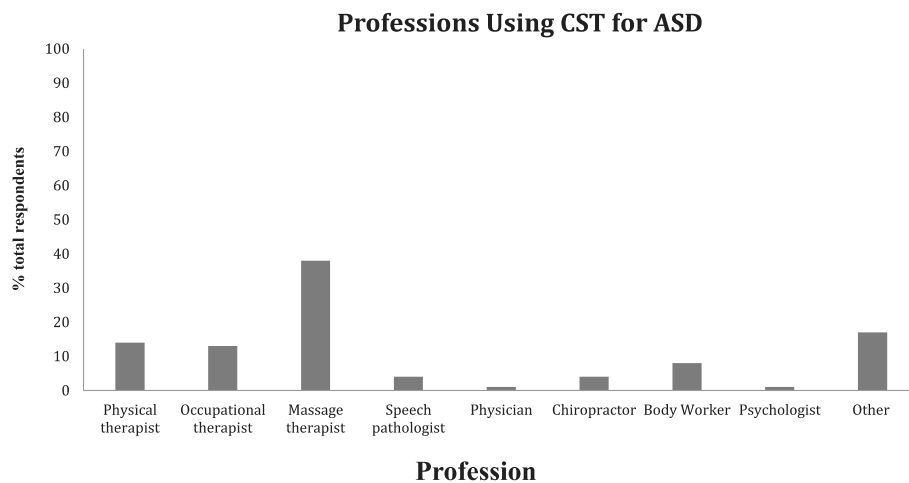
### Demographics

Of the 106 parent responders: 92% – mothers, 3% – fathers, 5% – legal guardians or caretakers. 82% had stated there was formal diagnosis of ASD for their child. Of the 96 parents who identified their continent of origin, 82% – North America, 1–6% equal distribution of all other countries.

Informed consent was obtained from all participants at the onset of respective surveys. Participants could exit the survey at any time and all surveys, regardless of degree of completion, were collected and used in the final analysis. No personal information was obtained in the process.

### Therapist data

As shown in (Fig. 1) it can be seen that the majority of therapists practicing CST who participated in this study were Massage Therapists. The second most prevalent occupations were Physical Therapy and Occupational Therapy (Professions Allied to Medicine). The least common healthcare



**Figure 1** Representation of various professions of participating therapists.

professionals using Upledger CST for ASD are Physicians and Psychologists.

The majority of therapists involved in the study had over 10 year experience in CST. From Fig. 2 it can be seen that N = 203. It can be seen that all therapists had a minimum training of CST 1. With approximately 11% achieving the highest recognized qualification in Upledger CST at Diplomat level. (CST1 and CST 2 plus SomatoEmotional Release 1 (SER 1) and SER2 as well as Advanced 1 are all considered to be the core training modules of CST. Completion of CST 1 and CST 2 is a prerequisite for completion of Technique Certification however all core training must be successfully completed before CST Diplomat Certification is awarded).

In addition the majority of therapists involved in the study had undertaken additional training specifically related to working with Autism. Some of this further training included sensory integration and listening therapy, with only 31% having no other training than their specified profession.

The therapists who participated in this study N = 213 displayed a range of experience in working with ASD. 57% of Therapists (N = 213) reported having work with 1–10

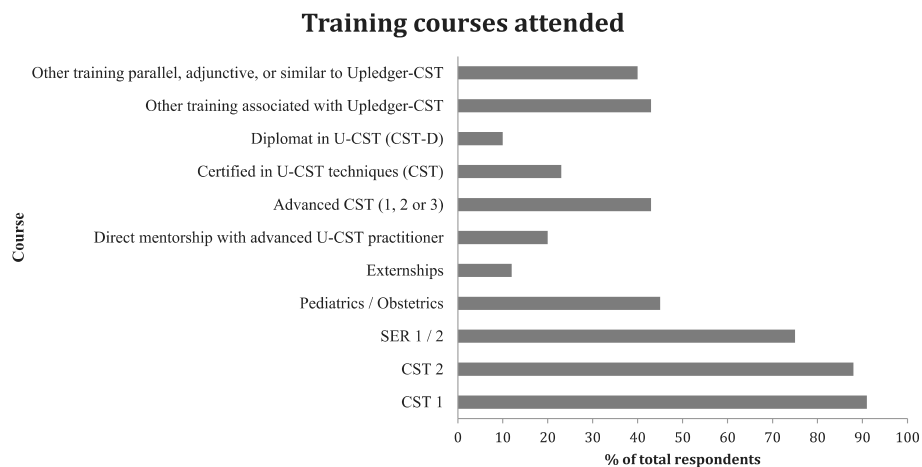
clients, 27% having worked with 11–30 clients, and 16% having worked with over 31 patients.

**Patient data**

The survey showed that the most prevalent childhood age at initial consultation before administration of CST was between the ages of 4 and 9 years. The next most common age group was between 10 and 19 year olds. An initial consultation was least likely to be administered to children between the ages of 0–3 years. It was seen that commencing CST treatment in adulthood is least common practice. 41.94% of the 93 parents answering this question reported receiving a professional referral for CST.

**Clinical perceptions & observations of therapists**

Of the 230 Therapists that responded to Question 12 “Rank the conditions or complaints you treat on a regular basis from MOST to LEAST (1–12)” Autism was ranked 5th behind



**Figure 2** Upledger CST courses/training attended by therapists. Data shown as percentage of total respondents. Respondents were permitted to choose multiple answers. Data reflects level of experience and training in CST of THERAPISTS.

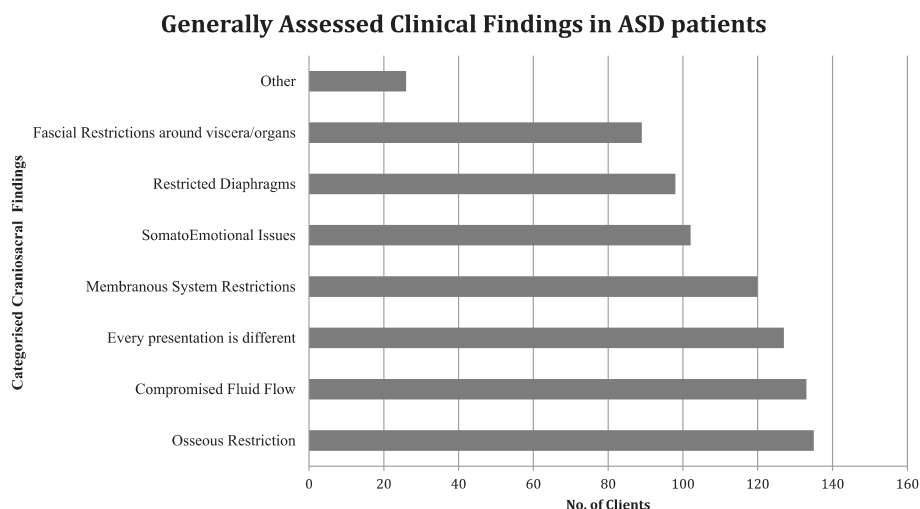
Chronic Pain/Generalized Pain, Pediatric Developmental and Learning Disorders and Stress/Tension/General Wellness.

Therapists were invited to give their own opinion on both the number of CST treatment sessions they would recommend when treating ASD and the number of treatment session they would administer before any measurable changes in ASD symptoms would be perceived. The most favorable answer out of 4 choices for number of treatments recommended was "weekly and on-going if changes continue". The majority of therapists (89%) reported that the number of sessions carried out before seeing any measurable change in ASD symptoms was 1–5 treatment sessions.

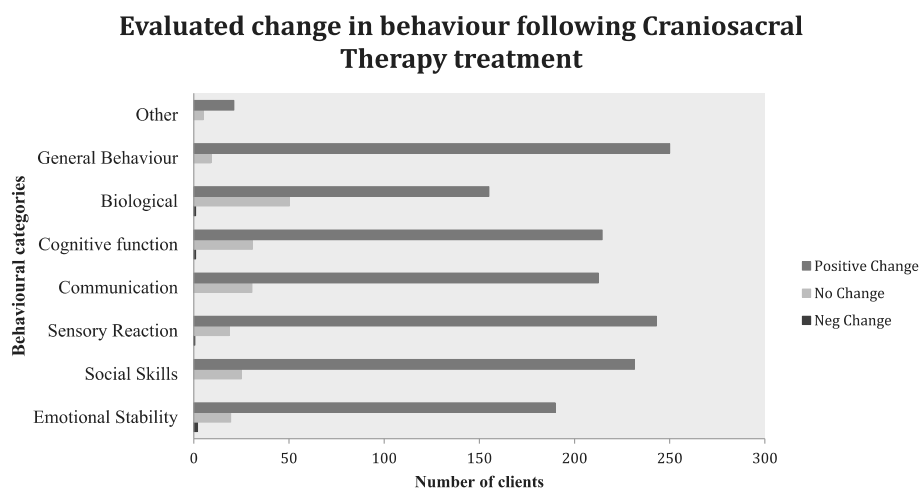
Therapists were asked to comment on a list of common craniosacral clinical findings with ASD. As can be seen from (Fig. 3) the most prevalent clinical findings by therapists

treating ASD were compromised craniosacral dysfunction and compromised fluid flow. In particular therapists reported finding tight membranes under the cranial bones (meninges). Although for the purposes of this study the membranous system included restricted structures around cranial and peripheral nerve root outlets and nerve lengths these were actually found to be the least compromised structures.

A total of 184 therapists responded to the invitation to comment upon 5 retrospective cases studies and the results are shown in (Fig. 4) reflecting the observations of 292 total clients. This chart demonstrates an obvious trend of improvement throughout all behavioral categories evaluated following CST treatment. The most negative changes related to emotional stability in particular aggression towards other people though it was not reported if these changes were either lasting or transient.



**Figure 3** Data presented as means. N = 206. Graph represents categories of clinical palpation findings/general observations of clients with ASD recorded by therapists. Grouped by general tissue restriction categories discovered in the treatment process. Multiple choices permitted.



**Figure 4** Data shown as means. N = 184. Graph represents categories of perceived improvement in behaviors demonstrated by children with ASD reported on by therapists in the survey. 20 Behavioral features assimilated into categories for reporting the data.

## Parents observations and comments

PARENTS offered over 130 open comments. This information did not lend itself to data analysis however some of the most profound comments are listed below.

### Anxiety and emotional stability

1. "CranioSacral Therapy has an immediate calming effect on my child. Relaxes and lets go. He will often ask for a session if we forgotten to make an appointment. Monthly sessions seem to work best now."
2. "My son is very calm after each session. He is able to communicate where he wants his therapist to work."
3. "Able to calm self down faster than before."
4. "Calm and happy."

### Social changes

1. "Eye contact, quality of social interactions."
2. "Moderate improvement – social communication."
3. "Eye contact and awareness of others around him, max improved area."

### Sensory – motor changes

1. "Without CST my son would not have made the progress he has made. He does not have sensory issues to the extreme degree he had when he first began treatment and has significantly decreased his ongoing anxiety."
2. "My daughter who doesn't like being touched not only copes with but seems to look forward to going to cranial. It makes her feel better."
3. "It made a dramatic difference in sensory defensiveness (improved), allowed better sleep, and has been a key therapy in helping my son to recover from his Autism. It has been a vital and necessary therapy."
4. "The need to seek deep pressure on his head and face decreased and finally went away. Also the bulges on his forehead and/or skull slowly went away."
5. "Motor planning improved."
6. "Ability to play greatly increased. Pain decreased."

### Changes in neurological symptoms

1. "I've been able to help my son's SEVERE headaches. We get up early and, following his lead, I'm able to help him start his day. Cranio[sacral therapy] seems the quickest and longer lasting fix. Advil can help short term. But since applying just a few more techniques from CST2, he's been so much more relaxed and functional, with spurts of language. All other treatments being normal, adding CST on top of it brought marked improvement in all areas."
2. "I use CST on both my children regularly. I see less "ticks" and less agitation in them."

3. "No other therapy was as effective to reduce seizure activity, reduce anxiety, allow us to touch her and cleared her intellectual disorientation."
4. "After just 4 treatments my son stopped drooling and started engaging in very simple conversations."

### Language or cognitive changes

1. "After 1st session our daughter began language, her balance improved, she began to look up and outside of herself."
2. "Cognitive development."
3. "Great improvement in communication, using language at right moment."
4. "Cognitive improvements."
5. "After a therapy session one time he blurted out the word "bubbles" he is non-verbal; not enough sessions to say if it would get him speech."
6. "Expressive language has improved."
7. "Sounds of speech increased. More eye contact."

### General comments

1. "Very beneficial for my child. I recommend it to all parents with children with autism as each child will respond different."
2. "This is an area that there is not a lot of practitioners. My CST therapist was advanced – we moved and have yet to even come close to replacing her ability the other issue is several autism people have seizures and CST is great for that."
3. "One therapist worked 'on' our daughter – creating a sort of dependency on the therapist. The second therapist worked 'with' our daughter, which taught her far more self-regulating skills. She made much more progress with the second therapist."
4. "We have been very, very pleased with how CST has improved our grandson's quality of life."
5. "VERY thankful we found this therapy. What a blessing to witness change."
6. "Less pain in GI area."
7. "The first day my son was treated he had eye contact with the therapist almost the whole session. That day was the beginning of him making eye contact. Really amazing stuff!"

### Discussion

This study represents the first documented evidence revealing global administration of Craniosacral Therapy as a treatment modality for Autism Spectrum Disorders; and the perceptions of the outcomes of such treatment by therapists, parents and clients. The survey showed that the use of CST is most prevalent in North America with more participants than in Mainland Europe, The United Kingdom and Australia collectively. The results suggest that the majority of people practicing CST originate from a manual therapy based practice such as massage therapy, followed by more typical therapists (occupational and physical therapists)

involved in pediatric populations. Upledger CST is a relatively new therapy its concept and techniques making an entrance into the therapy arena in the early-mid 1970's. The first official teaching manual was published in 1983. The 10-step protocol taught in CranioSacral Therapy 1 provides the foundation for any CST trainee and was evolved from Upledger's clinical experiences treating children diagnosed autistic (Upledger, 1978, 1990). The majority of therapists in this study did appear to have over 10 years of experience and very few therapists involved in the study were of Diplomat training level (Fig. 2). This suggests that the respondents held several years of experience utilizing the basic foundations of CST.

When Upledger carried out an exploratory "single blind" study of 63 autistic children, (previously rated by Rimland), the study demonstrated a positive correlation ( $p = 0.01$ ) between Rimland's rating scale for Autism severity and Upledger's rating of cerebral membranous restriction. In keeping with this preliminary work, the results of this study revealed therapists also reported a high incidence of membranous restrictions in their clients with ASD. It could be hypothesized that the quality of membranous restrictions being observed in both studies may be synonymous with the apparent inflammatory response created in the central nervous system of those diagnosed with Autism. As is demonstrated in Fig. 3 therapists reported a high level of compromised fluid flow within the craniosacral system of children with ASD.

Beider et al. (2007) reviewed the varying levels of evidence and potential benefits of pediatric massage therapies (akin to infant massage) for improving psychological and physiologic states in children who have various health and medical conditions. In their review of the massage therapy for children they discuss varying levels of benefit, though anxiety reduction had shown the strongest effect. There are inherent differences between the modalities of therapeutic massage and CST. Perhaps future studies using rigorous study design and methodology, with long-term follow-up, could compare effects of both.

Fig. 4 refers to the therapists' observations of change in behavior following CST treatment. On first appearance CST has a significantly positive change on all the behaviors observed. It is worthy to note the authors acknowledge the therapists likely chose clients with the most favorable responses to treatment, and therefore it can be argued that results may in fact be therapist biased. Nevertheless quite clearly of the therapists using CST to treat ASD appeared to witness a significant degree of positive change in behavior.

Fig. 4 demonstrates that therapists felt that in general behavior improved, but more specifically the categories of Sensory Reaction which included Interest or Engagement with Environment and Sensory Processing (aware/tolerance of sensations or reaction to sensations) showed most improvement. The observed improvement in cognitive function (including: flexibility of thought or actions, obsessions or compulsions, ability to make transitions in activities, ability to participate in educational program); communication (including: verbal expression, other forms of communication); and social skills (including: social engagement with other people, emotional engagement with other people) suggests an overall improvement in psychological well-being.

Although the data provided by the parents was not suitable in this instance for data analysis it is not to wonder why parents/carers made comments such as "Sometimes my daughter asks for CST when she feels anxious", and "Craniosacral therapy has been invaluable in treating my child. I see the difference if we go too long without a treatment. He is more comfortable, happy and engaged after treatment." CST therapy to not only changes lives of children with ASD but obviously has the potential to reach even beyond the client and potentially help the whole family unit.

From the data collected it appeared that most therapists reported seeing a measurable change in ASD behavioral symptoms within 1–5 treatment sessions of CST. Parents shared similar observations (Fig. 5). Therapists however tended to more strongly recommend a treatment protocol of weekly and ongoing sessions as each child is different and will respond individually.

There is no published data reporting harmful effects on patients from the specific use of Upledger-CST. In this study, only five specific comments from parents were offered addressing the question: "Did your child have any specific negative response to Upledger-CranioSacral Therapy?" The comments are quoted below:

1. "Nothing permanent; hyperactivity, screams, subtle new stim behaviors"
2. "Crying or negative emotional"
3. "Just at the point of getting a tissue release, my son would start slapping at the area and screaming for her to quit touching him. Since then, he can tolerate my touch and the work."
4. "He felt emotional discomfort"
5. "Vomiting, Diarrhea. We attributed that to detox release."

**When Changes Emerged**

| PARENTS (reporting on own child) |           | THERAPISTS (# on clients = 292)   |            |
|----------------------------------|-----------|-----------------------------------|------------|
| Saw no changes                   | 8%        | Saw no changes                    | 0%         |
| 1-3 Sessions                     | 60.5%     | 1 Session                         | 17%        |
| 3-5 Sessions                     | 22.1 %    | 2-5 Sessions                      | 53%        |
| 5-10+ Sessions                   | 9.3%      | 5-10 Sessions                     | 19%        |
|                                  |           | 10+ Sessions                      | 7%         |
| <b>Total Parents answering</b>   | <b>86</b> | <b>Total Therapists answering</b> | <b>292</b> |

**Figure 5** Number of treatment sessions when observed changes were first reported or emerged.



## Conclusion

Every new philosophy has to have a source and its recognition is dependent upon how it is received by its audience. Upledger International affiliates teach an annual average of 700 CST and related courses (UI Data Upledger Institute Data Base, 2015). The drive behind this has been primarily the absolute and profound mass effect of the sharing of anecdotal evidence. Increasingly CST is being sought as a preferential treatment as evidenced in a National Institute of Health's decade-long review of the U.S. trends in the personal use of complementary health approaches (Clarke et al., 2015). This study shares a representation of the anecdotal clinical evidence therapists and parents observe in the experiences of CST, as well as some demographics and reasoning for the use of CST for ASD.

There is a definite requirement to find effective treatment for ASD and initial findings suggest that CST may be a viable alternative or as a compliment to traditional medical, psychological, and educational approaches. CST lends itself to being a non-intrusive and non-invasive, conservative management approach for ASD without the potential side effects experienced with other modes of treatment. Further research may want to focus on the identification of quantifiable biomedical and behavioral markers to more accurately measure the clinical effects of CST. The lack of a control group in this study gave no foundation for direct comparison. Any future meta-analysis could be performed to include a more diverse population.

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## References

- Al-ayadhi, L.Y., Mostafa, G.A., 2011. Increased serum osteopontin levels in autistic children: relation to the disease severity, 2011 Oct *Brain Behav. Immun.* 25 (7), 1393–1398. <http://dx.doi.org/10.1016/j.bbi.2011.04.006>. Epub Apr 18.
- Beider, S., Mahrer, N.E., Gold, J.I., 2007. Pediatric massage therapy: an overview for clinicians. *Pediatr. Clin. N. Am. Complement. Altern. Med.* 54 (6), 1025–1104. <http://dx.doi.org/10.1016/j.pcl.2007.10.001>. December. <http://www.sciencedirect.com/science/journal/00313955>.
- Bordoni, B., Zanier, E., 2015. Sutherland's legacy in the new millennium: the osteopathic cranial model and modern osteopathy. *Adv. Mind Body Med.* Spring 29 (2), 15–21.
- Bradstreet, J.J., Pacini, S., Ruggiero, M., 2014. A new methodology of viewing extra-axial fluid and cortical abnormalities in children with autism via transcranial ultrasonography. *Front. Hum. Neurosci.* 7, 934. <http://dx.doi.org/10.3389/fnhum.2013.00934>.
- Burke, A., 2014. Zen shiatsu: a longitudinal case study measuring stress reduction in a child with autism spectrum disorder. Dec 2 *Int. J. Ther. Massage Bodyw.* 7 (4), 23–28 (eCollection).
- CDC.gov, 2016. Treatments & Therapies. Summary and explanation of current treatments available to families with children with ASD from various online help references. <https://www.autismspeaks.org/family-services/tool-kits/100-day-kit/treatments-therapies>. <http://www.webmd.com/brain/autism/autism-therapies-aba-rdi-and-sensory-therapies>. <http://www.autism-society.org/living-with-autism/treatment-options/>. <http://www.cdc.gov/ncbddd/autism/treatment.html>.
- Chikly, B. (2001 and 2005). *Silent Waves: Theory and Practice of Lymph Drainage Therapy: with Applications for Lymphedema, Chronic Pain, and Inflammation*. 1st and second edn.. Published by IHH Publishing, Pittsburgh, PA. ISBN 10: 0970053053/ISBN 13: 9780970053053.
- Christona, L.M., Mackintosh, V.H., Myers, B.J., 2010. Use of complementary and alternative medicine (CAM) treatments by parents of children with autism spectrum disorders. *Research in Autism Spectrum Disorders* 4 (2), 249–259. April–June.
- Clarke, T.C., Black, L.I., Stussman, B.J., Barnes, P.M., Nahin, R.L., 2015. Trends in the use of complementary health approaches among adults: United States, 2002–2012, 2015 Feb 10 *Natl. Health Stat. Rep.* 79, 1–16. PMID: PMC4573565 NIHMSID: NIHMS720042.
- Curtis, P., Gaylord, S.A., Park, J., Faurot, K.R., Coble, R., Suchindran, C., Coeytaux, R.R., Wilkinson, L., Mann, J.D., 2011. Credibility of low-strength static magnet therapy as an attention control intervention for a randomized controlled study of CranioSacral therapy for migraine headaches, 2011, Aug *J. Altern. Complement. Med.* 17 (8), 711–721. <http://dx.doi.org/10.1089/acm.2010.0277>. Epub 2011 Jul 6.
- Downey, P.A., Barbano, T., Kapur-Wadhwa, R., Sciote, J.J., Seigel, M.I., Mooney, M.P., 2006. Craniosacral therapy: the effects of cranial manipulation on intracranial pressure and cranial bone movement. *J. Orthop. Sports Phys. Ther.* 36 (11), 845–853 (November).
- Ernst, E., 2012. Craniosacral therapy: a systematic review of the clinical evidence. *Focus Altern. Complement. Ther.* 17 (4), 197–201.
- Gerdner, L.A., Hart, L.K., Zimmerman, M.B., 2008. Craniosacral still point technique: exploring its effects in individuals with dementia. *J. Gerontol. Nurs.* Mar. 34 (3), 36–45.
- Giaquinto-Wahl, D.A., 2009. In: Davis, C.M. (Ed.), "Cranial Sacral Therapy". *Complementary Therapies in Rehabilitation: Evidence for Efficacy in Therapy, Prevention, and Wellness*, third ed., pp. 75–86.
- Gillespie, B.R., 2008. Case study in pediatric asthma: the corrective aspect of craniosacral fascial therapy. *Explore (NY)* 4 (1), 48–51. <http://dx.doi.org/10.1016/j.explore.2007.10.001>. Jan–Feb.
- Gillespie, B.R., 2009. Case study in ADHD: the corrective aspect of craniosacral fascial therapy. *Explore (NY)* 5 (5), 296–298. <http://dx.doi.org/10.1016/j.explore.2009.06.003>. Sep–Oct.
- Girsberger, W., Bänziger, U., Lingg, G., Lothaller, H., Endler, P.C., 2014. Heart rate variability and the influence of craniosacral therapy on autonomous nervous system regulation in persons with subjective discomforts: a pilot study, 2014 May *J. Integr. Med.* 12 (3), 156–161. [http://dx.doi.org/10.1016/S2095-4964\(14\)60021-2](http://dx.doi.org/10.1016/S2095-4964(14)60021-2). PMID:24861836.
- Goin-Kochel, R.P., Myers, B.J., Mackintosh, V.H., 2007. Parental reports on the use of treatments and therapies for children with

- autism spectrum disorders. *Res. Autism Spectr. Disord.* 1 (3), 195–209. July–September.
- Goines, P., Van der, J., 2010. The immune system's role in the biology of autism. *Curr. Opin. Neurol.* 23 (2), 111–117. <http://dx.doi.org/10.3389/fnhum.2013.00670>, 2010, Apr 2010.
- Green, V.A., Pituch, K.A., Itchon, J., et al., 2006. Internet survey of treatments used by parents of children with autism. *Res. Dev. Disabil.* 27, 70–84. #1. Jan–Feb.
- Greitz, D., Franck, A., Nordell, B., 1993. On the pulsatile nature of intracranial and spinal CSF-circulation demonstrated by MR imaging. *Acta Radiol.* 34 (4), 321–328. Jul.
- Gupta, S., et al., 2014. Transcriptome analysis reveals dysregulation of innate immune response genes and neuronal activity-dependent genes in autism. *Nat. Commun.* 5, 5748. <http://dx.doi.org/10.1038/ncomms6748>. Dec 10.
- Haller, H., Cramer, H., Werner, M., Dobos, G., 2015a. Treating the sequelae of postoperative meningioma and traumatic brain injury: a case of implementation of craniosacral therapy in integrative inpatient care. *Feb J. Altern. Complement. Med.* 21 (2), 110–112. <http://dx.doi.org/10.1089/acm.2013.0283>. Epub 2015 Jan 21.
- Haller, H., Lauche, R., Cramer, H., Rampp, T., Saha, F.J., Ostermann, T., Dobos, G., 2015b. Craniosacral therapy for the treatment of chronic neck pain: a randomized sham-controlled trial. *Clin. J. Pain* 32 (5), 441–449. May.
- Harrison, R.E., Page, J.S., 2011. Multi practitioner upledger CranioSacral therapy: descriptive outcome study 2007–2008, 2011 Jan *J. Altern. Complement. Med.* 17 (1), 13–17. <http://dx.doi.org/10.1089/acm.2009.0644>. Epub 2011 Jan 9.
- Kratz, S.V., 2009. "CranioSacral Therapy: Are We Helping the Brain Heal?" and Single Case Study of a 10 Year Boy with ASD. *Autism File magazine*. <http://www.autismparentingmagazine.com/search-autism-articles/> (December).
- Levy, S.E., Hyman, M.D., 2008. Complementary and alternative medicine treatments for children with autism spectrum disorders. *Child Adolesc. Psychiatr. Clin. N. Am.* 17 (4), 803–820, 2008, October.
- Linninger, A.A., Tangen, K., Hsu, Chih-Yang, David Frim, D., 2016. Cerebrospinal fluid mechanics and its coupling to cerebrovascular dynamics. *Annu. Rev. Fluid Mech.* 48, 219–257. <http://dx.doi.org/10.1146/annurev-fluid-122414-034321> (Volume publication date January 2016). First published online as a Review in *Advance on August 28, 2015*.
- Lord, C., Risi, S., Lambrecht, L., Cook, E.H., Leventhal, B.L., DiLavore, P.C., et al., 2000. The autism diagnostic observation schedule–generic: a standard measure of social and communication deficits associated with the spectrum of autism. *J. Autism Dev. Disord.* 30 (3), 205–230.
- Louveau, A., Smirnov, I., Keyes, T.J., Eccles, J.D., Rouhani, S.J., Peske, J.D., et al., 2015. Structural and functional features of central nervous system lymphatic vessels. *Nature* 523, 337–341. <http://dx.doi.org/10.1038/nature14432>.
- Low, E., Murray, D.M., O'Mahony, O., Hourihane, J.B., 2008. Complementary and alternative medicine use in Irish paediatric patients, 2008. *Jun Ir. J. Med. Sci.* 177 (2), 147–150. <http://dx.doi.org/10.1007/s11845-008-0152-0>. Epub Apr 22.
- McManus, V., Gliksten, M., 2007. The use of CranioSacral therapy in a physically impaired population in a disability service in southern Ireland. *J. Altern. Complement. Med.* 13 (9), 929–930, 2007. Nov.
- Matthew, Šestan, 2012. The emerging biology of autism spectrum disorders. *Science* 337 (6100), 1301–1303. <http://dx.doi.org/10.1126/science.1224989>, 14 September.
- Mehl-Madrona, L., Kligler, B., Silverman, S., Lynton, H., Merrell, W., 2007. The impact of acupuncture and craniosacral therapy interventions on clinical outcomes in adults with asthma. *Jan–Feb Explore (NY)* 3 (1), 28–36.
- Milne, H., 1995. *The Heart of Listening: a Visionary Approach*. North Atlantic Books.
- Moskalenko, Y.E., Frymann, V.M., Weinstein, G.B., et al., 2001. Slow rhythmic oscillations with the human cranium: phenomenology, origin, and informational significance. *Hum. Physiol.* 27 (2), 171–178.
- Murphy, M.L., Pichichero, M.E., 2002. Prospective identification and treatment of children with pediatric autoimmune neuropsychiatric disorder associated with group A streptococcal infection (PANDAS). *Arch. Pediatr. Adolesc. Med.* 156 (4), 356–361. Apr.
- National Institute of Health, 2015. *Autism Spectrum Disorder Fact Sheet*. [http://www.ninds.nih.gov/disorders/autism/detail\\_autism.htm](http://www.ninds.nih.gov/disorders/autism/detail_autism.htm). NINDS, Publication date September. NIH Publication No. 15–1877.
- Onore, C., Careaga, M., Ashwood, P., 2012. The role of immune dysfunction in the pathophysiology of autism, 2012 Mar *Brain Behav. Immun.* 26 (3), 383–392. <http://dx.doi.org/10.1016/j.bbi.2011.08.007>. Epub Aug 28.
- Podlas, H., Allen, K.L., Bunt, E.A., 1984. Computed tomography studies of human brain movements. *South Afr. J. Surg.* 22 (1), 57–63. March.
- Prizant, B.M., Wetherby, A.M., Rubin, E., Laurent, A.C., 2003. The SCERTS model a transactional, family-centered approach to enhancing communication and socioemotional abilities of children with autism spectrum disorder. *Infants & Young Children* 16 (4), 296–316. Oct/Nov/Dec.
- Raviv, G., Shefi, S., Nizani, D., Achiron, A., 2009. Effect of craniosacral therapy on lower urinary tract signs and symptoms in multiple sclerosis. *May Complement. Ther. Clin. Pract.* 15 (2), 72–75. <http://dx.doi.org/10.1016/j.ctcp.2008.12.006>. Epub Jan 30.
- Rennels, M.I., et al., 1985. Evidence for a 'paravascular' fluid circulation in the mammalian CNS, provided by the rapid distribution of tracer protein throughout the brain from the sub-arachnoid space. *Brain Res.* 326, 47–63.
- Rimland, B., 1968. *Diagnostic Checklist Form E-2 and Research Questionnaire Form E-3*. [https://www.autism.com/pro\\_e2description](https://www.autism.com/pro_e2description).
- Rosignol, D.A., Genuis, S.J., Frye, R.E., 2014. Environmental toxicants and autism spectrum disorders: a systematic review. *Transl. Psychiatry* 4, e360. <http://dx.doi.org/10.1038/tp.2014.4>. Published online 11 February.
- Schopler, E., Van Bourgondien, M.E., 2000. *Childhood Autism Rating Scale™*, second ed. (CARS™-2) ATP. 2nd edition. ASIN: B004TGZYG6.
- Shea, M.J., 2007. *Biodynamic Craniosacral Therapy*, Vol. 1. North Atlantic Books.
- Sills, F., Kern, M., 2011. *Foundations in Craniosacral Biodynamics*, Vol. 1. North Atlantic Books.
- Silva, L.M., Schalock, M., Gabrielsen, K., 2011. Early intervention for autism with a parent-delivered Qigong massage program: a randomized controlled trial. *Am. J. Occup. Ther.* 65 (5), 550–559, 2011 Sep–Oct.
- Silva, L., Schalock, M., 2013. Treatment of tactile impairment in young children with autism: results with qigong massage, 2013 Dec 3 *Int. J. Ther. Massage Bodyw.* 6 (4), 12–20 (eCollection).
- Stoner, R., Chow, M.L., Boyle, M.P., Sunkin, S.M., Mouton, P.R., Roy, S., Wynshaw-Boris, A., Colamarino, S.A., Lein, Courchesne, E., 2014. Patches of disorganization in the neocortex of children with autism. *N. Engl. J. Med.* 2014 (370), 1209–1219. <http://dx.doi.org/10.1056/NEJMoa1307491>. March 27, 2014.
- Theoharides, T.C., Asadi, S., Panagiotidou, S., Weng, Z., 2013. The "missing link" in autoimmunity and autism: extracellular mitochondrial components secreted from activated live mast cells, 2013 Oct *Autoimmun. Rev.* 12 (12), 1136–1142. <http://dx.doi.org/10.1016/j.autrev.2013.06.018>. Epub Jul 3.

- Tsao, J.C., Meldrum, M., Kim, S.C., Jacob, M.C., Zeltzer, L.K., 2007. Treatment preferences for CAM in children with chronic pain. *Evid. Based Complement. Altern. Med.* 4 (3), 367–374. Sep.
- Upledger, J.E., 1978. The relationship of CranioSacral examination findings in grade school children with developmental problems. *J. Am. Osteopath. Assoc.* 77 (June).
- Upledger, J.E., Vredevoogd, J.D., 1983. *CranioSacral Therapy*. Eastland press, pp. 262–264.
- Upledger, J.E., 1990. *Somato Emotional Release and beyond*. UI Publishing, Palm Beach Gardens, FL, ISBN 0-9627157-0-0.
- Upledger, J.E., 1995. CranioSacral therapy part 1: its origins and development. *Subtle Energies* 6 (1), 49.
- Upledger, J.E., 2000. **Autism: observations, experiences, and concepts. An etiologic model for autism.** In: *Testimony before the U.S. House of Representatives 106th Congress*. April 2000. [http://www.iahe.com/images/pdf/3524\\_001.pdf](http://www.iahe.com/images/pdf/3524_001.pdf).
- Upledger Institute Data Base. (2015). <http://upledger.com/team/international.php>.
- Upledger, J.E., 2003. **Research an Observations that Supports the Existence of a Craniosacral System.** UI Enterprises, 2003. [http://www.iahe.com/images/pdf/Article\\_Research\\_Observations\\_Supporting\\_CS.pdf](http://www.iahe.com/images/pdf/Article_Research_Observations_Supporting_CS.pdf).
- Vargas, D.L., Nascimbene, C., Krishnan, C., Zimmerman, A.W., Pardo, C.A., 2005. Neuroglial activation and neuroinflammation in the brain of patients with autism. *Ann Neurol* 57 (2), 304, 2005 Feb.
- Ward, R.C. (Ed.), 2003. *Foundations for Osteopathic Medicine*. Lippincott Williams & Wilkins.
- Whedon, J.M., Glassey, D., 2009. Cerebral spinal fluid stasis and its clinical significance. *Altern. Ther. Health Med.* 15 (3), 54–60. May–Jun.