NEURO-STRENGTHS™ BASED SUPPORT FOR AUTISM

Medical Conditions Associated with Autism: An Overview

Tara J. Marshall, BA, SLPA

Making Sense of Autism

About the Presenter

Tara J. Marshall

- Middle-aged AuDHD adult with many Autistic family members
- Misdiagnosed as Elective Mutism with Autistic Features at 6
- Properly diagnosed as Autistic, Support Level 1 at 28
- Other mental health diagnoses of ADHD, Depression, Anxiety, CPTSD, OCPD
- Medical diagnoses of Hypermobile Ehlers-Danlos Syndrome, Mast Cell Activation Disorder, Celiac Disease, IBS-C, 2 Primary Immunodeficiency Disorders, and Partial Agenesis of the Corpus Callosum
- Language History consistent with being a Gestalt Language Processor
- Currently working as a Speech Language Pathology Assistant, working in Arizona with primarily Autistic clients
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What we do at Making Sense of Autism:

- We offer Neurodiversity-Affirming Strength-Based training from the Autistic point of view.
- We have presentations to help Allistic people better understand the world through an Autistic lens.
- We offer mentorship services to help younger Autistic teens and adults have an older peer for advice and consultation.
- We provide Neurodiversity-Affirming Speech Therapy in Arizona and Colorado.

Disclaimer:

I am not a doctor or other medical professional, I am a patient self-advocate. The information in this presentation is meant only to inform people of possible medical complications for themselves or their child or adult loved ones or clients with an Autism diagnosis. If you think that any of the various diagnoses in this presentation may apply to you or someone you care for, please consult with a doctor or medical professional for diagnosis and treatment

Course objectives:

For participants to:

- Gain a basic understanding of medical conditions associated with Autism.
- Look for symptoms that could be markers of these diagnoses and know that could indicate more than just "behavior."
- List some ways the current medical and educational system are failing to provide appropriate supports for Autistic children and adults.
- Be able to provide basic references to doctors or other medical professionals who may work with themselves or the Autistic person in their lives.
- Spread the word that many Autistic people have underlying, treatable medical conditions that may affect their apparent level of functional ability.

ALWAYS CONSULT MEDICAL PROFESSIONALS FOR DIAGNOSIS AND TREATMENT WHEN POSSIBLE.

I am Neurodiversity Affirming

While some supporters of Neurodiversity are very firm in their belief that Autistic people are not sick, the medical literature shows that this is frequently in error. Most of these people are young, and some make the mistake of falling into Aspie Supremacy due to the trauma they have endured. Many of them will end up with obvious symptoms of these illnesses as they get older or have children who do – and some Autistic children and adults with higher support needs may never be able to join our community because they cannot communicate through the symptoms of their illnesses. I am an advocate for "big tent" Neurodiversity. All people with brain differences to Neurotypical are Neurodivergent. This includes people who are Autistic, people with Down Syndrome, William's Syndrome, Epilepsy, mental illnesses, TBI, stroke, etc. I continue to use Identity First Language because it is preferred by over 80% of Autistic adults, including many who use AAC to communicate.

Why are there so many missed-diagnoses in Autistic people?

- A diagnosis of Autism is based on BEHAVIOR, it is not a medical diagnosis in the sense of diabetes and other diseases or disorders with specific, testable lab criteria. That said, a lot of Copy Number Variants and mutations to nuclear DNA have been found in Autistic people, though few are thought to "cause" Autism since they are also found in Allistic relatives.
- Diagnostic Overshadowing: when a person has a diagnosis, and rather than paying attention to present symptoms, medical personnel often place first priority on a psychiatric or other diagnosis and say that is the actual problem – very common in Autistic people presenting to the medical practitioners with new symptoms. Particularly common in AFAB people and People of Color.
- Few practitioners outside of diagnosis who specialize in the treatment of Autistic people, and even fewer who know about our probable medical conditions.
- Increased incidence of being LGBTQIA in Autistic people, which may limit access to caring medical professionals.

Syndromic Autism: An Overview

Genetic Disorders that Increase the Likelihood of a Co-Diagnosis of Autism.

- Diagnosis requires a consult with a geneticist.
- Referral should be asked for by Autistic person's Pediatrician/General Practitioner.
- Should be asked for any time there is:
  - Unusual/asymmetrical body or facial features.
  - Late regression.
  - Onset of a seizure disorder.
  - Diagnosis in a First Degree Relative.
  - Immunodeficiency
- There are literally dozens of chromosomal/genetic disorders that can increase the chances of developing symptoms diagnosed as Autism including Down's Syndrome, 22Q Deletion Syndrome, Fragile X, etc.
- Found in approximately 10% of people also diagnosed with Autism.
- Does not exclude any of the other conditions I talk about (multi-causal/factorial Autism).

New Research: 4 Distinct Subtypes of Autism

Decomposition of phenotypic heterogeneity in autism reveals underlying genetic programs | Nature Genetics

Social & Behavioral Challenges:

- 37%, fewer delays but meet autism criteria, more likely to have ADHD, Anxiety, Depression, & OCD

Mixed with Developmental Delay

- 19%, more developmental delays, fewer behavioral symptoms and mental health conditions

Moderate Challenges:

- 34%, fewer mental health conditions, few delays, but experience core challenges of autism

Broadly Affected

- 10%, significant delays in many developmental areas, repetitive behaviors, social & communication differences, likely to have ADHD, mental health challenges

Problems: only 5,000 participants, relies upon reporting of symptoms by family members, all on people diagnosed as children, over 80% male.

Common Secondary Conditions in Autism

- PANDAS/PANS: Pediatric (onset) Autoimmune Neuropsychiatric Disorders (first associated with strep), may still be active in adulthood – frequently has a sudden onset of symptoms of OCD or ticques (Tourette's Syndrome), is frequently secondary to immune dysfunction.
- Yeast Overgrowth/SIBO (Small Intestinal Bacterial Overgrowth): usually in the intestines, secondary to dysbiosis of the gut microbiome associated with immune system dysfunction.
- Vitamin Deficiencies: can be secondary to a variety of GI disorders/gut microbiota differences, may be due to genetic conditions as well. The gut microbiome actually makes a lot of vitamins and minerals for the human body, however, genetic disorders such as a mutation of MTHFR or COMT can affect the ability to make others. B vitamins are the most commonly affected by those mutations, but Vitamin D deficiency is also common.

These issues are "downstream" of an underlying cause, which I will cover in more depth. If you treat the primary cause, these secondary disorders are less likely to develop and may improve.

Why Would Medical Conditions Affect Support Needs?

- Interoception: our sense of how things are going in our body.
  - OTs mostly talk about it in the fact that it controls our sensations of hunger, the need to urinate, defecate, etc.
  - The most important thing interoception does is tell us "something is wrong" with our medical health.
  - As long as we are sick, our minds are filled with a feeling of unhealth and dread. "Something is wrong and I have to fix it" fills our heads.
  - For children, this will be expressed as trying to get assistance from caregivers – but may be perceived as Self-Injurious Behavior or Aggression, when the child is actually trying to communicate that something "feels wrong" but has no way to tell us due to delays with communication skills.
  - Most doctors and many typical people have no experience with chronic illness. As a person with chronic illness who has been through years of attempting to get assistance and resorting to self-treatment, I can tell you that when I get it right, I know within days, because the background dread, the brain fog, and all the other things that hold me back disappear or greatly lessen.

  (This is my only slide that is partially based on medical documentation but partially based on a personal hypothesis for which I am trying to gather more supporting evidence.)

Increase in more Generalized Health Risks

- Mental: Depression, Anxiety, Bipolar, PTSD/C-PTSD, Suicide Risks
- Physical: Diabetes, Gastrointestinal Disorders, Epilepsy, Sleep Disorders, High Cholesterol, High Blood Pressure, Heart Conditions, Obesity, Stroke, and Parkinson's Disease

30% Risk: Parkinson's Disease

- Multiple research articles have found that many children with Autism/Asperger's Syndrome have copies of the PARK2 Mutation (Chromosome 6Q26) or SERAC1 (6Q25.3), which increase the risk of Parkinson's Disease.
- Additionally, one of the only studies on the health of Autistic adults conducted in the UK found that approximately 20% of Autistic adults surveyed qualified for a diagnosis of Parkinson's, although fewer than half of them were diagnosed.
- The PARK2 Mutation is though to affect mitochondrial function, and multiple studies have linked ASD with mitochondrial dysfunction.
- Possible preventative treatments include: Probiotics, since a skewed intestinal biota is linked to onset of Parkinson's Disease.
- PQQ, which increases biogenesis (new growth of) mitochondria.
- Multiple vitamins, including A, B3, B12, D, and K are shown to reduce the symptoms of Parkinson's.
- Onset of symptoms is usually in the late 30s - 50s.

Mothers of Autistic children (may also apply to Autistic adults)

- Higher rates of Autoimmune Disorders
  - Inflammation and other symptoms reduced by gluten-free diet, other anti-inflammatory diets, Vitamin D, turmeric, ginger, and other supplements, and anti-inflammatory medications.
- Higher rates of cardiovascular disease
  - Reduce with diet, exercise, maintaining a healthy weight, various supplements including CoQ10, Omega 3 Fatty Acids, Garlic. May also be treated with chelating supplements, including Chlorella, MRM, EDTA, DMSA, ALA, etc. Amino acids such as L-Carnitine and L-Arginine may also be of benefit.
- Higher rates of breast, ovarian cancer
  - Test for BRCA1 or BRCA2 mutations, consider prophylactic removal of ovaries, breasts if present, regularly self-check for lumps.

Gastrointestinal Disorders

- Reported in up to 70% of Autistic children, no reason to believe the risk decreases significantly in adults.
- Several different disorders are present, from impaired carbohydrate digestion (up to 50%) to Celiac Disease, Eosinophilic Esophagitis, reflux, IBD, chronic diarrhea or constipation, may also be found in Ehlers-Danlos Syndrome and Mast Cell Activation Disorders.
- Symptoms may be reduced with specialized diets, probiotics, or medications.
- Fecal Microbiota Transplant may reduce GI symptoms and symptoms of Autism & Anxiety by up to 50%.
- Much of the damage attributed to Celiac, Crohn's, IBS, and Eosinophilic Disorders is actually done by Mast Cells (more on those later).

ARFID?

Avoidant Restrictive Food Intake Disorder

- Limiting the amount and type of food that is consumed.
- Sensory aversion or fear of vomiting, choking, etc.
- Can lead to serious health problems, including loss of vision, heart conditions, or death.

Teenager left blind and deaf by decade-long diet of sausages, crisps and processed food | The Independent | The Independent

Overlap in symptoms with GI Disorders

- Choking – common in Eosinophilic Esophagatis
- Vomiting – common in FPIES – Food Protein-Induced Enterocolitis Syndrome, Mast Cell Activation Disorders
- GI Pain – common across most GI Disorders
- ARFID is usually diagnosed through behavior, and many times GI and Allergy Specialists aren't consulted.

Sleep Disorders

- (PDF) Histamine N-methyltransferase regulates aggression and the sleep-wake cycle (researchgate.net)
- Autism and sleep disorders - PubMed (nih.gov)
- Rethinking bedtime resistance in children with autism: is restless legs syndrome to blame? | Journal of Clinical Sleep Medicine (aasm.org)
- (PDF) Effects of Sleep Disturbances on Behavioral Problems in Preschool Children With Autism Spectrum Disorder (researchgate.net)
- Sleep problems in adults with autism spectrum disorder and intellectual disability - Ballester - 2019 - Autism Research - Wiley Online Library
- Histamine in the regulation of wakefulness – ScienceDirect
- Histamine: neural circuits and new medications | Sleep | Oxford Academic (oup.com)

Some Other Possible Causes of Autism:

- Cerebral Folate Deficiency – associated with Autism and/or Epilepsy with very high support needs but may be present in milder cases as well. Folate Deficiency may be present in up to 60% of Autistic People and may also be caused by mutations in the MTHFR or COMT genes.
- MTHFR/COMT mutations: both related to methylation (reduction) of B vitamins, mutations such as C677T or A1298 may reduce ability to create these and neurotransmitters for regulation of brain activity.
- Mitochondrial Disorders/Dysfunction – the latter is more common, the former tends to be more severe. Can cause intellectual disabilities, movement disorders, and other symptoms.

Immune Dysfunction: a Quick Overview

- Primary Immunodeficiency: ¼ of the Autistic population, estimated at 1/600 of the total population by the Immune Deficiency Foundation. May be low in antibodies, lack various types of cells involved in immune function (such as T-Cells or immunoglobulins/antibodies), or have defects in the cells, etc., dependent upon actual disorder, increased risk of developing MCADs.
- Autoimmune Disorders: children have high rates of markers, up to 80% in some studies, in Autistic adults probably a majority who develop full autoimmune disorders are female (as seen in the typical population as well), thought to frequently originate in the mast cells.
- Allergies: usually IgE mediated, sensitivities are related to other immunoglobulins – A, D, G, M, but histamine itself is released by the mast cells or basophils.
- Inflammation: a localized protective response elicited by injury or destruction of tissues, which serves to destroy, dilute, or wall off both the injurious agent and the injured tissue. Generalized chronic inflammation and neuroinflammation are commonly found in Autistic people and may be related to mast cell dysfunction.
- Mast Cell Activation Disorders, including Mastocytosis, Hereditary Alpha Tryptasaemia, and Mast Cell Activation Syndrome. Mast Cells are a specialty White Blood Cell.

Maternal Infections May Affect Fetal Neurology

Sharp increase in Developmental Disabilities in children born after 1918 Flu Epidemic

- Many doctors said they could tell when in gestation the mother had been infected due to the symptoms of the children.
- Sharp driver of the Eugenics Movement in the USA, ultimately leading to the Nazi genocide in Europe, specifically Aktion T4.

Is this happening post-Covid? Some doctors think so.

- Neurological effects of Covid-19 include damage to the frontal lobe, responsible for empathy, emotional regulation, and impulse control.
- Long Covid shares many markers with Mast Cell Activation Disorders and sometimes can be treated with the same diets and medications.

Autoimmune Disorders

Up to 80% of Autistic children have at least one biomarker for autoimmunity.

- Over 100 Autoimmune Disorders are known of.
- The immune system misfires and starts attacking parts of our own bodies.
- Many Immunologists believe that most Autoimmune Disorders originate in mast cell dysfunction.

Some biomarkers for Autoimmune Disorders in Autoantibodies tests.

- ANA – Antinuclear Autobodies
- CRP – C-Reactive Protein
- ESR – Erythrocyte Sedimentation Rate
- Ferritin
- RF – Rheumatoid Factor
- Anti-CCP – Anti-Cyclic Citrullinated Peptide

Neurological Effects of Autoimmune Disorders Can Include:

- Brain Fog – difficulties with memory and thinking clearly
- Seizures
- Loss of balance/dizziness
- Tremor
- Fatigue (debilitating exhaustion)
- Bladder and bowel problems
- Numbness and tingling
- Pain
- Cognitive changes
- Movement disorders
- Psychiatric symptoms

Particular concern with autoimmunity for subset of Autistic adults with Epilepsy

- Several studies have now found that children and adults with Epilepsy are more likely to have markers for autoimmunity than typical participants. Some disorders often misdiagnosed as Autism, such as Landau-Kleffner Syndrome, have been found to likely be autoimmune in origin.
- This is particularly true for the subset of people with refractory Epilepsy, that is, non-responsive to typical treatments such as AEDs, and is up to 30% of the population with Epilepsy.
- Epilepsy is one of the most common comorbid condition reported in Autism, with rates varying from 30% to more than 60% depending upon the criteria used. In fact, it is so common that the correlation was how Dr. Rimland destroyed the "Refrigerator Mother" theory of Autism in 1967, since a psychological disorder couldn't produce a presumed "organic syndrome" such as Epilepsy.
  - Other ways to treat Epilepsy: reduce inflammation, treat with IVIG, CBD Oil, Medical Marijuana, Modified Atkins Diet (gluten free), Ketogenic Diet, Steroids.

Seizure Symptoms!

- Obviously, we all know that to suspect a seizure if a person drops on the floor and starts moving spasmodically. But usually it's more subtle.
- Anxiety (may intensify)
- Complaints of headache, light spots in eyes, smells (such as smoke), buzzing sounds, etc.
- Confusion
- Hallucinations (visual, auditory, etc.)
- Irritability
- Nausea
- Déjà vu
- Unusual sensations (feeling funny)
- Numbness
- Tingling
- Muscle twitching
- Staring spell
- May not respond to name or other auditory input
- Loss of consciousness
- Night terrors

Primary Immunodeficiency Disorders:

- Found in about 25% of Autistic population.
- Over 250 that are found and can be tested for.
- May be genetic or occasionally caused by environmental insults.
- Frequently can be treated.
- Vaccination is contraindicated for people with some PIDs, but most can tolerate them safely, although they may be less effective than usual.
- Not to be confused with Secondary/Acquired Immunodeficiency Disorders (HIV/AIDS, for example).
- Usually see an increased frequency of various infections in early childhood.
- Very common in people who are later diagnosed with PANDAS/PANS.
- People with PIDs are more likely to develop a Mast Cell Activation Disorder.

Connective Tissue Disorders:

- Found in about 75% of Autistic population.
- Ehlers-Danlos Syndrome, Mixed Connective Tissue Disorder, Marfan's Syndrome, Osteogenesis Imperfecta, etc.
- Usually genetic, but environment can affect presentation of symptoms.
- Usually have comorbid disorders that can be treated but are not suspected or looked for until the underlying Connective Tissue Disorder is diagnosed.

Frequently have a long, thin build (but not always) technically called marfanoid habitus.

Very important to pull out the goniometers and other equipment to measure hypermobile joints (if present).

Likely to have skin and dental abnormalities.

Genetic tests are available for Marfan's, most subtypes of Ehlers-Danlos Syndrome, and Osteogenesis Imperfecta.

Animals with Connective Tissue Disorders

Ehlers-Danlos Syndrome has been observed in cats, dogs, sheep, cows, hamsters, rabbits, mink, and zebrafish.

Animal Models of Ehlers-Danlos Syndromes: Phenotype, Pathogenesis, and Translational Potential - PMC

Marfan's seen primarily in bovines (cows)

An animal model of the Marfan syndrome - PubMed

Osteogensis Imperfecta in animals has been seen primarily in dogs, mice, and fish.

Animal models of osteogenesis imperfecta: applications in clinical research - PubMed

So all of these genetic mutations date back millions of years considering that the split between ray-finned and lobe-finned fish (the latter being ancestral to all terrestrial vertebrates) occurred approximately 450 million years ago, in the Ordovician Period.

Ehlers-Danlos Syndrome/HSD and Autism?

May be commonly co-occuring

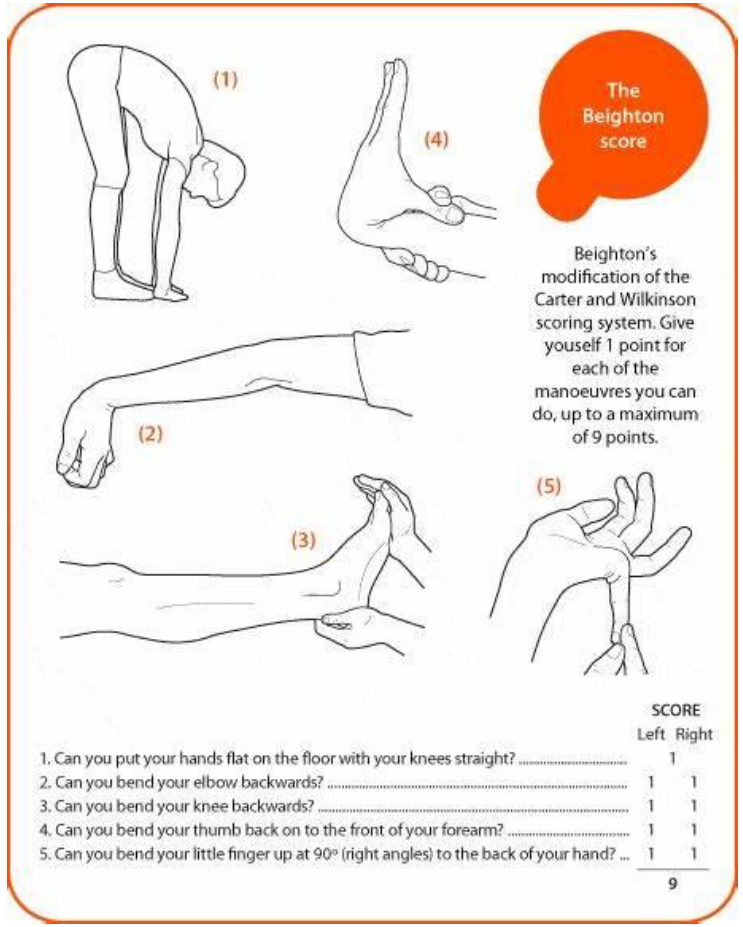
- Females are more frequently diagnosed with EDS/HSD, but males are more frequently diagnosed with Autism.
- Significant overlap in Sensory Processing Differences.
- Frequently mothers with EDS have children with Autism and then may be diagnosed as Autistic themselves.

- The Relationship between Autism and Ehlers-Danlos Syndromes/Hypermobility Spectrum Disorders - PubMed (nih.gov)
- Prevalence of ADHD and Autism Spectrum Disorder in Children with Hypermobility Spectrum Disorders or Hypermobile Ehlers-Danlos Syndrome: A Retrospective Study - PubMed (nih.gov)

EDS Diagnostics: the Beighton Scale

Due to the current correlation, it makes sense to:

- Pull out your tools and measure just how hypermoble our joints are and document that in evaluations and reports.
- Refer children for diagnosis by a rheumatologist is hypermobility is present after the age of 14.
- Ask about family history or relatives who are "double-jointed," especially first-degree relatives.



Why Does it Matter? We can't treat EDS/HSD…

Some treatable disorders EDSers are more likely to have:

- Mast Cell Activation Disorders
- Chiari Malformation
- Epilepsy
- Gastrointestinal Disorders
- Strokes
- Joint dislocation/subluxation
- Dysautonomia (POTS, etc.)
- Tethered Cord Syndrome & CCI

MakingSenseOfAutism.com

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Subtypes of Ehlers-Danlos Syndrome

Officially 13 subtypes, but more are suspected and being researched.

- Classical EDS – cEDS, COL5A1, COL5A2
- Classical-like EDS – clEDS, TXNB
- Cardiac-Valvular EDS – cvEDS, COL1A2
- Vascular EDS – vEDS, COL3A1
- Hypermobile EDS – hEDS, KALK15?
- Arthrocalasia EDS – aEDS, COL1A1, COL1A2
- Dermatosparaxis EDS – dEDS, ADAMTS2
- Kyphoscoliotic EDS – kEDS, PLOD1, FKBP14
- Brittle Cornea Sydnrome – BCS, ZNF469 PRDM5
- Spondylodysplastic EDS – spEDS, B4GALT, B3GALT6, SLC39A13
- Musculocontractural EDS – mcEDS, CHST14, DSE
- Myopathic EDS – mEDS, COL12A1
- Periodontal EDS – pEDS, C1R, C1S

Under Investigation: AEBP1-related EDS, THBS2-related EDS, COL1-Overlap Disorder, CAH-X Syndrome

hEDS/HSD blood test for 52 kDa fibronectin and collagen fragments under investigation

Symptoms of EDS by subtype:

Hypermobile EDS – most common, between 80-90%

- Joint hypermobility, but commonly develop comorbid conditions such as MCAS

Classical EDS

- Generalized joint hypermobility, elastic skin, hypertrophic scarring (thick, raised scars)

Classical-Like EDS

- Skin fragility, joint hypermobility

Cardiac-Valvular EDS

- Severe cardiovascular disease, skin fragility, joint hypermobility

Vascular EDS

- Thin, translucent skin, ruptures of arteries, pinched nose (tip is elongated away from face)

Arthrochalasia EDS

- Congenital hip dislocation, severe joint hypermobility

Dermatosporaxis EDS

- Skin is extremely fragile, easy bruising, characteristic sagging appearance of face (loose skin hanging)

Kyphoscoliotic EDS

- Severe congenital scoliosis, visual impairments, hypotonia

Symptoms of EDS by subtype, continued:

Brittle Cornea Syndrome

- Thinning of cornea, potential rupture, other eye complications

Spondylodysplastic EDS

- Bowed limbs, short stature, joint laxity

Myopathic EDS

- Joint hypermobility, muscle weakness, some proximal (near center of the body) contractures

Musculocontractural EDS

- Skin fragility, congenital joint contractures, hyperextensive skin, palmar wrinkling, craniofacial abnormalities such as brachycephaly, short philtrum (space between nose and mouth), thin lower lip, small mouth, low set ears, multiple eye abnormalities

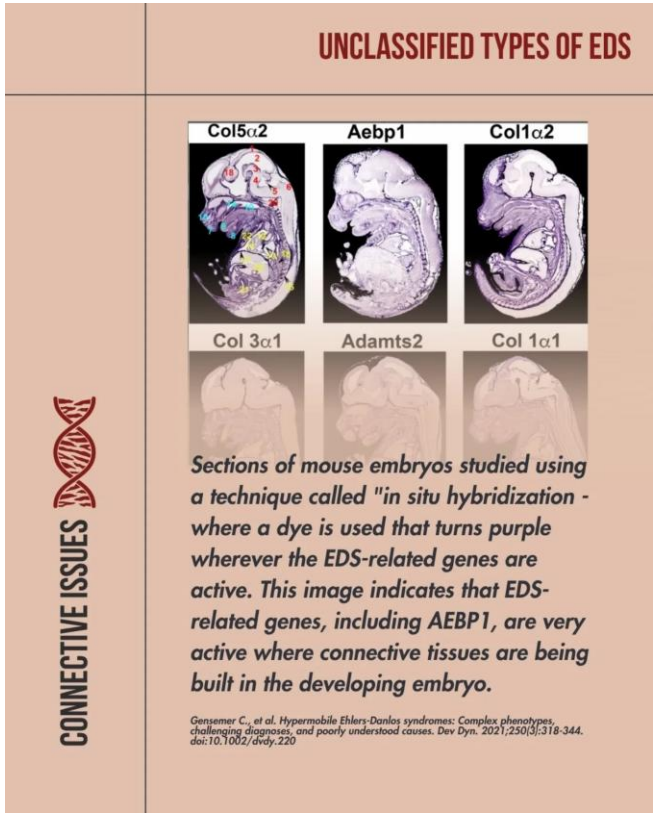
Periodontal EDS

- Severe periodontal disease, early tooth loss, fragile gums in mouth.

What do Connective Tissue Disorders Have to do with Neurodiversity?

The fetal brain develops on a substrate of connective tissue.

- The current hypothesis is that if the connective tissue (including collagen) that the brain is built on is different, the resulting brain will be different.
- Various differences in neurological structure are associated with Autism, including Partial or Complete Agenesis of the Corpus Callosum, an enlarged Amygdala, and etc., although these differences are also found in people with other diagnosis, hence, no MRI diagnosis of Autism, ADHD, etc.



Overlap in Symptoms Between Autism & EDS/HSD

[The Relationship between Autism and Ehlers-Danlos Syndromes/Hypermobility Spectrum Disorders - PMC (nih.gov)]

- Dyspraxia/Apraxia
- Other brain-based movement disorders
- Joint Laxity (generalized)/Low Tone
- Reduced Proprioceptive Input
- Toe Walking
- Anxiety
- Depression/Suicidal Behavior
- Eating Disorders
- Epilepsy/Seizure Disorders
- Sleep Disorders
- Sensory Processing Differences
- GI Disorders
- Immune Dysregulation/Immunodeficiency
- Autonomic Dysregulation/POTS
- Interoception Differences
- Alexithymia

Ehlers-Danlos Syndrome & Hearing

Auditory processing differences are common in EDSers.

- Hyperacusis
- Hypoacusis
- Misophonia
- Some subtypes have hearing loss or deafness occur more frequently, usually correctable with hearing aids or, in extreme cases, with cochlear implants

- Structural differences in ears, specifically in the connective tissue that should connect and align the bones of the malleus, incus, and stapes. In extreme cases, one or all of these bones can become permanently dislocated leading to deafness.
- Audiological consultation should take place before developmental evaluation to rule out these concerns.

Audiologic Outcomes in Ehlers-Danlos Syndrome - PubMed

A little more overlap…

T-rex arms/raptor hands

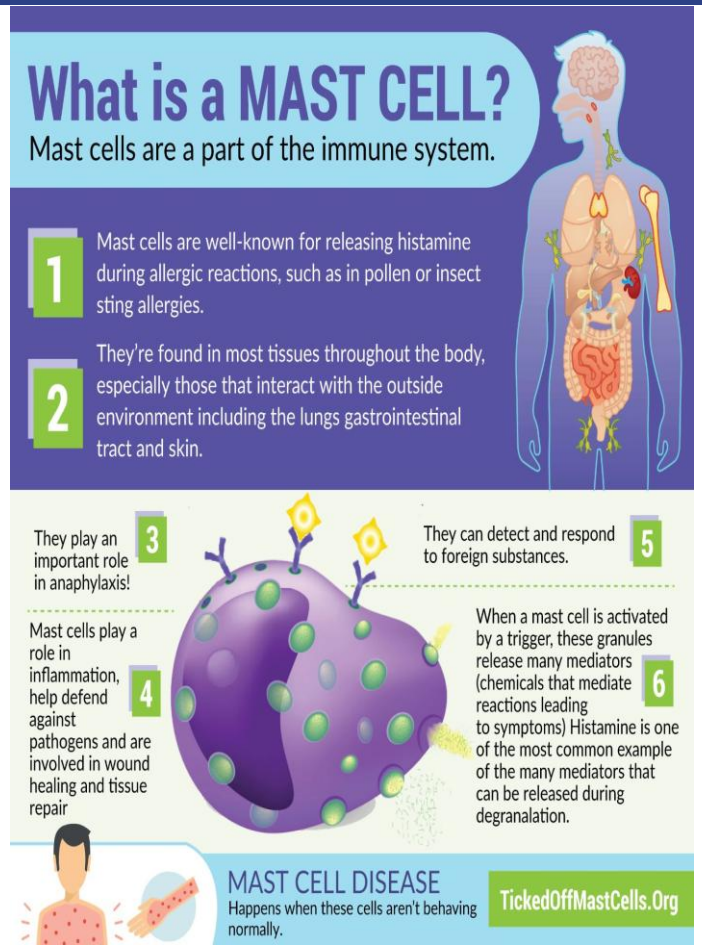
- Once simply thought of as an odd behavior, newer research in EDS/HSD shows that this posture actually serves a purpose and may be a marker that hypermobility is present.
- Explicitly, it takes the weight of the arms off the shoulder joints and helps to reduce subluxation/dislocation of the shoulder.

Common presentation in early childhood

Many EDSers can be detected in childhood

- Note the low tone, floppy positioning of my limbs in the picture.
- May lean on tables/desks or support upper body during sit-down tasks.
- Frequently corrected for slumped posture.
- May relax in positions that look like we're ready to audition for Cirque du Soleil.

Up to 89% of EDSers have or develop:



Mast Cell Activation Disorder Symptoms
(Mast Cell Mediator Release Symptoms)

- Anaphylaxis
- Flushing of the face, neck, and chest
- Itching, +/- rash
- Hives, skin rashes
- Angioedema (swelling)
- Nasal itching and congestion
- Wheezing and shortness of breath
- Throat itching and swelling
- Headache and/or brain fog, cognitive dysfunction, anxiety, depression
- Diarrhea, nausea, vomiting, abdominal pain, bloating, gastroesophageal reflux disease (GERD)
- Bone/muscle pain, osteosclerosis, osteopenia, osteoporosis
- Light-headedness, syncope/fainting
- Rapid heart rate, chest pain
- Low blood pressure, high blood pressure at the start of a reaction, blood pressure instability
- Uterine cramps or bleeding

Common Symptoms of Mast Cell Activation Disorders

Flushing/rashes – various presentations, but typically pink or red, may be bumpy, may be itchy

Nasal congestion (stuffy nose)

Wheezing, coughing, stuffy nose

Low blood pressure/light headedness, variable blood pressure

Angioedema: swelling of face, lips, eyes, tongue, throat

Abdominal pain, cramping, diarrhea/constipation

Rapid or variable pulse, especially with movement

Bone/joint pain

Anxiety, depression

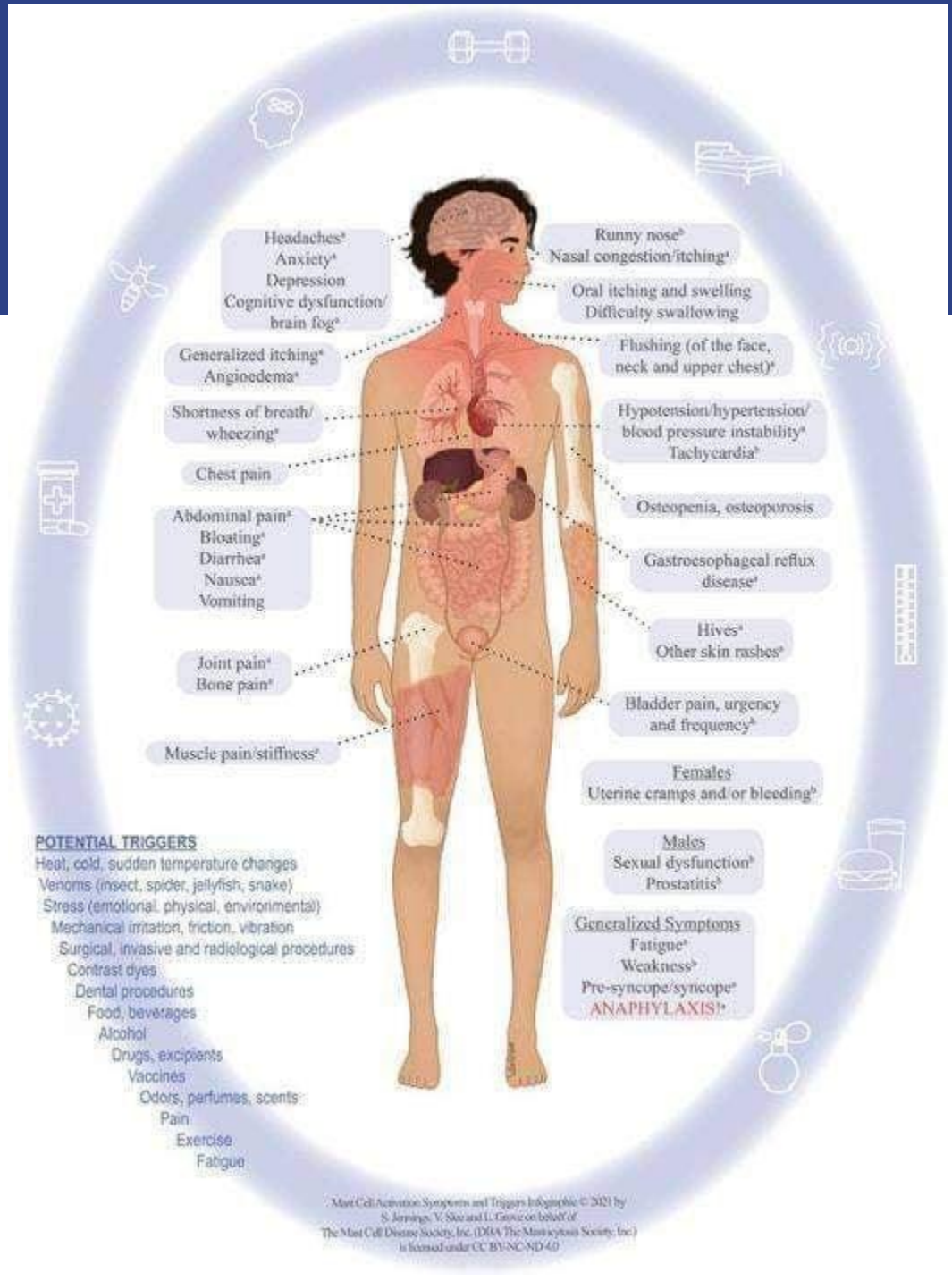
Emotional lability – sometimes misdiagnosed as Bipolar

Headache

Allergic reactions with or without positive IgE allergy testing – may need an epi-pen

Dermatographia – skin writing

Various heart, skin, lung, GI, and neurological issues



Origins of Mast Cells

Mast cells originated extremely early in the evolution of multi-cellular life, occurring before 520 million years ago, in the Cambrian period. Mast cells have been found in all animals in the evolutionary line that are the direct ancestors of chordates – the family that includes every creature with a neural tube, the earliest precursor of what is now the spine in every creature from the earliest fish ancestors, such as Haikouicthys and Myllokunmingia, which first appeared in our oceans approximately 518 mya.

Ancient origin of mast cells - PMC

The amphioxus genome and the evolution of the chordate karyotype | Nature

(PDF) Head and backbone of the Early Cambrian vertebrate Haikouichthys

Types and Testing of Mast Cell Activation Disorders

The Disorders:

- Mastocytosis (98% have a KIT4 mutation), may develop into Mast Cell Leukemia
- Hereditary Alpha Tryptasaemia (extra copies of a gene that produces tryptase) CNV of TPSAB1
- Mast Cell Activation Syndrome
- Monoclonal Mast Cell Activation
- Idiopathic Anaphylaxis?

Urine tests chlled on ice:

- PGD2
- PGF2A
- Leukotriene E4
- N-methylhistamine

Blood tests:

- Blood serum tryptase
- Blood serum histamine
- Serum chromogranin A
- Plasma histamine (chilled on ice)
- Plasma PGD2 (chilled on ice)
- Plasma PGF2a (chilled on ice)
- Plasma heparin (chilled on ice)

Treatments for Mast Cell Activation Disorders

- Elimination and Rotation Diets
- Removing fragrances and chemical irritants

Over the counter:

- H1 (typical allergy) and H2 (stomach upset/acid reflux) antihistamines

Prescription:

- Oral Cromolyn Sodium
- Ketotifin
- Steroids

- The treatments are the same regardless of diagnosis unless one develops severe Mastocytosis, which can lead to Mast Cell Leukemia requiring chemotherapy.
- Some supplements will help some people, including Quercetin, N-Acetyl Cysteine, Luteolin, and L-ornithine listed in order of patients reporting effectiveness.

Diets for Mast Cell Activation Disorders

- Gluten-Casein Free Diet
- Rotation Diet – basically a testing of foods with a diary of noted symptoms within 24 hours of consumption.
- Low Histamine Diet – emphasis on fresh foods, removal of all fermented/aged food and drink from diet.
- Low Oxalate Diet
- Paleo Diet
- Modified (gluten-free) Atkin's Diet
- Ketogenic Diet
- Carnivore Diet (generally don't recommend)
- Vegan Diet (low in L-carnitine & B vitamins)
- Low FODMAP Diet (reduced fermentable short-chain carbohydrates, especially present in grains, potatoes).
- GAPS Diet (Gut & Psychology Syndrome)
- No/reduced alcohol intake
- Removal of artificial ingredients from diet (many are petrochemical derivatives and increase mast cell activation)

Mast Cells and Mental Health

Is your medication treating your mental health or your mast cells?

- It's probably treating both.
- People with MCADs are frequently diagnosed with Anxiety, Depression, Bipolar, Panic Disorders, PTSD/CPTSD, and Cognitive Dysfunction (brain fog).
- Many "psychiatric medications" actually suppress activation of mast cells.

Neuropsychiatric Manifestations of Mast Cell Activation Syndrome and Response to Mast-Cell-Directed Treatment: A Case Series – PMC

Improvement in Neuropsychiatric Symptoms With the Addition of Nortriptyline in the Context of Mast Cell Activation Syndrome | American Journal of Psychiatry Residents' Journal

What Mental Illness Is Associated With Mast Cell Activation Syndrome? | The EDS Clinic

Dysautonomias/POTS

- 15 subtypes of Dysautonomia
- POTS: Postural Orthostatic Tachycardia Syndrome, most commonly diagnosed
- Occurs frequently as a secondary condition to Connective Tissue Disorders, Chiari Syndrome, Tethered Cord Syndrome, Cranial Cervical Instability, MCADs
- POTS is diagnosed by tilt test, usually at the office of a cardiologist
- Treatment usually focuses on symptoms

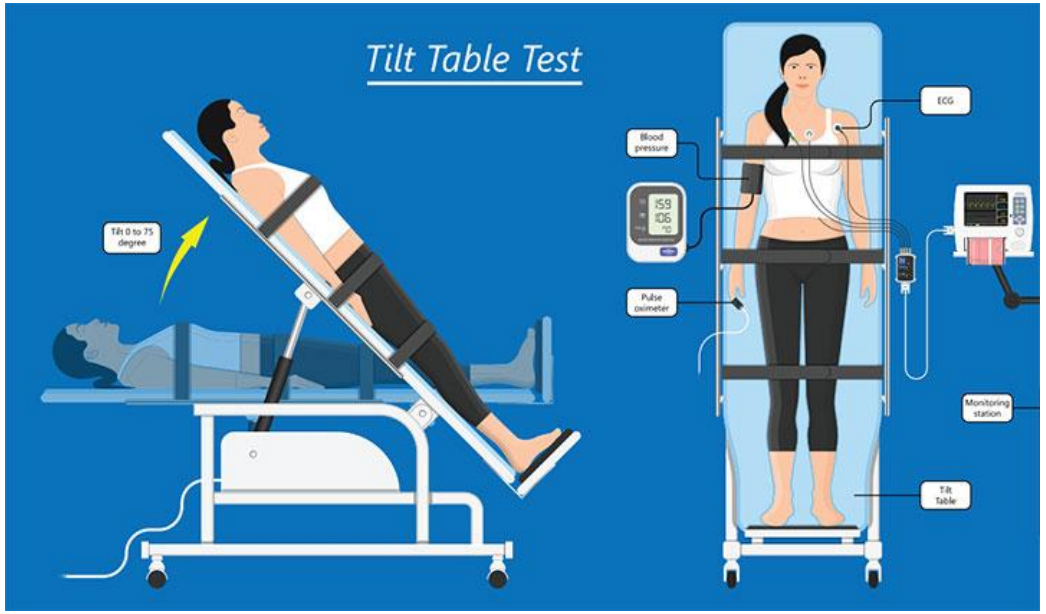
Treatments:

- Increased salt intake/electrolyte drinks
- Increase fluid intake
- Medication
- Brain Training
- Physical Therapy
- Diet & Supplements

Symptoms of Dysautonomia

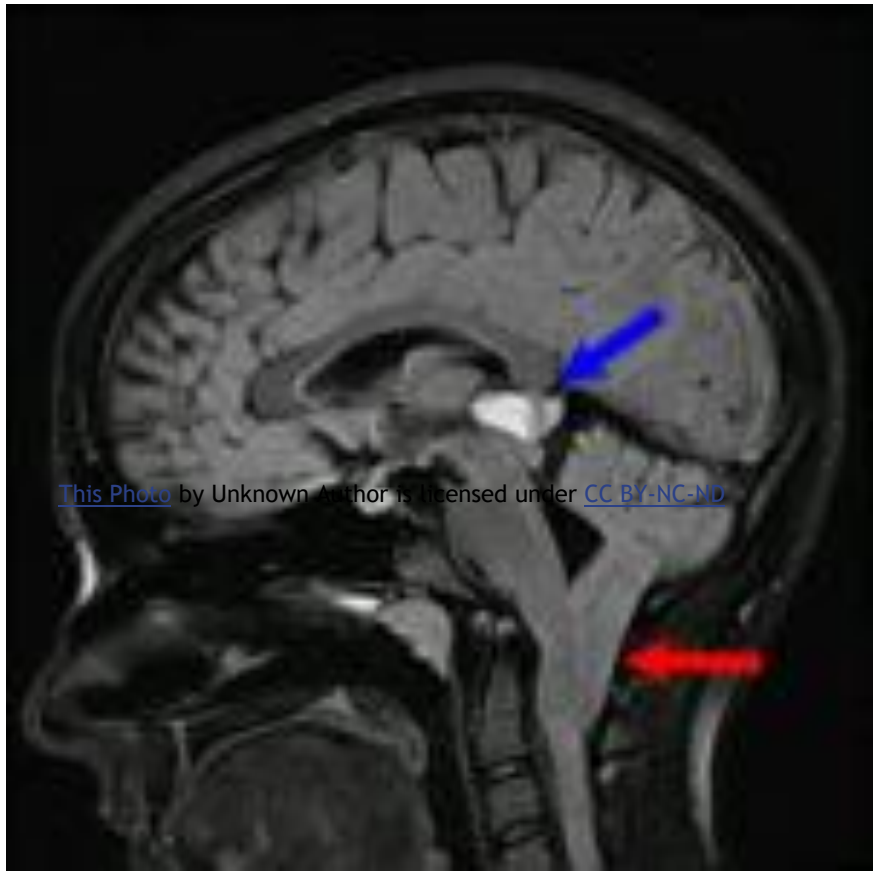
Autonomic nervous system malfunction

- Light headedness
- Fainting
- Fatigue
- Temperature regulation difficulties
- Heart palpitations
- Gastroparesis (slow GI motility)
- Sleep disturbances
- Breathing disturbances



Chiari Malformation

- Cerebellum pokes through the foramen magnum at the base of the skull
- 4 types based on severity & symptoms
- Diagnosed with MRI, easier to diagnose mild Chiari with upright position instead of prone
- May be corrected with neck brace or surgery if considered severe, which may reduce or cure symptoms



Symptoms of Chiari Malformation

Common:

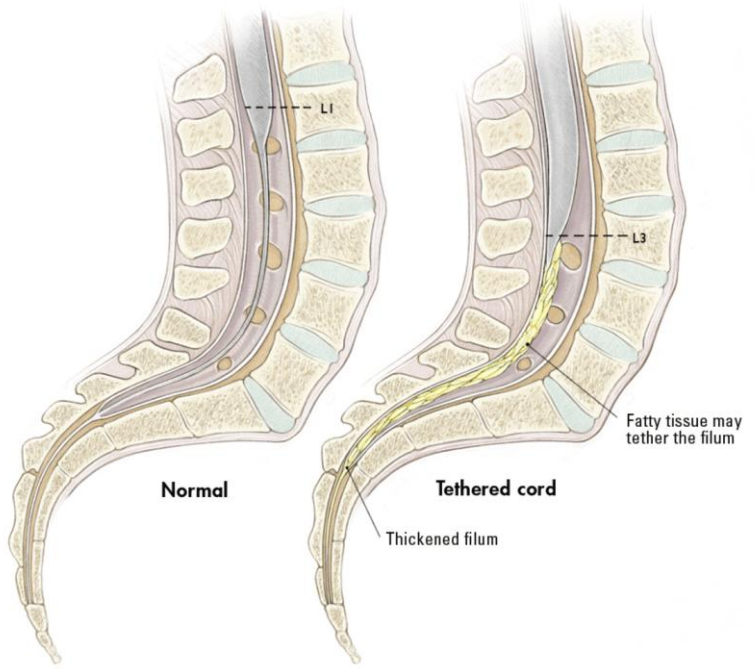
- Neck pain
- Balance issues/unsteady walking
- Poor hand coordination
- Numbness or tingling of hands/feet
- Dizziness
- Swallowing difficulties, including gagging, choking, or vomiting
- Speech changes/hoarseness

Less common:

- Tinnitus: ringing or buzzing in ears
- Weakness
- Slowed hearth rhythm
- Scoliosis
- Breathing difficulties

Tethered Cord Syndrome

- Spinal cord attached to surrounding tissues
- May stretch the spinal cord and lead to blood flow issues in the spinal nerves and cause damage
- More common in Spina Bifida, less common in EDS
- May require surgical correction, reducing or curing symptoms
- Usually congenital, may be acquired through infection, spinal trauma, tumors, or scarring after spinal surgery



Symptoms of Tethered Cord Syndrome

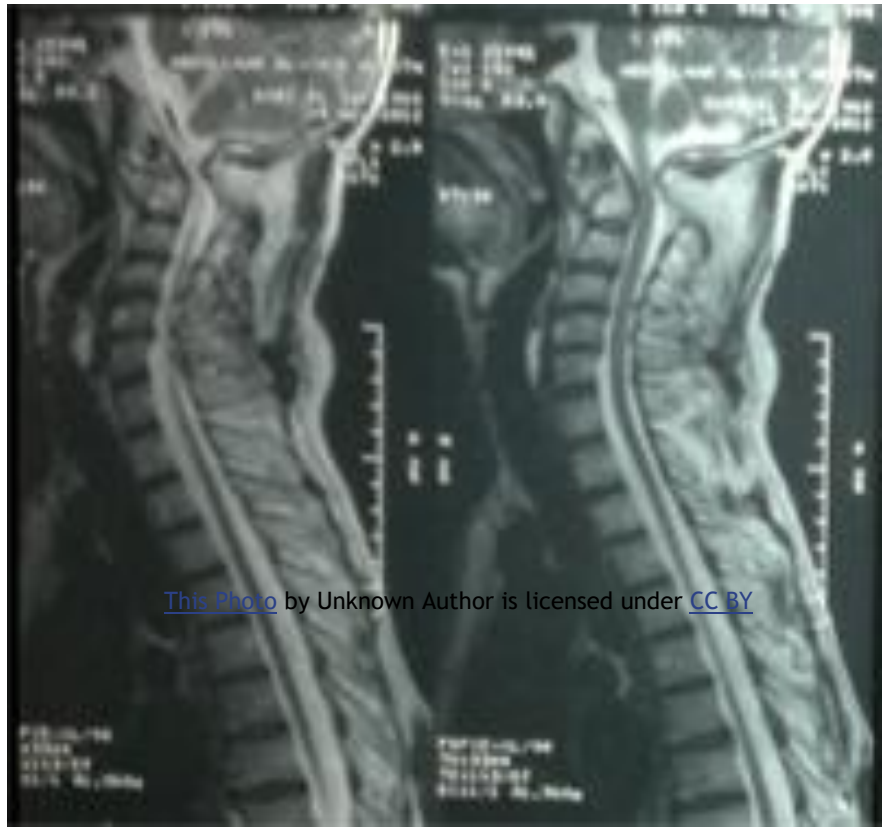
- Difficulty with walking
- Numbness of legs or back
- Severe leg or back pain, may extend to genitals or anus
- Difficulties with bowel and/or bladder control
- Hemangiomas/discolored skin patches
- Dimples, benign tumors, or patches of hair on lower back
- Scoliosis
- Acrochordons: skin tags
- Syringomyelia: cysts filled with fluid on spinal cord
- Muscle atrophy: loss of muscle mass

Diagnosed with:

- MRI
- Myelogram: injects contrast dye into sac around spinal cord
- CT scan
- Ultrasound

Cranial Cervical Instability

- Ligaments and tissues in the neck that support the head are damaged and weakened.
- Usually occurs between the C1 and C2 vertebrae, the junction between skull and neck.
- Compresses or stretches the brainstem and/or spinal cord.



Symptoms of Cranial Cervical Instability

- Headaches
- Upper neck pain
- Dizziness
- Brain fog
- Blurred vison

Diagnosed through:

- MRI
- DMX: Digital Motion X-ray
- CT Scan: upper cervical or rotatory

Treatment

- C0-1 and C1/2 facet injections with X-ray guidance
- Occipital nerve blocks
- Superficial cervical plexus blocks
- Ligament injections

Strokes

BE FAST:

- Balance or coordination
- Eyes (blurring, loss of vision)
- Facial drooping
- Arm (or leg) weakness
- Speech difficulties
- Time to call emergency services

- Very common in Ehlers-Danlos Syndrome.
- vEDS is at highest risk, but other types are noted for having it as well, such as hEDS.
- Can happen at any age in EDSers, from newborn to elderly.
- Important to get to hospital for quick treatment to prevent further damage and complications.

Marfan's Syndrome

- **Ghent criteria for diagnosing Marfan syndrome** include the following major criteria:
- **Skeletal System**: Four or more of the following:
- Pectus carinatum (pigeon chest) or pectus excavatum
- Span to height ratio > 1.05
- Wrist and thumb signs
- Scoliosis > 20°

Mutation of FBN1 gene

Cardiovascular System:

- Dilatation of the ascending aorta involving at least the sinuses of Valsalva
- Dissection of the ascending aorta
- **Ocular Features**:
- Ectopia lentis
- **Family History**:
- Major criterion in one organ system and involvement of a second organ system for relatives of an index case.
- These criteria help in the accurate recognition and diagnosis of Marfan syndrome, facilitating better patient management and counseling.

Osteogenesis Imperfecta (Brittle Bone Disease)

19 subtypes, symptoms generally include:

- Fragile bones that may break easily during normal activities.
- Curved spine (scoliosis)
- Muscle weakness
- Teeth may break easily
- Bone pain
- Bluish sclera ("whites" of eyes)
- Triangular face shape with pointy chin
- Short stature
- Misaligned, discolored teeth
- Barrel-shaped rib cage
- Easy bruising
- Lung weakness
- Hearing loss
- Heart disease
- Nervous system complications
- Collagen deficiency
- Usually mutations of COL1A1 or COL1A2

Symptom or "Behavior?"

- Symptoms are physical or emotional responses based upon an underlying medical condition.
- A "behavior" is an observable reaction to any sort of input – and it could be internal.
- Does the person exhibit the behavior in many different settings, with different people, etc.?
- Consistency – does it happen while the child is doing something motivating and enjoyable?

How can I access this research?

Many of these articles will want you to pay for full access to the files. That is not necessary.

If you enroll for even one credit in a community college or university, you have access to their library, which includes subscriptions to a variety of research publications.

If you email the researcher(s) at the email address provided with medical publications, many of them have assistants who will send you a copy of the article (usually in PDF format) for free.

For as long as it remains up, you can also access scientific research for free at Sci-Hub: removing barriers in the way of science.

Suggested Resources

Home - The Ehlers Danlos Society (ehlers-danlos.com)

Mast Cells - Dr T C Theoharides MD PhD (mastcellmaster.com)

Hell's Bells and Mast Cells - Raising awareness about MCAS, EDS, and dysautonomia one laugh at a time (hellsbellsandmastcells.com)

Telehealth | Mast Cells United

Dr. Tania Dempsey | MCAS, Lyme & Complex Diseases (drtaniadempsey.com)

Chiari Malformations | National Institute of Neurological Disorders and Stroke (nih.gov)

Tethered Spinal Cord Syndrome | National Institute of Neurological Disorders and Stroke (nih.gov)

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Health Disparities Among Sexual and Gender Minorities with Autism Spectrum Disorder | SpringerLink
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Elevated rates of autism, other neurodevelopmental and psychiatric diagnoses, and autistic traits in transgender and gender-diverse individuals | Nature Communications
Evidence-based support for autistic people across the lifespan: maximising potential, minimising barriers, and optimising the person–environment fit - The Lancet Neurology
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Novel SERAC1 Variant Presenting With Adult-Onset Extrapyramidal Dystonia-Parkinsonism Phenotype | Neurology Genetics
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> "Twelve of the 37 subjects (32 %) met the diagnostic criteria for parkinsonism; however, of these, 29 subjects were on atypical neuroleptics, complicating interpretation of the findings. Two of eight (25 %) subjects not taking atypical neuroleptic medications met the criteria for parkinsonism. Combining subjects who were not currently taking atypical neuroleptic medications, across both studies, we conservatively classified 4/20 (20 %) with parkinsonism."

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