

**Summary Comparison of Characteristics
of Autism & Mercury Poisoning**

Mercury Poisoning	Autism
<i>Psychiatric Disturbances</i>	
Social deficits, shyness, social withdrawal	Social deficits, social withdrawal, shyness
Depression, mood swings; mask face	Depressive traits, mood swings; flat affect
Anxiety	Anxiety
Schizoid tendencies, OCD traits	Schizophrenic & OCD traits; repetitiveness
Lacks eye contact, hesitant to engage others	Lack of eye contact, avoids conversation
Irrational fears	Irrational fears
Irritability, aggression, temper tantrums	Irritability, aggression, temper tantrums
Impaired face recognition	Impaired face recognition
<i>Speech, Language & Hearing Deficits</i>	
Loss of speech, failure to develop speech	Delayed language, failure to develop speech
Dysarthria; articulation problems	Dysarthria; articulation problems
Speech comprehension deficits	Speech comprehension deficits
Verbalizing & word retrieval problems	Echolalia; word use & pragmatic errors
Sound sensitivity	Sound sensitivity
Hearing loss; deafness in very high doses	Mild to profound hearing loss
Poor performance on language IQ tests	Poor performance on verbal IQ tests
<i>Sensory Abnormalities</i>	
Abnormal sensation in mouth & extremities	Abnormal sensation in mouth & extremities
Sound sensitivity	Sound sensitivity
Abnormal touch sensations; touch aversion	Abnormal touch sensations; touch aversion
Vestibular abnormalities	Vestibular abnormalities
<i>Motor Disorders</i>	
Involuntary jerking movements - arm flapping, ankle jerks, myoclonal jerks, choreiform movements, circling, rocking	Stereotyped movements - arm flapping, jumping, circling, spinning, rocking; myoclonal jerks; choreiform movements
Deficits in eye-hand coordination; limb apraxia; intention tremors	Poor eye-hand coordination; limb apraxia; problems with intentional movements
Gait impairment; ataxia - from incoordination & clumsiness to inability to walk, stand, or sit; loss of motor control	Abnormal gait and posture, clumsiness and incoordination; difficulties sitting, lying, crawling, and walking
Difficulty in chewing or swallowing	Difficulty chewing or swallowing
Unusual postures; toe walking	Unusual postures; toe walking
<i>Cognitive Impairments</i>	
Borderline intelligence, mental retardation - some cases reversible	Borderline intelligence, mental retardation - sometimes "recovered"

Poor concentration, attention, response inhibition	Poor concentration, attention, shifting attention
Uneven performance on IQ subtests	Uneven performance on IQ subtests
Verbal IQ higher than performance IQ	Verbal IQ higher than performance IQ
Poor short term, verbal, & auditory memory	Poor short term, auditory & verbal memory
Poor visual and perceptual motor skills, impairment in simple reaction time	Poor visual and perceptual motor skills, lower performance on timed tests
Difficulty carrying out complex commands	Difficulty carrying out multiple commands
Word-comprehension difficulties	Word-comprehension difficulties
Deficits in understanding abstract ideas & symbolism; degeneration of higher mental powers	Deficits in abstract thinking & symbolism, understanding other's mental states, sequencing, planning & organizing
<i>Unusual Behaviors</i>	
Stereotyped sniffing (rats)	Stereotyped, repetitive behaviors
ADHD traits	ADHD traits
Agitation, unprovoked crying, grimacing, staring spells	Agitation, unprovoked crying, grimacing, staring spells
Sleep difficulties	Sleep difficulties
Eating disorders, feeding problems	Eating disorders, feeding problems
Self injurious behavior, e.g. head banging	Self injurious behavior, e.g. head banging
<i>Visual Impairments</i>	
Poor eye contact, impaired visual fixation	Poor eye contact, problems in joint attention
"Visual impairments," blindness, near-sightedness, decreased visual acuity	"Visual impairments"; inaccurate/slow saccades; decreased rod functioning
Light sensitivity, photophobia	Over-sensitivity to light
Blurred or hazy vision	Blurred vision
Constricted visual fields	Not described
<i>Physical Disturbances</i>	
Increase in cerebral palsy; hyper- or hypo-tonia; abnormal reflexes; decreased muscle strength, especially upper body; incontinence; problems chewing, swallowing, salivating	Increase in cerebral palsy; hyper- or hypotonia; decreased muscle strength, especially upper body; incontinence; problems chewing and swallowing
Rashes, dermatitis/dry skin, itching; burning	Rashes, dermatitis, eczema, itching
Autonomic disturbance: excessive sweating, poor circulation, elevated heart rate	Autonomic disturbance: unusual sweating, poor circulation, elevated heart rate
<i>Gastro-intestinal Disturbances</i>	
Gastroenteritis, diarrhea; abdominal pain, constipation, "colitis"	Diarrhea, constipation, gaseousness, abdominal discomfort, colitis
Anorexia, weight loss, nausea, poor appetite	Anorexia; feeding problems/vomiting
Lesions of ileum & colon; increased gut permeability	Leaky gut syndrome
Inhibits dipeptidyl peptidase IV, which cleaves	Inadequate endopeptidase enzymes needed for

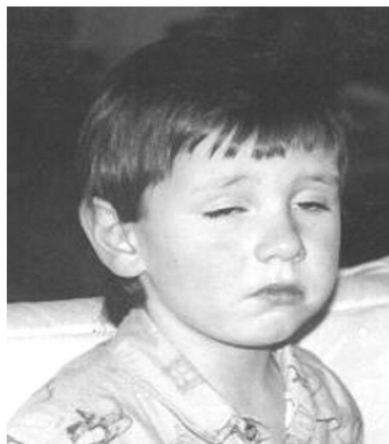
casomorphin	breakdown of casein & gluten
<i>Abnormal Biochemistry</i>	
Binds -SH groups; blocks sulfate transporter in intestines, kidneys	Low sulfate levels
Has special affinity for purines & pyrimidines	Purine & pyrimidine metabolism errors lead to autistic features
Reduces availability of glutathione, needed in neurons, cells & liver to detoxify heavy metals	Low levels of glutathione; decreased ability of liver to detoxify heavy metals
Causes significant reduction in glutathione peroxidase and glutathione reductase	Abnormal glutathione peroxidase activities in erythrocytes
Disrupts mitochondrial activities, especially in brain	Mitochondrial dysfunction, especially in brain
<i>Immune Dysfunction</i>	
Sensitivity due to allergic or autoimmune reactions; sensitive individuals more likely to have allergies, asthma, autoimmune-like symptoms, especially rheumatoid-like ones	More likely to have allergies and asthma; familial presence of autoimmune diseases, especially rheumatoid arthritis; IgA deficiencies
Can produce an immune response in CNS	On-going immune response in CNS
Causes brain/MBP autoantibodies	Brain/MBP autoantibodies present
Causes overproduction of Th2 subset; kills/inhibits lymphocytes, T-cells, and monocytes; decreases NK T-cell activity; induces or suppresses IFNg & IL-2	Skewed immune-cell subset in the Th2 direction; decreased responses to T-cell mitogens; reduced NK T-cell function; increased IFNg & IL-12
<i>CNS Structural Pathology</i>	
Selectively targets brain areas unable to detoxify or reduce Hg-induced oxidative stress	Specific areas of brain pathology; many functions spared
Damage to Purkinje and granular cells	Damage to Purkinje and granular cells
Accumulates in amygdala and hippocampus	Pathology in amygdala and hippocampus
Causes abnormal neuronal cytoarchitecture; disrupts neuronal migration & cell division; reduces NCAMs	Neuronal disorganization; increased neuronal cell replication, increased glial cells; depressed expression of NCAMs
Progressive microcephaly	Progressive microcephaly and macrocephaly
Brain stem defects in some cases	Brain stem defects in some cases
<i>Abnormalities in Neuro-chemistry</i>	
Prevents presynaptic serotonin release & inhibits serotonin transport; causes calcium disruptions	Decreased serotonin synthesis in children; abnormal calcium metabolism
Alters dopamine systems; peroxidase deficiency in rats resembles mercurialism in humans	Possibly high or low dopamine levels; positive response to peroxidase (lowers dopamine levels)
Elevates epinephrine & norepinephrine levels by blocking enzyme that degrades epinephrine	Elevated norepinephrine and epinephrine
Elevates glutamate	Elevated glutamate and aspartate
Leads to cortical acetylcholine deficiency; increases muscarinic receptor density in hippocampus & cerebellum	Cortical acetylcholine deficiency; reduced muscarinic receptor binding in hippocampus

Causes demyelinating neuropathy	Demyelination in brain
EEG Abnormalities / Epilepsy	
Causes abnormal EEGs, epileptiform activity	Abnormal EEGs, epileptiform activity
Causes seizures, convulsions	Seizures; epilepsy
Causes subtle, low amplitude seizure activity	Subtle, low amplitude seizure activities
Population Characteristics	
Effects more males than females	Male:female ratio estimated at 4:1
At low doses, only affects those genetically susceptible	High heritability - concordance for MZ twins is 90%
First added to childhood vaccines in 1930s	First "discovered" among children born in 1930s
Exposure levels steadily increased since 1930s with rate of vaccination, number of vaccines	Prevalence of autism has steadily increased from 1 in 2000 (pre1970) to 1 in 500 (early 1990s), higher in 2000.
Exposure occurs at 0 - 15 months; clinical silent stage means symptom emergence delayed; symptoms emerge gradually, starting with movement & sensation	Symptoms emerge from 4 months to 2 years old; symptoms emerge gradually, starting with movement & sensation

Safe Minds, www.safeminds.org



Child with Acrodynia, form of mercury poisoning
(courtesy: *L'Acrodynie* by AW Cameron, 1931)



Child diagnosed with autism
(courtesy: Lyn Redwood, Safe Minds, 2001)