

OSTEOPATHY: A PHILOSOPHY AND METHODOLOGY FOR THE EFFECTIVE TREATMENT OF CHILDREN WITH AUTISM

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INTRODUCTION

Founded in the backwoods of the Missouri frontier at the close of the 19th century, osteopathy (or osteopathic medicine, as it has more recently been called) is perhaps the only uniquely American form of complete medicine in existence today. While other healing systems have fallen by the wayside, osteopathy as a profession has persisted by means of osteopathic hospitals, specialists, surgeons and a unique philosophy of healing and medical care. Today, most Americans have never heard of osteopathy. However, using figures derived from the website of the American Association of Medical Colleges, nearly 11% of all American physicians hold a doctor of osteopathic medicine (DO) degree (Cohen, 2005). Unfortunately, the practices of many modern day DOs are indistinguishable from their MD counterparts. The majority of today's DOs are either unaware of osteopathy's extensive teachings and techniques, or perceive the healing philosophy as too obscure. Lured by the quick fix of pharmaceutical intervention, many DOs may also consider as overly burdensome the delicate, precise, and perceptive palpation skills required for proper osteopathic diagnosis and treatment.

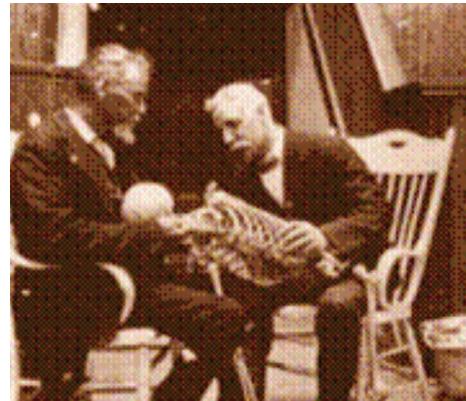
Nonetheless, a small and growing number of osteopathic physicians continue to practice traditional osteopathy. Traditional osteopaths, who remain dedicated to understanding the anatomy and

physiology of the human organism, use their hands to diagnose and treat the body, words to comfort and touch the mind, and hearts to encourage and find health for their patients. Moreover, after persistent national and international research, multicenter studies, and publication of clinical results in mainstream journals such as *Pediatrics*, there is now a renewed and heightened enthusiasm for the benefits of traditional osteopathic care for both adults and children.

ORIGINS AND HISTORY OF OSTEOPATHIC MEDICINE

Osteopathy was founded at a time when the scourges of cholera, smallpox, and dysentery were capable of wiping out entire families, and the primary treatments for such ills were mercury (in the form of calomel) and bloodletting. In the latter part of the 19th century, osteopathy offered a bold alternative, declaring that the body could heal itself and that every person, regardless of disease, had the potential to get better. Early practitioners of osteopathy also stated openly that many of the day's medications did not work or, even worse, were potent toxins. This philosophy and approach to care set the osteopathic profession squarely at odds with its mainstream counterpart, represented by the American Medical Association (AMA). In fact, the AMA was founded with a specific mandate to rid the

American landscape of the "vile cults" of osteopathy, homeopathy, and botanical medicine. Whereas the AMA viewed "regular" medicine as being grounded solely in "the truth of science," osteopathy's founders had a broader vision. Framing osteopathy not only as a healing methodology but also as a philosophy and social movement to reform the dominant system of medicine, osteopaths viewed physicians as teachers and servants of nature, while decrying the use of mercury and other toxic medicines, questioning vaccination, and encouraging self-reliance.



Andrew Taylor Still, MD,
"Discoverer of Osteopathy"

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Andrew Taylor Still, MD (1828-1917) is regarded by most medical historians as the founder of osteopathic medicine. Dr. Still was a frontier physician, considered by some a renegade and radical. Still reviled slavery, objected to the inhumane treatment of women and children, and admitted women to and graduated them from his medical school at a time when women's brains were thought to be “too small for intellectual pursuits but just right for love” (Sims, 1889). Although Still attended medical school in Kansas City and apprenticed with his physician father, he credited most of his medical learning to “the school of life” as well as careful and meticulous observation, tutelage from American Indians, and countless dissections and studies of human anatomy. Dr. Still also garnered considerable experience while working as a surgeon in the Civil War.

Although Dr. Still constantly sought to deepen his understanding of the world around him, it was only after the deaths of three of his children that he began to question the efficacy of the medical practices of his day. For weeks after their deaths, Dr. Still traveled hours on horseback to a university library to read medical texts and attempt to understand why conventional medicine had failed his children. One day, Still stumbled upon a text authored by Samuel Thomson (1769-1843), one of the forefathers of what is now called herbal medicine. Although more than three million Americans used Thomsonian medicine in the 1840s, “regular” physicians were not allowed to associate with Thomsonian physicians nor even mention Thomson’s name or practices in their medical writing or correspondence. By 1860, Thomsonian medicine was specifically targeted for eradication by the AMA and, by the 1890s, it had been almost completely eliminated.

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Still began to voraciously read everything he could about the medical profession. Returning to the original teachings of Hippocrates, Still realized that many practitioners had lost touch with Hippocrates’ essential lessons regarding the need to “do no harm,” the importance of harnessing the healing power in nature and the vital forces in the body, and the ability of the body to heal itself once balance is restored.

Drawing on Hippocrates’ ideas and his own observations of nature, Dr. Still began to formulate a philosophy and methodology of practice to improve on the current system of medicine. Dr. Still called this new system osteopathy, from “osteо” (meaning “structure”) and “pathо” (meaning “suffering or deepest need”). To guide this new approach to healing, Still formulated three fundamental osteopathic principles: (1) Structure and function are reciprocally interrelated; (2) The body is one integrated unit of function; and (3) The body has an innate self-healing or vital force within.

FIRST OSTEOPATHIC PRINCIPLE: STRUCTURE AND FUNCTION

The principle of the reciprocal interrelationship of structure and function is a basic teaching of the biological sciences. However, modern day medicine rarely applies this teaching with any real meaning or intent. In osteopathic science, in contrast, the structure-function principle is a foundational concept, teaching us that structure (whether through evolution or the infinite intelligence of the universe) has a purpose and that the purpose relates directly to function. Every structure within the body has a function, from the smallest microscopic or chemical level to the largest bone within the organism. If the structure is absent or impaired, proper function cannot occur.

As a simple illustration of the first principle on the chemical level, if the structure of the walls of a red blood cell is weakened because a glutamine molecule is present instead of a valine molecule, the red blood cell will fold over onto itself. As the blood cell tries to move through the capillaries, it will clog the capillaries and, if the capillaries are in the lungs, the red blood cell will interfere with the function of

the lungs to such an extent that the patient may die. Although the red blood cell may function perfectly in every other way, in this instance its altered structure impairs its function. (In fact, we call this condition “sickle cell anemia” because the structure of the cell is like a sickle.)

A more complex illustration of the first osteopathic principle can be achieved by considering the skeletal tissue, which represents 70% of all body tissue. Every skeletal muscle has a vein that takes deoxygenated blood as well as toxins produced by the muscle back to the heart. If a muscle is injured and micro-tears occur in the muscle’s fibers, the muscle will contract so that the micro-tears can heal (a situation described by physiologists as “hypertonicity”). If the hypertonicity is the result of acute trauma, it may remain for days, weeks, or—in some cases—years, resulting in compression and/or irritation to the venous structure underneath the muscle and, eventually, partial or complete occlusion of the vein. Just as a slight alteration in the circumference of a tube will dramatically decrease the amount of fluid that can flow through the tube, similarly if less blood returns from a vein because of occlusion, the arteries will compensate by sending less blood back to the muscles. The inadequate supply of oxygen received by the muscle due to the decreased blood supply will then cause the muscles to use an alternative mechanism for acquiring oxygen (called anaerobic metabolism), which will cause further muscle contraction and an increase in toxins (primarily lactic acid) within the muscle.

To further elaborate on this example, one must consider that all skeletal muscles are covered by a white shiny tissue called fascia. (Dr. Still observed, “We begin with the fascia and we end with the fascia.”) The fascia—the body’s great organizer—covers all muscles, blood vessels, and organs, and connects to every other structure in the body. If the consistency of the fascia is changed by a hypertonic muscle in one area of the body, it affects every other bodily structure. Fascia, made primarily of collagen, has the unique property of being a colloid, meaning that it can behave as either a liquid or solid. If a high-velocity force impinges upon the tissue (meaning

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the fascia and anything that the fascia encases or is surrounded by) over a short period of time (as in the case of a traumatic muscle strain) or tissue is held in a constant position for a prolonged period of time (as when a baby's head is abnormally positioned in utero), then the fascia becomes more like a solid, resisting deformation or change in shape. If this continues for any length of time, the fascia (and the tissue beneath it) will retain the shape, position, and tone acquired at the time of the injury or trauma, a fact acknowledged by Dr. Still in his comments about tissue memory.

The tissue memory property of the fascia has to do with adhesions (called cross linkages) that form within the fascial layers, as collagen fibers become intertwined and tangled. By observing the movement of the fascia and applying sustained pressure along the lines of the original injury, osteopaths have found that fascial adhesions can be untangled or unwound and resolved. If done over a period of 90 to 120 seconds, the unwinding of the fascial tissue will cause the muscle to return to its original physiological tone and will resolve the occlusion of the underlying venous structure. This, in turn, allows proper physiological blood flow to return to the affected areas and effectively eliminates the tissue dysfunction. Osteopathic physicians refer to this type of treatment as osteopathic manipulative therapy (OMT). OMT improves function by restoring proper physiological structural relations, which is the foundation of the structure-function principle.

SECOND OSTEOPATHIC PRINCIPLE: INTEGRATED UNIT OF FUNCTION

The second osteopathic principle perceives the body as an integrated unit of function, meaning that patients are greater than the sum of their parts. In today's economically motivated, protocol-driven, and "evidence-based" practice of medicine, this simple principle is too often ignored. Rather than equating patients with their disease label, Dr. Still encouraged osteopathic practitioners to view patients as marvelous human beings designed by a perfect architect and containing within them the blueprint for perfect functioning. Operating from a fundamentally different perspective than the conventional medical practitioners of his day, Dr. Still did not believe that isolated organs or systems were "stuck" or "broken," but instead examined the state of the whole body.

Supported by his understanding of anatomy, Dr. Still saw the body as a network bounded and made whole by the vast interconnectedness of the fascia. Viewed in this way, a disruption in one part of the body may have distant effects in an entirely different and unexpected area. Thus, for an osteopath it would not be at all unusual to find that the source of shoulder pain or dysfunction might be in the big toe. In fact, pain referral patterns of this type are numerous throughout the body (as when heart attacks cause pain in the left arm, or gall bladder disease causes pain under the right shoulder blade).

Originally, because little was known about the role of the movement of cranial bones, osteopaths worked with the body from the neck down. In the early 1900s, however, Dr. Still challenged one of his students, Dr. Charlotte Weaver (1884-1964), to investigate the head. Dr. Weaver accepted the challenge, traveling to the Ecole de Médecine in Paris (Louis Pasteur's university) to do extensive anatomic work on the fascia and structure of the skull. Through extensive dissections of fetal and newborn skulls, Dr. Weaver made the unexpected discovery that there were intervertebral discs between the occipital and the sphenoid bones in the skull, similar to those found in the spinal vertebrae. Dr. Weaver speculated that the presence of the discs in the skull was indicative of movement in the gelatin-like cranial bones, at least in fetal life. She later noted that the discs could be found in infants up to six months of age.

In the 1930s, William G. Sutherland (1873-1954), a DO with a background in engineering (and another student of Dr. Still's), noticed that the cranial sutures (the spaces between the 32 bones that make up the skull) had alternating bevels. This suggested to Dr. Sutherland that the bones moved in a distinct physiological pattern, like gears in a watch. Sutherland experimented by creating a device that used gigantic wooden screws to apply sustained pressure to each of the separate skull bones. Sutherland noted that when pressure was applied to certain areas, the shape of the skull changed due to slight movements between the individual bones. Through careful study, he further discovered that it was possible to feel a slight and rhythmic expansion and contraction motion between the skull bones, occurring approximately 6-12 times per minute. This rhythmic motion was interconnected with the rest of the body, changing when trauma was present elsewhere. This meant that a trauma or muscle fascia imbalance in the pelvis would affect the motion felt

in the head. Likewise, impairment of the minute motions of the skull could cause far-reaching effects throughout the rest of the body.

Dr. Still had reasoned that motion was the very characteristic of life. The inherent motion of the body, even when lying completely still, is caused by the beating of the heart, the rhythmic interchange of oxygen and carbon dioxide in the lungs, the slow rolling motions of the intestines, and the increase and decrease in pressure within the brain and spinal cord. Motion brings nutrients and allows for proper interchange of fluids to remove toxins. According to Dr. Still, if the motion of any vital organ stops, then the tissue begins to decay or die. Although most anatomists of the time still believed that the spaces between skull bones were remnants of fetal growth and did not move, Dr. Sutherland's findings confirmed the fact that the head, too, is in constant motion. To Sutherland, it was obvious from an engineering standpoint that the skull is designed for motion. In fact, every type of possible joint known to engineering occurs in the skull.

Dr. Sutherland went on to develop and teach techniques of precise palpation to detect the inherent motion within the head. However, although Sutherland described his initial findings regarding functional and dysfunctional cranial motion in 1936, it was not until 1956 that American anatomists published histological studies showing that slight movement occurred between the bones, even in adults. Later, others were able to demonstrate the inherent motion of the cranium through sophisticated physiological recording devices that continued to confirm Dr. Sutherland's 1936 findings noted through simple palpation. Newer technologies have continued to yield similar findings. Finally, in the late 1990s, Dr. Viola Frymann, a renowned osteopathic physician, and Professor Yuri Moskalenko, an internationally recognized pioneer in cerebral circulation, demonstrated that cranial OMT using Sutherland's techniques resulted in marked and quantifiable changes in cerebral blood flow. This proved that function (i.e., blood flow) could be influenced by manipulative techniques.

THIRD OSTEOPATHIC PRINCIPLE: INNATE VITAL FORCE

The third principle of osteopathy states that within the body is an innate vital force that pushes the body toward balance or healing. Dr. Still believed that physiological balance and proper nutritional resources allow the body to heal itself. Other measures to promote the body's natural healing include removing toxins, resolving structural inadequacies, and even changing toxic thoughts. By these means, the body can achieve physiological homeostasis and thereby heal itself.

As a simple illustration of the third principle, Dr. Still noted that physicians cannot heal a simple cut but the body can (although physicians can bandage, clean, and place salve on it). Still also spoke of an inherent therapeutic potency that could produce



Dr. William G. Sutherland

In short, Still's osteopathic model of dis-ease acknowledged that the body is constantly exposed to stresses but has innate healing forces that tend toward self-regulation and health.

its own medicines, defend against invading bacteria or disease, and alleviate pain and discomfort when necessary. Nearly 25 years before the discovery of the humoral immune system, 70 years before the understanding of endorphins, and 90 years before the concept of psychoneuroimmunology, Dr. Still taught that blood contained within it chemical "factories" that could produce antibiotics, analgesics, and self-regulating substances. In short, Still's osteopathic model of dis-ease acknowledged that the body is constantly exposed to stresses but has innate healing forces that tend toward self-regulation and health.

If one recognizes that the body will always attempt to adapt to and compensate for stressors, then it becomes apparent that disease can only develop when stressors accumulate beyond the body's ability to compensate. Thus, while a first-year medical student might list the respective causes of cancer, pneumonia, and AIDS as carcinogens, bacteria, and a virus, an osteopath would instead view the body's susceptibility to these factors as the cause of disease. Consider, for example, an individual diagnosed with tuberculosis. Studies have noted that the bacillus can readily be found circulating in the New York City subway system, as well as in many other cities and places in the world. However, only a very small percentage of subway system riders (perhaps one out of several million) become TB-positive, and even fewer contract full-blown tuberculosis. Similarly, only 0.3% of healthcare workers stuck with an HIV-infected needle will go on to become infected with HIV. What determines who will and who will not become infected?

According to Dr. Still, three areas create stress and lead to disease: the mind (i.e., attitudes, beliefs, mental state); matter (physical exposures such as food, environment, or atmosphere); and motion (the fundamental characteristic of life, as discussed earlier). Each of these aspects may affect an individual's health in a variety of ways. From the osteopathic perspective, we may add resources to the body through nutrients or freedom of motion and even a change in attitude, or we may take strain away from the body by removing toxins, resolving

structural inadequacies, or changing toxic thoughts. Through these means, the body is allowed to achieve a more physiological homeostasis. With proper nutrition, removal of toxins, and a physiological state of balance, the body will, in turn, be able to heal itself.

In osteopathy we do not believe that patients are inherently sick, stuck, or broken. Rather, we realize that patients may have symptoms of dis-ease as a result of strains placed on the internal homeostatic mechanisms. These strains (or "lesions" as osteopathy calls them) are not the disease but the precursors of disease. As such, these precursors are actually the "best" option for health that the body has at a given moment, representing the body's attempt to adapt and achieve homeostasis or balance. For example, if a muscle undergoes a strain, it contracts—thereby changing function—yet this is still better than if the muscle tears. In other words, a muscle strain is the body's mechanism for trying to compensate or heal itself.

From an osteopathic perspective, the roots of subsequent disease may be established at birth. Consider an individual who had a difficult, labored birth, causing compression of nerve tracks in the head and neck, resulting in early colic and increased work of the diaphragm. Perhaps this same person went on to have a poor diet as a child and, in addition, used a pacifier, causing the muscles in the posterior pharynx to become tight and rigid. This may have allowed sugar-filled foods to be sucked up the small tube in the back of the throat (which connects the posterior pharynx to the inner ear), leading to ear infections. Perhaps this individual then was given antibiotics. In addition to disrupting the flora in the intestine, the antibiotics may have placed the body under stress as it tried to eliminate the toxins in the medication. Imagine further that this person lives in an area with poor air quality and takes inadequate breaths, contributing to the development of asthma. Finally, imagine that this individual's parents divorce, causing mental stress. In this example, the body surely will attempt to compensate for each instance of stress. Eventually, however, the accumulation of physical, mental, and structural toxins overcomes the body's ability to

adapt. This becomes the individual who acquires tuberculosis when exposed to the bacterium, or acquires AIDS when stuck by a needle.

OSTEOPATHIC PERSPECTIVE ON AUTISM AND AUTISM SPECTRUM DISORDERS

All models of healthcare come with their own biases, opinions, and theories. The conventional model of healthcare focuses on the disease entity, teaching that the patient is sick, stuck, or broken. In this model, the provider's duty is to diagnose and "fix" the patient, attack the disease, prevent future occurrences, and decrease the burden to the overall population. As has been seen with autism, in the absence of a "magic bullet," conventional medicine has framed the "battle" as unwinnable, leaving practitioners with few apparent options other than to manage the condition.

How does osteopathy approach the child with an autism spectrum disorder (ASD)? First, rather than labeling and treating an "autistic child," osteopathic practitioners make the important distinction of treating a child who happens to have symptoms of autism. Osteopathy operates from the bias that healing comes from within and that the physician's job is to assist the patient in finding health. Osteopathy also views all children, regardless of diagnosis, as wonderful human beings who need to be helped to achieve their maximum structural, physiological and emotional potential. Drawing on the three fundamental principles laid out by Dr. Still, osteopaths seek to determine the most effective treatment approach for each child by considering the child's medical, psychological and spiritual needs, as well as their age and developmental level. This requires careful attention to symptoms, past history, and psychological and social issues in relation to the child's family and caregivers.

The osteopathic approach also requires reaching agreement as to what defines autism. From the osteopathic perspective, autism is, first and foremost, a collection of symptoms—not a disease—found in susceptible children. Those working with children with autistic symptoms have noted four key symptom categories:

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1. Disruptions in the ability to effectively communicate. This includes challenges with expressive language (i.e., the ability to communicate ideas, feelings, and needs), and difficulties with receptive communication (i.e., the ability to understand, relate, and process both verbal and nonverbal language).

2. Sensory dysregulation, which may manifest as increased or decreased sensitivity to sound, touch, pain, or light. When children with symptoms of autism flap their hands, cover their ears, or bang their heads, osteopaths believe that the behaviors are responses to pain or abnormal sensory stimuli rather than the result of dysfunctional mental aberrations.

3. Problems in auditory processing. Children with ASD symptoms generally have hearing that is within normal range but experience impairment in their ability to perceive sound and interpret language.

4. Gastrointestinal dysfunction. Children with symptoms of autism frequently have an early history of gastrointestinal dysfunction, including colic, diarrhea, and constipation. Such children may also have a history of sucking difficulties, and may be hypersensitive to foods or environmental allergens.

Osteopaths also note that many children with autism have changes in muscle tone (hypotonia) and difficulty in motor planning (dyspraxia).

Many of these symptoms (for the most part ignored by the mainstream medical community) also occur in siblings of children diagnosed with classic autism, as noted in the 1970s by the pioneering psychologist Dr. Bernard Rimland, himself a parent of a child with autism. In surveys and extensive interviews with families of children labeled autistic, Dr. Rimland discovered that many of the “non-autistic” siblings had similar hyper- or hyposensitivities. For example, where a child diagnosed with autism might display extreme sensitivity to loud noises, his non-autistic sibling might have the same hypersensitivity but without any other symptoms of autism. Dr. Rimland found that many of the “non-autistic” siblings also had other diagnoses or medical conditions (e.g., ADHD, obsessive-compulsive disorder, or a seizure disorder). Dr. Rimland concluded that the children all had the same disorder but manifested differing levels and degrees of severity. Moreover, what psychiatrists dismissed as stereotypical behaviors were actually signs and symptoms linking autistic children with an array of children suffering from other conditions. Conceptualizing autism as a spectrum of disorders,

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with severe autism on one end and perhaps seizure disorders on the opposite end, led practitioners to begin referring to those affected as children with autism spectrum features rather than autism.

OSTEOPATHIC TREATMENT GOALS AND TREATMENT APPROACH

Although the specific causes or etiology of ASD remain unclear, the standard medical bias is that autism is a genetic-based disorder that precludes the possibility of significant improvement. From the osteopathic viewpoint, where every child with symptoms of autism is unique, our goal is not to “recover” or “cure” the autistic child but rather to allow each child to reach their optimum potential. Nonetheless, it is clear that it is possible for children with severe symptoms to make significant recoveries. Some children regain language and communication over a period of time. Other children may not regain language but progress in other areas. Finally, some children make such a significant recovery that it would be difficult for anyone to ascertain that they had ever had a diagnosis of autism. (When “recovered” children return to the clinicians who originally diagnosed them, invariably the clinician will deny that the child ever had the condition in the first place and will claim that their original diagnosis was inaccurate or wrong. This is not surprising, as it reflects the underlying bias of the prevailing medical model.)

The osteopathic approach to treating symptoms of autism begins with a detailed history from birth to the present. It is also essential that the osteopathic physician establish a true and meaningful rapport with the child. Observing the child at play and in a position of comfort can provide valuable information regarding the child’s level of wellness, developmental stage, and attitude. Osteopathy is also a touching profession, involving the use of hands to palpate the inherent motion of the child’s body. Because many children on the autism spectrum are resistant to touch and may refuse to lie down on a treatment table (particularly if they have had negative experiences with other healthcare providers or significant trauma within their body), osteopathic physicians may need to proceed cautiously.

Osteopathic evaluation and treatment should begin with a total and complete focus on establishing

a meaningful contact with the tissue under our hands, alongside a focus on the highest aspect of the child (i.e., “What is beautiful about this child?” or “What are this child’s gifts?”). Initially, we may perform vibratory stimulation with a fast-moving device called a percussion hammer, or palpate the body from distant areas such as the feet or hands. As we gradually establish a “dialogue” with the tissue through palpative skill, children eventually will perceive the touch as safe and allow us to manipulate and unwind the tense and tight areas within their bodies. From this point on, we divide our approach into the three different areas of motion, matter, and mind. Each area is discussed in greater depth below.

IMPAIRED MOTION IN CHILDREN WITH SYMPTOMS OF AUTISM

Autistic children are 12 times more likely to have suffered birth trauma or complications than their non-autistic siblings. Medically induced deliveries are associated with birth trauma. In a British study describing children born in a London hospital (Stein et al., 2006), children had an autism rate 21 times higher than that of neighboring hospitals. Examination of the hospital’s records revealed that the hospital had a policy of scheduling all mothers for elective C-sections one week prior to their due dates. Two other large studies in Sweden (Stein et al., 2006) and Australia (Glasson et al., 2004) failed to find a genetic basis for autism but found that birth trauma correlated highly with its subsequent development. In both studies, premature infants were excluded from the research.

Normal birth involves coordinated, efficient, involuntary contractions that lead to progressive cervical effacement, dilatation, descent, and delivery of the newborn baby. However, if the birth process is not coordinated, efficient or natural, or if the labor is prolonged, complicated and/or difficult, stress can become trauma. Normally, as a baby’s head descends into the pelvis during birth, the pubic bone exerts pressure on the presenting part of the skull (usually the occipital area). If forces exceed the limit of the tissue, the soft tissues may become strained or bent. As the cranial bones override each other, this, in turn, can compress the venous structures within the skull, ultimately resulting in decreased blood to the brain.

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These changes in structure can affect the function of the brain and brain stem. Instrumentation such as forceps or vacuum extraction, although at times life-saving, can further put babies at risk for cranial bone dysfunction. In addition, as a baby's head is delivered, the neck is frequently hyperextended. Obstetricians who are focused on getting the baby out quickly generally devote little thought to the possibility of injury. However, hyperextension of the neck can cause injury to the soft tissues at the base of the skull.

Cranial bone dysfunctions, including a misshapen head (plagiocephaly), are frequent findings in children with symptoms of autism. When providing a health history, parents often note that the child arched his neck repeatedly as an infant, was extremely sensitive at the base of his head, or refused to wear hats or constrictive clothing. Long-term studies of children with plagiocephaly suggest that they are at increased risk of subsequent neurological and developmental problems (for example, 40% of the children in a 2000 Washington University study) (Miller & Clарren, 2000) compared to their age-matched siblings.



Examples of plagiocephaly

In children with autism symptoms, injury to the back of the skull (where the first cervical vertebra attaches to the skull) results in the neck being jammed up against the skull base or occiput. This condition, in turn, results in injury to three groups of muscles that make up the suboccipital triangle. When these muscles and their fascia become contracted, they compress a space called the jugular foramen (literally a hole in the skull). Several nerves as well as a large blood vein pass through this area. The jugular vein drains 95 percent of all blood coming from the brain. If the hole is compressed, the amount of blood that can flow through the vein will be decreased. (This is so because what goes in must equal what goes out to

avoid brain swelling; when less blood exits the skull, the spinal cord "tells" the arteries to send less blood to the brain.)

The brain does not distribute blood equally to all areas; rather, blood distribution occurs in a specific order and sequence. The areas at the base of the skull (e.g., those used in movement, respiration, and hormone regulation) receive the greatest amounts of blood, while the peripheral areas (e.g., speech) receive less. (In other words, it is more important for the heart to beat and the body to take in oxygen and metabolize food than it is to speak.) As it happens, the areas that receive a decreased amount of blood flow are the same areas involved in autism.

The jugular foramen contains exit points for three cranial nerves (9, 10, and 11). Infants experiencing irritation to cranial nerve 9 will often display early difficulties in sucking. Irritation to cranial nerve 11 can cause tight neck muscles and, in some cases, a condition called torticollis where the baby holds his or her neck to one side. Cranial nerve 10 (the vagus nerve) is one of the largest nerves in the body and the body's primary parasympathetic nerve. Irritation and compression to this nerve can cause widespread problems, which may manifest in infancy as difficulty feeding, persistent and excessive spitting up, diarrhea and, later, constipation. Babies with this type of compression also typically have early histories of colic and abdominal pain.

Looking at autism spectrum disorders from a brain function point of view, some interesting correlations

are apparent (see Figure 1). In children with seizure disorder, for example, we find very fast abnormal brainwaves called gamma waves (from 30-100 cycles per second or cps) in the temporal lobes of the brain and the amygdala. In children with ADHD and hyperactivity, we typically find slowing of alpha waves (7-14 cps) in the frontal lobes and amygdala. In children with autism, very slow delta brainwaves (1-7 cps) are found in the frontal, temporal, and prefrontal areas and the amygdala. The commonality in each of these conditions is the presence of a unifying dysfunction within the amygdala. Moreover, nearly 90 percent of all nerve impulses occurring in the amygdala come from or go to the vagus nerve. In effect, vagal nerve dysfunction equals dysfunction in the amygdala. The amygdala, of course, is especially associated with emotions and aggression. (In fact, when removed in animals, the animals exhibit autistic-like symptoms.)



Figure 1
Brainwaves in seizure, ADHD,
and autism spectrum disorders



SEIZURE DISORDER

Left Temporal Lobe &
Amygdala
30-100 cps (gamma waves)

HYPERACTIVITY/ ADHD

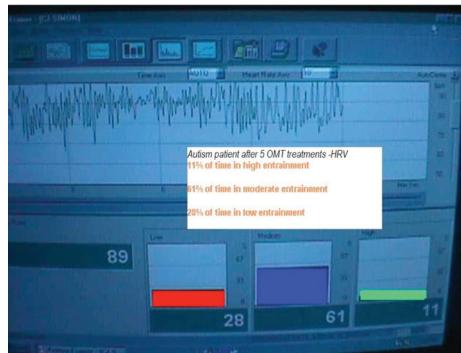
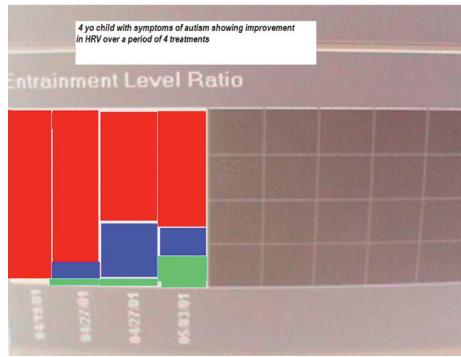
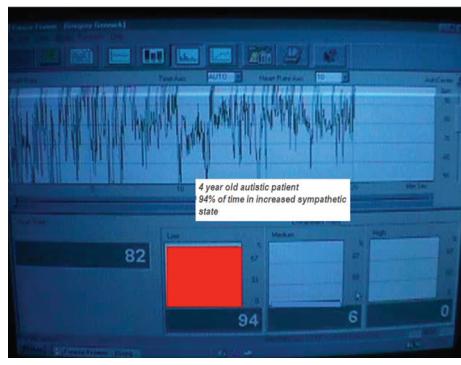
Frontal Lobe & Amygdala
10-14 cps (alpha waves)

AUTISM

Frontal, Prefrontal and
Temporal Lobes & Amygdala
1-7 cps (delta waves)

Ideally, the body should have a slight predominance of parasympathetic function (also called the relaxation response). When the body is under chronic stress, however, the sympathetic (fight or flight) function comes to predominate. From a structural point of view, then, the osteopathic physician's first objective is to restore motion in the area of the jugular foramen to decrease tension on the vagus nerve. Bringing the sympathetic and parasympathetic nervous systems (also called the autonomic nervous system) into balance has long been a core goal of osteopathic treatment, guided by studies done in the 1950s and 1960s confirming the benefits of osteopathic manipulation for autonomic nervous system functioning.

Although measuring the sympathetic versus parasympathetic state quantitatively is difficult, heart rate variability (HRV) studies can be helpful. HRV technology measures the second-to-second beating of the heart. When the heart rate speeds up or slows down, the sympathetic nervous system is predominant, whereas a fairly constant beat indicates dominance of the parasympathetic system. We have performed HRV analysis on dozens of autistic children and, in almost all cases, have found



a predominant hypersympathetic discharge. After 4-5 osteopathic treatments, however, we begin to see changes on the HRV monitor and notice a marked change in the hypersympathetic state.

Consider the example shown in the three accompanying photographs. Note that the green box represents high HRV (a balanced autonomic function), the blue represents moderate HRV, and the red indicates low HRV (autonomic dysfunction). In this instance, a 4-year-old child with a diagnosis of autism exhibited marked hypersympathetic variability 94% of the time (red box) at baseline. After the fifth osteopathic treatment, the child displayed low HRV (autonomic dysfunction) just 28% of the time (with moderate to high parasympathetic output, or balanced autonomic function, rising from a low of 6% to a combined 72%). This remarkable improvement correlated with a subjective improvement in the child's overall symptoms.

MATTER

The second component that osteopaths examine in a child with ASD is matter, that is, what the child physically puts into the body or toxins to which the child may be exposed. Osteopathic findings suggest that hyperstimulation to the vagus nerve through a problematic birth can result in hypersensitivity of the gastrointestinal (GI) tract, causing it to be more sensitive to various viral and toxic influences. If the tissue of the GI tract becomes dysfunctional, impulses will be sent from the intestinal tract back to the amygdala through the hypersensitive vagal nerve. These abnormal reactions may well be responsible for some types of seizures as well as autism symptoms. There is a well-known association between GI disorders and seizures, so severe in some children that it is referred to as abdominal epilepsy.

Although Dr. Still did not address autism in his writings, he did address childhood epilepsy, which clearly is structurally and functionally closely related to autism. Dr. Still wrote the following regarding infant seizures:

*Not a single author has hinted or in any way intimated that the cause of [the] disease is a failure of the passing of the blood, chyle, and other substances to and from the abdomen to nourish and renovate the abdominal viscera, that are diseased owing to a lapsed diaphragm, which would cause resistance to blood flow in the aorta, through which passes arterial blood, and the vena cava, through which the venous blood returns. The afflicted one is intoxicated. (Still, *Philosophy & Mechanical Principles of Osteopathy*, 1892)*

Dr. Still also advised: "Be very particular to bring the third, fourth, and fifth lumbar far enough forward to give free passage of the nerve and blood supply to sacral and lower abdominal viscera....Fill the lower bowels with gruel, not starch, in order to take off any irritation that undigested food is producing because this irritation has much to do with infant convulsions." (Still, *Osteopathy Research & Practice*, 1910)

Still's advice foreshadows more recent reports (Murch et al., 1998) in which investigators found significant bowel pathology in 47 out of 50 autistic children. When subjected to colon cleansing, the children showed notable improvement in their autistic symptoms. (In fact, the gruel mentioned by Dr. Still, a poorly digestible oat preparation, was used in the 1800s for colon cleansing.)

Since Dr. Still's time, there have unquestionably been enormous changes to children's diets. The impact on food quality from insecticides, pesticides, inorganic fertilizers, genetic manipulation, additives and preservatives, inappropriate farming techniques, chemical colorings, and food processing techniques have caused much of today's food supply to be of poor nutritional value. Studies published by the Food and Drug Administration and the Department of Agriculture actually show that since the 1920s, the vitamin and mineral content of fruits and vegetables has decreased. Although these nutrient declines are not well understood, scientists speculate that they are, at least in part, due to improper crop rotation and fertilizer use (Rutgers University, 1995).

When a hyperfunctioning intestinal tract damages the intestinal wall and makes it more susceptible to pathogenic viruses or bacteria, these, in turn, may damage the intestines' enzyme system and cause overgrowth of normally occurring yeast or bacteria. Although osteopathic treatment can restore proper neurological function through manipulation affecting the vagus nerve, improvements in function will not correct the underlying dysbiosis. Therefore, it is essential to also address the dysbiosis and digestive functioning more directly.

Recent research has suggested that gut dysbiosis may lead to inappropriate breakdown products of large protein molecules. Related research indicates that high levels of morphine-like peptides (the incomplete breakdown products of gluten, casein, and soy) can be found in children with autism spectrum disorders (Reichelt et al., 1991). Normally, when an individual digests wheat or

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milk, the proteins are broken apart in the stomach into peptides, which are sent to the intestine to be broken down by enzymes into their smallest components, called amino acids. Amino acids are the building blocks of the body. If the enzymes are not functioning properly, some or all of the proteins may not be broken down. If the peptides are not digested, children will become relatively deficient in amino acids. More importantly, large peptides derived from soy, gluten and casein may pass directly into the blood from the intestine. Because the blood does not recognize the peptides, it begins to make antibodies against them and the child may subsequently develop an allergic response. In addition, the peptides may stimulate opiate receptors that ultimately can lead to many of the stereotypical symptoms reported in autism.

Osteopathic physicians test patients' urine to look for undigested casein and gluten peptides. If they are present, we remove gluten, casein, and soy from the diet. We have seen dramatic improvements in seizure disorder and autism spectrum symptoms resulting from this dietary change alone. Colon cleansing, enzyme therapy, the use of probiotics and other nutritional factors may also be needed to help improve the dysbiosis.

MIND

In children with autism spectrum disorders, many of the stereotypical behaviors observed are related to autonomic dysregulation. With proper osteopathic treatment of structural issues, hypersensitivities to touch, sound, or light often will disappear. However, this is not always the case. In instances where the brain has adapted to dysfunctional sensory input over a number of years, it may not resolve even if the initial structural dysfunction causing the adaptation is resolved. This is especially true for visual problems. Many children with symptoms of autism will look from the side of the face instead of making direct eye contact. Yoked prism glasses that cause the child to focus in front of them, accompanied by treatment from an experienced developmental optometrist, can be exceedingly helpful for these children.

In cases where there are disruptions in the auditory system, a child may misperceive the sounds in his or her environment. One of the branches of the vagus nerve goes to the ear, supplying it with sensation. Abnormal firing of the nerve can result in abnormal reactions to certain sound frequencies. Many ASD children have poor or inadequate perception of high-frequency sound.

The problem is not necessarily that the children cannot perceive high frequencies but, rather, they may be too sensitive to this spectrum of sound. In this situation, auditory reeducation, such as Somanas sound therapy or Tomatis therapy, may be helpful. These therapies involve filtering and reintroducing high-frequency sound patterns. In our office, we have a specially designed osteopathic treatment table that helps to address these needs while the child is being treated osteopathically.

Children on the autism spectrum may also be highly sensitive to light and colors. Fluorescent lighting and some computer screens may cause emotional outbursts and reactions. These children can benefit from visual perceptive training by a developmental optometrist. It may also be helpful to expose the child to separate wavelengths of light in a sequential order, or to the various colors within the color spectrum, one at a time. We find that dim lighting and the use of specific colored filters can help calm children.

CONCLUSION

Perhaps the most important aspect of working with ASD children is to never forget that we are treating a child, not a disorder or a label. Osteopathic physicians must endeavor to establish a meaningful contact with each child. If we treat such children like infants or speak about them in their presence, we do them a disservice. Children are very perceptive and will take on the expectations that others have for them.

Recently, a 9-year-old patient introduced himself as learning disabled, dyslexic, and Asperger's. I, of course, responded by saying, "How do you do, Mr. Asperger's?" He then explained to me that Asperger's was a disease that made him autistic. When I asked how he knew that he was learning disabled, he responded that he must be disabled because his former doctor and teacher both had told him so, and he was in a learning disabled class. However, as we looked through his past records, I noticed that they contained many inconsistencies and multiple diagnoses, including ADD, Tourette syndrome, and obsessive-compulsive disorder. One past provider actually reported that he did not know what was wrong with the child. In our office, our first impression and presupposition was that this 9-year-old was none of these things. He was a magnificent human being (as are all of the patients who come to see us).

When we examined him, we noticed a significant visual tracking problem but little else.

We decided to go through the charts with the patient, pointing out their obvious inconsistencies. We noted, for example, that the person who diagnosed him as having Asperger's was a school psychologist who had no professional or clinical degree whatsoever. She came to her diagnosis after administering, in one hour, a neuropsychological test designed to be given by a certified clinician over a 36-hour period. The physician in the case then simply copied and carried forward the psychologist's diagnosis. We suggested that perhaps the doctors had made a mistake and the child did not have a learning disability. The patient was stunned by the discovery that a doctor or teacher could be wrong. Over the next year, the boy made such dramatic progress and experienced such enhanced self-esteem that one would hardly know it was the same child. In fact, by the end of the year the teachers and school system admitted that they had made a mistake, and removed the child from the learning disabled class to place him in the gifted class.

From the osteopathic perspective, *every* child is a gifted child. It should be our goal to unveil those gifts, regardless of diagnostic labels. Sadly, many of the ideas upheld by the prevailing model of healthcare are antithetical to the fundamental principles and approaches espoused by the osteopathic model. Given these two models of healthcare, both admittedly guided by their own biases, isn't a model that supports the integrity of the person better than one that conditionally assumes the worst? Dr. Still thought so. Osteopathy teaches us to point every child in the direction of health, irrespective of label or dysfunction, so that children can achieve their optimum potential.



Osteopathic manipulation

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