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Function

Transmit electrical impulses to and from central nervous system (CNS) (sensation and motor control)

Interconnecting neurons in CNS provide for consciousness, learning, creativity, memory (outside this scope)

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Structure

Nerves are bundles of individual neurons.

Each neuron has axon, cell body, dendrite; Neurons communicate at synapses, using neurotransmitters

Peripheral nerves = bundles of axons and dendrites

Sensory neurons: long dendrites, cell body in dorsal root ganglion (DRG), short axons

Motor neurons: long axons, cell body and short dendrite in ventral horn of spinal cord

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All motor neurons terminate in muscle or glandular tissue

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Reflex Arc

Connects sensation to motor response

Reaction to spinal cord response to synapses, whereby information travels up the spine into the brain

Neurons covered with Schwann cells form **myelin** and **neurilemma**

_____

Myelin in CNS and peripheral nervous system (PNS)**:**

Speeds transmission, electrical insulation

_____

Neurilemma in CNS only:

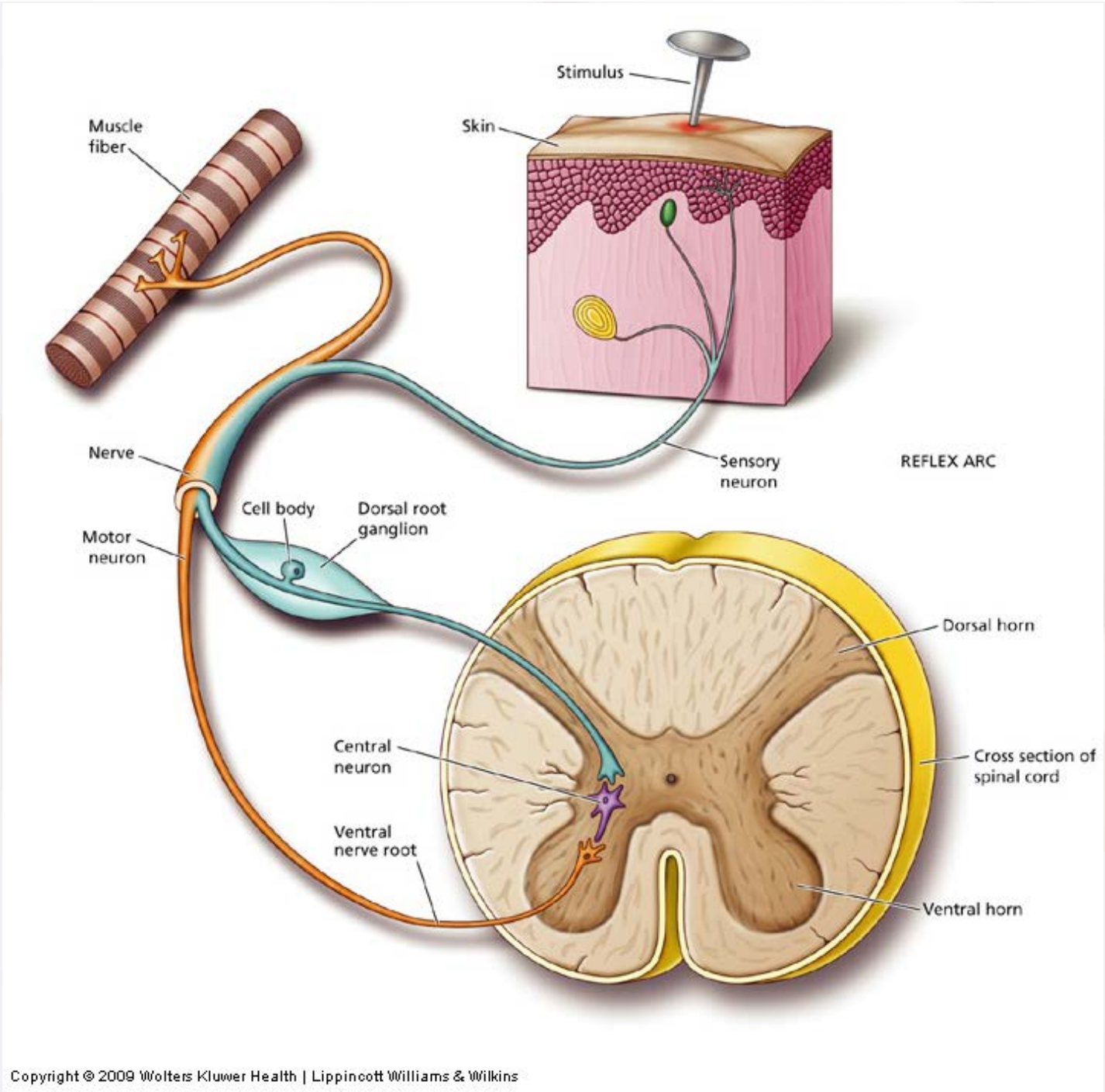
Promotes repair of PNS tissue

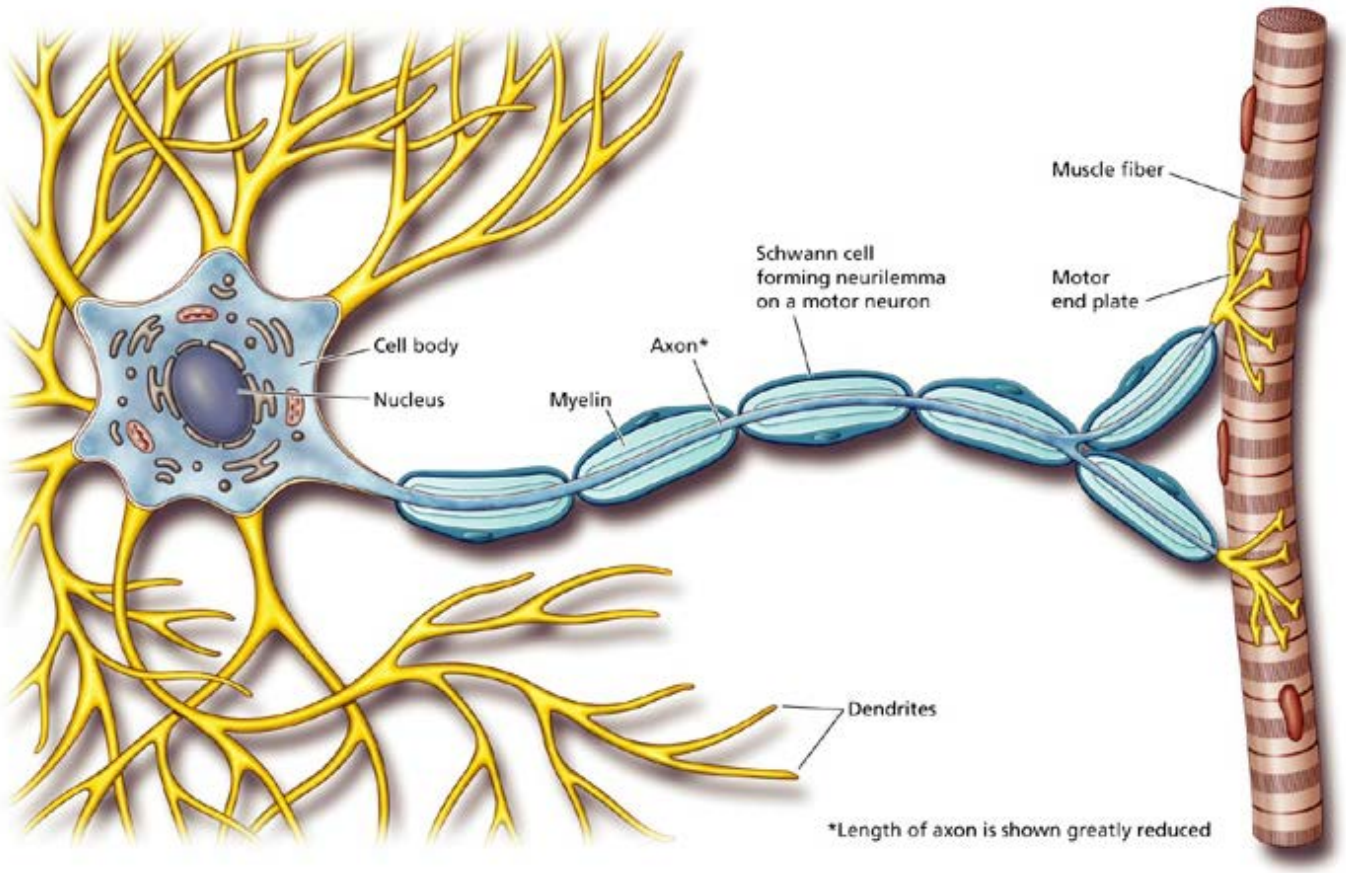
_____

Most PNS nerves run close to bone for protection

_____

Vulnerable in a few places





General Neurological Problems

Most disorders that massage can affect involve pinching or distortion of peripheral nerves

Brain and spinal cord injuries are inaccessible

Patients can benefit from massage to maintain function

Proprioceptive adaptation may be subject to interruption

Psychological disorders are a different class

May benefit from massage for stress balance

Risk of interpersonal complications

Massage may aggravate or relieve pressure

Major cautions for massage therapists:

Numbness (more dangerous than pain)

Verbal communication (watch for nonverbal signals)

Medications (may have interactions with massage)

Chronic Degenerative Disorders

Alzheimer Disease

Amyotrophic Lateral Sclerosis

Multiple Sclerosis

Peripheral Neuropathy

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Alzheimer Disease

Progressive degenerative brain disorder; Memory loss, personality changes, death

Etiology

First observations were plaques and tangles: still leading issues

Plaques

- Beta amyloid deposits on neurons in brain
- Stimulates inflammatory response: kills affected and nearby unaffected cells

Neurofibrillary tangles

- Tau in cytoskeletons collapses; cells fall out of relationship, become twisted and tangled
- Can't transmit messages, shrink and die

Brain shrinks (See Image)

Fewer brain cells function, neurotransmitter levels drop

- Remaining neurons don't work as well

Other issues may contribute

Demographics

About 5% of U.S. population (4.5 million)

Half of people in nursing homes

$100 billion/year in direct, indirect medical costs

Incidence increases with age

10% people > 65 years

About half of people > 85 years

Women > men; may be related to longer life span

Chronic inflammation, history of head injury, exposure to toxins, high cholesterol, low estrogen, and other factors

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more Alzheimer Disease

Signs and Symptoms	Diagnosis	Treatments	Massage
Staging protocols vary Mild, moderate, severe Progressive memory loss from mild cognitive impairment to complete disconnection, organ failure	Conclusive only with autopsy Tests to rule out other sources of dementia, evaluate mental status Important to identify early: medication can preserve early stage **Differential Diagnosis** Causes of permanent memory loss other than AD include Vascular dementia Stroke and transient ischemic attack (TIA) Parkinson disease Lewy body dementia Huntington disease	Medication to prevent reuptake of acetylcholine Mood, behavioral modifiers	Patients respond well to touch Less disruptive, better orientation, etc. Cautions: Elderly clients have other health problems Inability to communicate verbally

	Creutzfeldt-Jakob disease		

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Amyotrophic Lateral Sclerosis

Also called Lou Gehrig disease in the United States and motor neurone disease in the United Kingdom; Progressive degeneration of motor neurons in CNS and PNS; Large motor neurons on lateral aspect of spinal cord are replaced with fibrous astrocytes

Demographics

Three types: sporadic (most common); familial (genetic), Mariana Island variety

Mostly people 40–70 years old

Average age at diagnosis = 55

About 5,000 diagnoses/year; 30,000 with ALS in the United States

Men > women

Etiology

Cause unknown

- Degeneration of motor neurons in spinal cord → progressive, irreversible atrophy of skeletal muscle
- One-third of motor neurons for a muscle must be destroyed for symptoms to develop

Factors:

- Tangled neural fibers, deposits of plaque
- Glutamate accumulates in synapses
- Interrupts only motor function; intellect and memory stay intact

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more Amyotrophic Lateral Sclerosis

Signs and Symptoms	Diagnosis	Treatments	Massage
75% is spinal variation Loss of coordination, fine motor skills in hands, feet Progresses toward core; breathing muscles are last to lose function 25% is bulbar form Speech, swallowing, control of tongue Frequent, extreme mood swings (emotional incontinence) Tends to be faster progression Upper motor neuron problems Progressive spasticity Exaggerated reflexes Positive	History, physical examination, nerve conduction studies, electromyographs Rule out muscular dystrophy, hyperthyroidism, multiple sclerosis, postpolio syndrome, peripheral neuropathy, spinal cord restriction	Palliative Moderate exercise, physical therapy (PT), occupational therapy (OT) Heat, whirlpools Speech therapy Assistive devices: braces, wheelchairs, computers, voice aids Medication for fatigue, spasms, infections New drugs may limit glutamate accumulation Prognosis Most patients die 2–10 years after diagnosis Pneumonia, cachexia Some live for decades (Stephen Hawking); not clear why/how	Appropriate for pain, within client resilience Work with health care team

Babinski sign Lower motor neuron problems Weakness, atrophy, muscle cramps, fasciculations Pain develops as the body collapses; no attack on sensory neurons			

Multiple Sclerosis

Inflammation, degeneration of myelin sheaths in CNS; Probably autoimmune

Etiology

Myelin sheath in CNS is attacked, destroyed

Oligodendrocytes multiply to repair damage; ultimately fail

- Myelin is replaced with scar tissue

Electrical impulses are slowed or obstructed

- Motor, sensory paralysis

Runs in flare/remission

- With persistent flares the neuron is damaged: this is permanent

Causes

Most agree on immune system attack on myelin sheath

Genetic predisposition for autoimmunity

- Probably a combination of predisposition and exposure to a trigger

Demographics

Whites more than other groups

Mostly among people who live far from equator, especially before age 15

Usually diagnosed 20–40 years old

Young women> young men

Older women = older men

300,000–350,000 live with MS now

25,000 new diagnoses/year

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more Multiple Sclerosis

Signs and Symptoms	Diagnosis	Treatments	Massage
The great imitator: looks like lots of other disorders Weakness Spasm Changes in sensation Optic neuritis Urological dysfunction Sexual dysfunction Difficulty walking Loss of cognitive function Depression Lhermitte sign Digestive disturbances Fatigue Progression Five patterns:	Possible, probable, definite MS Symptoms, family health history, spinal tap, magnetic resonance imaging (MRI), nerve conduction tests Official diagnostic criteria: Evidence of two or more episodes Episodes of flare are separated by at least 1 month No other explanation for symptoms can be found Differential Diagnosis Lyme disease HIV/AIDS Scleroderma Vascular problems in brain	Steroids can reduce inflammation; good for short term only Interferon betas: limit immune system activity Plasmapheresis (for acute situations) Also exercise, PT, OT, diet, sleep, stress management	Safest in remission; take care not to overstimulate (→ spasms, pain) Exacerbated with heat: avoid rapid changes in environment

Benign MS: only one flare Relapse/remitting (RRMS): flare and remission: most common presentation Secondary progressive MS (SPMS): only partial recovery during remission Primary progressive (PPMS): steady decline in function Malignant MS: rapidly progressive	Complications of encephalitis Herniated, ruptured disc Lupus CNS tumors Fibromyalgia B_{12}, folic acid deficiency		

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Peripheral Neuropathy

Symptom or complication of underlying problem: nerve damage

Etiology

Mononeuropathy

Polyneuropathy

Can affect sensation, motor control; voluntary or involuntary muscle function

Can be genetic anomaly

Usually a complication of some other problem

Injury: carpal tunnel syndrome, thoracic outlet syndrome, Bell palsy, disc disease, trigeminal neuralgia

Infection: herpes simplex, herpes zoster, HIV/AIDS, Lyme disease, hepatitis, syphilis, leprosy

Systemic disease: diabetes (type 1 or type 2), renal failure, vitamin B_{12} deficiency, cancer; also autoimmune diseases, including lupus, Sjögren syndrome, sarcoidosis, Guillain-Barré syndrome.

Toxic exposure: chronic alcoholism, sniffing glue, some medications, exposure to heavy metals (especially lead and mercury), solvents, other environmental contaminants

more Peripheral Neuropathy

Signs and Symptoms	Treatments	Massage
Usually has slow onset Depends on which neurons are damaged Sensory: pain, tingling, hypersensitivity, loss of sensitivity, numbness Usually at extremities Motor: twitching, cramps, atrophy of muscles Autonomic: problems with heart rate, blood pressure, respiratory rate, digestive and urinary function	Depends on source of problem Chronic pain: tricyclic antidepressants, antiseizure meds Topical ointments TENS (transcutaneous electrical nerve stimulation) units Biofeedback Acupuncture Relaxation techniques Massage	Numbness, tingling, changes in sensation should be diagnosed Touch may soothe or irritate PN

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Chronic Degenerative Disorders

Dystonia

Parkinson Disease

Tremor

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Dystonia

Repetitive, involuntary, sustained contractions in skeletal muscles

Demographics

Most types: females > males (2–3:1)

Some = genetic anomaly

250,000–300,000 in the United States

Etiology

Problems at basal ganglia

- Inability to process dopamine, gamma-aminobutyric acid) GABA, serotonin, acetylcholine
- Bursts of electrical activity in affected muscles (not the same as tremor)

Types of dystonia:

- Focal dystonia affects only one area
- Spasmodic torticollis
- Vocal dysphonia
- Oromandibular dystonia
- Blepharospasm
- Writer's cramp

Others

- Segmental dystonia affects two adjacent or nearby areas of the body
- Multifocal dystonia affects two disconnected parts of the body
- Hemidystonia affects the left or right side of the body
- Generalized dystonia may progress to affect the whole body

more Dystonia

Signs and Symptoms	Diagnosis	Treatments	Massage
Involuntary contraction of an area Exacerbated by stress or fatigue May disappear with alternating movements Progression varies Sudden or slow onset May stabilize or subside May spill over to other muscles Can cause other problems: headaches, functional blindness, muscle irritation, fibrosis	Rule out neck injuries, Parkinson disease, Tourette syndrome, other movement disorders Genetic testing	Medications to change neurotransmitter secretion/uptake Botox injections Deep brain stimulation Surgery at brain or spinal cord	Massage is safe, may be helpful Get information on medications

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Parkinson Disease

Shaking palsy ; Progressive degenerative movement disorder

Etiology

Basal ganglia help with voluntary movement

Basal ganglia need dopamine from nearby substantia nigra

- Substantia nigra cells die
- Dopamine shortage
- Basal ganglia don't work
- Voluntary movement degrades

Causes

Not clear

- Environmental agents
- Lewy bodies
- Genetic predisposition

Parkinsonism = Parkinson-like symptoms

- Drug use
- Pugilistic parkinsonism
- Neurovascular disease

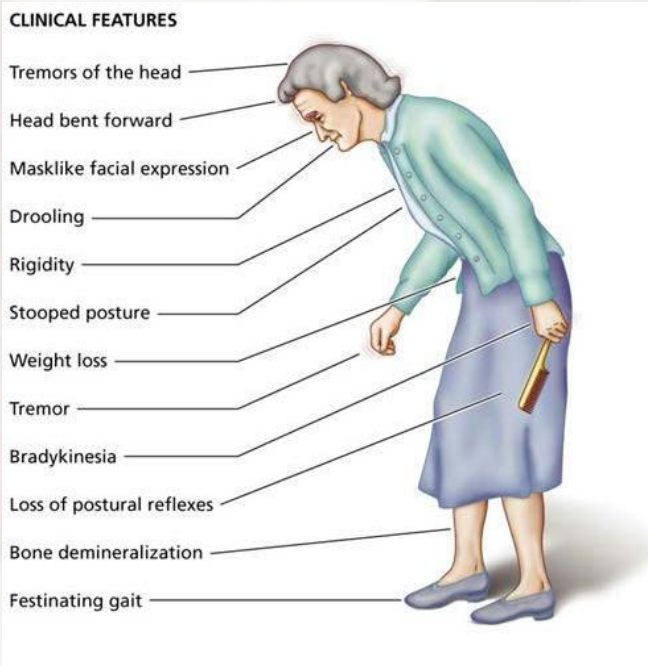
Demographics

1 to 1.5 million in the United States

60,000 new diagnoses/year

Rare under age 40; about 1% of people over 60

Men > women, 3:2



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more Parkinson Disease

Signs and Symptoms	Treatments	Massage
Primary symptoms (related to disease process): Nonspecific achiness, weakness, and fatigue Resting tremor Bradykinesia Rigidity (not the same as spasticity) Poor postural reflexes **Secondary symptoms (indirect effects or related to medications)** Shuffling, festinating gait Changes in speech Changes in handwriting Sleep disorders Depression Mental degeneration	Medication L-dopa, carbidopa (temporary, side effects) Other dopamine-affecting drugs Anticholinergic agents Antivirals Nondrug treatments Deep brain stimulation Surgery to thalamus, midbrain PT, OT, speech therapy	Massage can be safe and effective People don't move easily Can reduce rigidity Can improve sleep

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Tremor

Rhythmic oscillations of antagonistic muscle groups ; Movement occurs in a fixed plane; Varies by velocity, body parts involved, and amplitude

Etiology

Most related to dysfunction in links between the brainstem, cerebellum, thalamus

Several classifications

Resting tremor

Action tremor

- Postural
- Isometric
- Intention

Psychogenic

Physiological: exacerbated by fear, stress, underlying problem

Pathological: idiopathic or caused by other disease

Essential Tremor

- Idiopathic, not secondary to other disease
- 10 million in the United States
- Slowly progressive, not debilitating

Huntington disease

- Hereditary degeneration of cerebrum
- Symptoms show in adulthood: tremors, progressive dementia
- 5 in 1 million in the United States

Multiple system atrophy

- Tremor and many other problems
  - Shy-Drager syndrome, striatonigral degeneration, olivopontocerebellar atrophy
- Parkinson disease
  - Discussed elsewhere
- Other factors
  - Alcohol withdrawal, peripheral

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more Tremor

Treatments	Massage
Depends on causes Medication, surgery	Appropriate for diagnosed conditions; may help reconnect brain to muscles

Infectious Disorders

Encephalitis

Herpes Zoster

Meningitis

Polio, Postpolio Syndrome

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Encephalitis

Infection of brain ; Usually virus ; Occurs with myelitis, meningitis

Etiology

Mostly viral

- Can be bacterial, fungal

Viral infections can be primary or secondary (from somewhere else in the body)

Primary infections:

- Enteroviruses (directly communicable)
- Arboviruses (insect vector)

Secondary

- Herpes simplex, mumps, measles, herpes zoster

Affect parenchyma of brain

- Often mild with no lasting problems

In young and old can cause permanent damage, death

Demographics

Not always reported; difficult to estimate

Elderly and infants most vulnerable to worst effects

more Encephalitis

Signs and Symptoms	Diagnosis	Treatments	Massage
Mild to very severe Fever, headache, drowsiness, irritation, disordered thoughts Double vision, confused sensation, impaired speech, hearing Partial, complete paralysis, changes in memory, personality Convulsions, stupor, coma	Spinal tap, computed tomography (CT), MRI Blood test Electroencephalography (EEG)	Antivirals, steroids, sedatives, TLC Prognosis Depends on virulence, health of patient Most survive with no lasting problems Can cause paralysis, cognitive changes	Contraindicated while acute If in past, check for lasting problems and adjust accordingly

Herpes Zoster

Also called shingles ; Viral infection of sensory dendrites: painful, fluid-filled blisters

Etiology

Causative agent is varicella zoster virus (VZV) (also for chickenpox)

Virus is never expelled from childhood infection

Later in life virus reactivates: shingles

Causes

Stress, age, impaired immunity, trauma

Communicable only to people with no exposure to VZV

Demographics

500,000 diagnoses/year

Seldom occurs more than once, unless immunocompromised

more Herpes Zoster

Signs and Symptoms	Diagnosis	Treatments	Massage
Pain is present for 1-3 days before a blister breakout. Blisters may grow along the entire dermatome of the host dorsal root ganglion, but most often appear along isolated stretch. Sensory nerves that supply trunk and buttocks are most frequently affected.	Blood test	Antivirals may shorten outbreak Soothing lotions, steroids for anti-inflammatory action and painkillers.	Contraindicated while acute After blisters have healed and the pain has subsided, massage is appropriate

Meningitis

Meninges + itis: inflammation of the meninges, arachnoid layer, cerebral spinal fluid

Demographics

5,000 diagnoses/year

Most in children <5 years or elderly

College students, military recruits

Etiology

Important to identify the causative factor for best treatment

Bacterial meningitis

- More severe than viral; risk of permanent damage is significant
- Hearing loss, cognitive function
- Responds to antibiotics if given early

Viral meningitis

- Enteroviruses, herpes, others
- Less severe than bacterial meningitis

Bacteria in CNS thrive in cerebrospinal fluid (CSF)

- Increased permeability → cerebral edema, toxins in CSF
- Increased pressure in brain put cranial nerves at risk
- Hearing loss
- Obstructive hydrocephalus
- Blood clots, ischemic damage

Without treatment, autoregulating centers can be damaged

- 11–19% all patients have permanent damage

Bacteria can affect other areas in body

Pneumonia, rash, blood vessel damage with risk of clotting, cell death in extremities

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more Meningitis

Signs and Symptoms	Diagnosis	Treatments	Massage
Rapid-onset high fever, chills Deep red, purple rash Headache, irritability, photophobia, stiff rigid neck Can involve nausea, vomiting, delirium, convulsions, coma Long incubation period; may take 10 days for bacterial infections to peak Viral infections are slower: 3 weeks to peak, 2–3 weeks to resolve	Spinal tap	For bacterial infection: antibiotics, steroids For viral infection: supportive therapy Communicability Mucous secretions, contaminated surfaces Enteroviruses: oral-fecal contamination Prevention: HiB (*Haemophilus influenzae type B*) vaccine for childhood bacterial meningitis Vaccine for 2 of 3 meningococci is recommended for high-risk groups	Contraindicated while acute After recovery massage is appropriate

Polio, Postpolio Syndrome

Used to be called infantile paralysis; Polio: viral attack on digestive mucosa and anterior horn motor neurons; PPS: progressive muscular weakness that develops 10–40 years later

Demographics

Wild polio almost extinct

PPS still affects people infected many years ago

Etiology

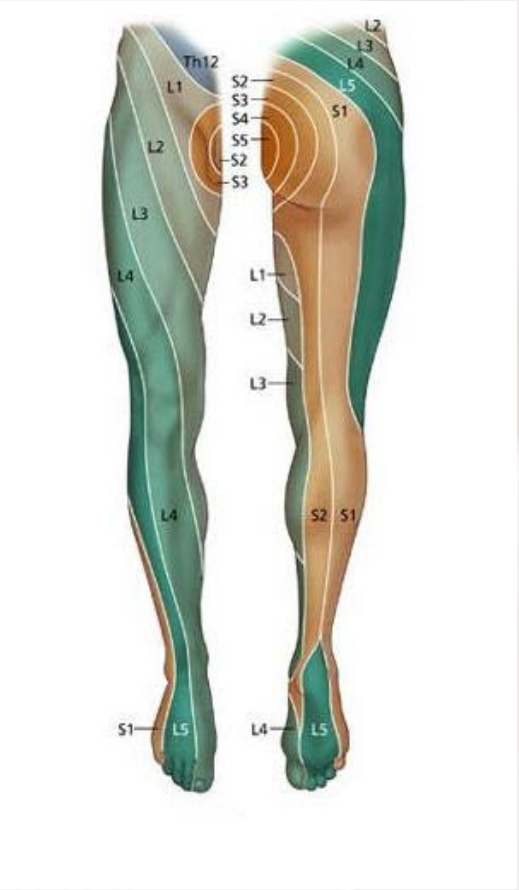
Poliovirus spreads through oral-fecal contamination

- Contaminated water
- Into stomach, intestine (concentrates in fecal matter) ; Infection looks like flu plus diarrhea
  - 1% of infected people: virus travels to CNS ; Destroys motor neurons in ventral horn ; Atrophy of supplied muscles, motor paralysis (sensation is intact)

Overlap of nerve supply allows function to remain in muscle groups

Anterior horns can grow new terminal axons

- Puts more demand on each nerve cell
- Eventually they wear out: PPS



more Polio, Postpolio Syndrome

Signs and Symptoms	Diagnosis	Treatments	Massage
PPS Sudden onset of fatigue, pain, muscle weakness Dyspnea, dysphagia, sleep disturbances Cycles of lost function, some recovery, flare again	Episode of polio plus Onset of muscle weakness, loss of stamina for at least 1 year	Reduce muscular, neurological demand: Change in activity levels Using braces Exercising muscles *not* affected by polio Prevention Polio vaccines: Salk = inactivated virus to create antibodies (may spread in feces of patient) Sabin = oral dose of weakened virus, slightly higher risk of infection	For polio, because sensation is intact, massage is indicated For PPS, massage is indicated to improve local nutrition, decrease tension

Psychiatric Disorders

Anxiety DIsorders

Attention Deficit Hyperactivity Disorder

Autism Spectrum Disorders

Chemical Dependency

Depression

Eating Disorders

Anxiety Disorders

Collection of disorders; Irrational fears; Efforts to control them; Mild to debilitating

Etiology

"*Am I safe?*"

"*Probably not.*"

Arousal: preparation for a stressful event

Fear: the event is confirmed

Anxiety: prolonged arousal or fear—without an event

Two major factors:

The limbic system and the hypothalamic-pituitary-adrenal (HPA) axis

Limbic system determines perceived safety

Amygdala, hippocampus

Linked to hypothalamus: center for sympathetic/parasympathetic response

Hippocampus: center for verbal memory

Amygdala: history of fear responses

Together they can stimulate the HPA axis to establish a stress response

HPA axis : Chemical/electrical connections ; Excessive glucocorticoid secretion (cortisol) with prolonged stress

Weakens connective tissue

Suppresses immunity

Shrinks hippocampus

Demographics

Discussed with each type

40 million in the United States aged 18 years or older have some type (lots of overlap)

Women> men 3:2

Low end of socioeconomic scale

More likely to become substance abusers, depressive, suicidal

Neurotransmitters

Norepinephrine

GABA

Serotonin

CRF

Tightly interdependent: disruption in one → disruptions in all

Types of anxiety disorders

General anxiety disorder (GAD)

6.8 million in the United States

Women > men 2:1

Chronic, exaggerated, consuming worry; constant anticipation of disaster : Restlessness/edginess; Fatigue; Poor concentration ; Irritability; Muscle tension; Sleeping problems

Panic disorder

6 million in the United States

Sudden onset of extreme sympathetic reactions: Pounding heart, chest pain, sweatiness, dizziness, faintness; Feeling of impending doom, nearness of death; 10 minutes to many hours

Can have panic attack without panic disorder

Complication: agoraphobia, shrinking safety zone

Acute and posttraumatic stress disorder

Acute (ATSD) = symptoms within 1 month of triggering event

Post (PTSD) = symptoms persist 3 or more months

7.7 million in the United States

Persistent visceral memories of ordeal: Combat, abuse, rape, assault, torture, natural disaster, terrorist attack; Patient may be a witness or participant

Memories relieved in nightmares, flashbacks

Exaggerated startle reflex, dissociation, hypervigilance

PTSD may have delayed onset

Obsessive-compulsive disorder (OCD)

2.2 million in the United States

Men = women

Can come and go, is not always progressive

Unwelcome thoughts (obsessions)

Efforts to control them (compulsions)

Common obsessions : Fear of contamination (dirt, germs, sexual acts); Fear of violence, catastrophic events; Fear of committing violent, sexual acts; Fear of disorder, asymmetry ; Common rituals; Repeated handwashing; Refusing to touch people, surfaces; Repeated checking locks, stove, irons, etc.; Counting telephone poles; Symmetrically arranging items; Repetition of chants, prayers; Many hours/day devoted to rituals

Phobias: social and specific

Social phobia

Also called *social anxiety disorder*

15 million in the United States

Intense, irrational fear of being judged negatively by others, public embarrassment

Can limit ability to work, school, relationships

Specific phobias

19.2 million in the United States

Intense irrational fear of something that poses no, little threat : Animals (dogs, cats, birds, insects, spiders) ; Closed-in places, heights, flying, elevators, blood

Respond to desensitization and relaxation techniques more than to medication

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more Anxiety Disorders

Treatments	Massage
Medication and psychotherapy Most are treatable if patients can find it Medications Antidepressants Antianxieties Beta-blockers Psychotherapy Supported resistance to compulsive behaviors Controlled exposure to stimuli for phobics Behavioral-cognitive therapies	Relaxation techniques, breathing exercises, biofeedback are often taught; massage Touch and massage can reduce self-reported anxiety Indicated as long as the stimulus is perceived as safe and nurturing

Attention Deficit Hyperactivity Disorders

Neurobiochemical disorder → difficulties with attention, movement, impulse control

Etiology

Still being explored

Problems with dopamine production, transportation, reabsorption

Noradrenaline disruption in frontal cortex and basal ganglia (judgment, movement)

Demographics

Estimates only

4.3% school-age children (= 4.4 million) in the United States

Some surveys show higher, lower numbers

May be both overdiagnosed and underdiagnosed

Boys > girls 2.5:1; may not be accurate

30–75% of children with ADHD have it as adults

They may raise kids with ADHD

more Attention Deficit Hyperactivity Disorders

Signs and Symptoms	Diagnosis	Treatments	Massage
Three behavior patterns: Inattentiveness Hyperactivity Impulsivity Behaviors are consistent in various settings	Observation and ruling out other disorders: Depression, anxiety, learning disabilities, sleep disorders, fetal alcohol syndrome, vision/hearing problems, Tourette syndrome, mood disturbances, seizure disorders, others Complications Poor self-esteem, difficulty with relationships, performance at school, work High rate of motor vehicle accidents (MVAs), substance abuse, other addictions	Counseling, training for coping skills Medications Psychostimulants Medication side effects Appetite suppression Increased blood pressure, heart rate Sleep problems Facial, vocal tics Nondrug approaches Nutritional supplements Avoid caffeine, sugar, stimulants	Indicated: may improve classroom behavior, interpersonal relationships May need to adjust length of session

Autism Spectrum Disorders

Communication disorders ; Specific, predictable movement patterns ; Sensory problems ; Usually begins early in childhood; diagnosable by age 3 ; Also called pervasive developmental disorders (PDD)

Demographics

Three to four in 1,000 school-aged children

Number is rising; unclear why

Etiology

Abnormalities in neural systems that link brainstem, limbic system, basal ganglia, cerebellum, corpus callosum, cerebral cortex

Some causes identified:

- Fragile X syndrome
- Tuberous sclerosis
- Genetic predisposition

Theories

- Mitochondrial dysfunction in neurons?
- Autoimmune response?
- Exposure to heavy metals
- Allergies

more Autism Spectrum Disorders

Signs and Symptoms	Diagnosis	Treatments	Massage
Three major issues - Deficit in verbal and nonverbal communication - Problems with social interactions - Repetitive behaviors, movements Sometimes: extreme reactions to sensory stimuli Locked inside perspective: no understanding of other consciousness - No interpretation of voice or tone - People seem completely unpredictable Often appears with other conditions - Seizures, cognitive disability (However, if IQ is over 35,	Identified in regular screenings, then referred for specialists - Rule out lead poisoning, hearing loss Types of autism spectrum disorders Autistic disorder Asperger syndrome PDD-NOS: pervasive developmental disorder, not otherwise specified Rett syndrome: Childhood disintegrative disorder Related issues: - Semantic pragmatic communication disorder - Nonverbal learning disabilities - High-functioning autism - Hyperlexia	Depends on type of disorder, individual child Highly structured programs that reinforce positive behaviors Applied behavioral analysis Sensory integration therapy Dietary adjustments: - Avoid gluten, casein - Supplement B_6 with magnesium Medication for anxiety, seizures, depression	Can be helpful - Improves sleep, more positive social interactions, more time on task Some may not tolerate touch: requires adjustments from therapist

25% with ASD show some savant characteristics) Signs (no babbling, delayed language, communication of any kind, no eye contact, etc.) usually appear by age 3, may not be diagnosed until 5 years or older Early intervention can improve function			

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Chemical Dependency

Use ; Abuse ; Dependence

Etiology

Depends on substance

Some drugs slow neurotransmitter absorption, change number of receptor sites

Disruptions in neural pathways

Alcoholism

1 drink = 12 oz beer; 4–5 oz wine; 1.5 oz 80-proof liquor

Moderate consumption = 1–2 drinks/day

Heavy consumption = 2–4 drinks/day

Binge drinking = 4+ in a row for a man, 3+ in a row for a woman

Depresses CNS arousal, slows brain activity

Loss of inhibitions can feel like a stimulant

Risk factors

Genetic predisposition

Other mental illness

Environmental factors

Type of drug being used

Age

Demographics

National Survey on Drug Use and Health Issues:

22.5 million the United States older than 12 years = ongoing abusers of drugs or alcohol

3.8 million get help

Alcoholism = number 3 cause of death from a preventable cause

85,000 alcohol-related deaths/year

$185 billion in health care costs

Medical reasons

Body can become dependent on drug to do some job (decongestant, painkiller)

Body can develop tolerance, need more drug to do same job

The higher the tolerance, the stronger the addiction

Types of addiction

Psychological addiction: using feels good!

Physical addiction: withdrawal symptoms, not using feels like death!

more Chemical Dependency

Signs and Symptoms	Treatments	Massage
Persistent craving Person goes to great lengths for supply Person can't voluntarily control use Person develops increasing tolerance Cessation of use creates unpleasant, dangerous symptoms Also devotes a lot of time to use/recovery Neglects responsibilities Lives in denial Complications of chemical dependency Paranoid delusions, coma, death Violent crime, car/industrial accidents, spread of AIDS, domestic violence, child abuse Complications of alcoholism The digestive system Irritates stomach lining (gastritis); ulcers; liver damage and cirrhosis; cancer at esophagus,	Recognizing a problem Treatment program Recurrence is high until 5 years of sobriety Goals: abstinence, rehabilitation, prevention of relapse Many programs begin with detoxification Sedatives, tranquilizers, other versions of drug Aftercare is most important part of treatment Some medications can suppress cravings (temporary solution only)	Can help with detox, help person reconnect with healthy body Watch for other health problems Long-term recovery probably fine for massage Clients who are high/drunk at appointment may get sick

pharynx, larynx, mouth; pancreatitis The cardiovascular system Arrhythmia, cardiomyopathy; agglutinates red blood cells (RBCs); also reduced clotting factors, bleeding ; (Moderate alcohol use may protect from CV disease) The nervous system: Memory loss; slowed reflexes, slurred speech, impaired judgment; toxicity can cause brain damage The immune system Impedes resistance; vulnerable to pneumonia The reproductive system: Reduced sex drive, erectile dysfunction, menstrual irregularity, infertility, fetal alcohol syndrome (2,000 births/year) Alcoholic families Children 3x risk of substance abuse; depression, anxiety disorders, phobias Other complications Traffic injuries, drownings, falls, burns, unintentional shootings		

Depression

A genetic-neurochemical disorder requiring a strong environmental trigger whose characteristic manifestation is an inability to appreciate sunsets.

Demographics

20% of women

12% of men

Will experience some type of depression

Every year, 9.5% of the United States population have depression (20.9 million people)

Etiology

Some distinguishing features

Neurotransmitter imbalance: serotonin, norepinephrine, dopamine

Hormonal imbalance: progesterone, estrogen, endorphins, cortisol

HPA axis: high amounts of corticotropin-releasing hormone (CRH), adrenal stimulation

Atrophy in the hippocampus: may be related to cortisol levels

Causes

Genetics

Environmental triggers

Personality traits

Chronic illness

Other issues (hypothyroidism, smoking, drug use, side effects of medications, B_{12} and folate deficiency)

more Depression

Signs and Symptoms	Diagnosis	Treatments	Massage
Depends on type Sad, empty feeling Less pleasure from hobbies Sense of guilt, disappointment with self Hopelessness Irritability Change in sleeping habits Also Poor concentration Weight changes Loss of energy Sense of helplessness Persistent physical pain: headache, gastrointestinal	Rule out hypothyroidism, vitamin deficiencies, etc. Try to identify which type of depression In older people a diagnosis is easy to miss: physical symptoms often lead Complications 200,000 suicide attempts/year, 30,000 suicides Half related to depressive episodes 15% with major depressive disorder commit suicide Men > women 4:1 Number 2 cause of death among adolescents	Most types are treatable Can be challenging to find right combination, dosage Important to treat fully to decrease risk of repeat episodes Antidepressant drugs Four main categories SSRIs : Selective serotonin reuptake inhibitors: Prozac, Zoloft SNRIs : Serotonin norepinephrine reuptake inhibitors: Effexor, Cymbalta MAOIs : Monoamine oxidase inhibitors: Nardil, Parate TCAs : Tricyclic	Benefits: Improves HPA axis function Parasympathetic balance Increase in serotonin, decrease in cortisol Shift in mood state Self-care Risks: Clients may want to stop taking meds Complex emotional issues, high risk for boundary confusion

(GI) discomfort

Types of depression

Major depressive disorder

- 6- to 18-month-long episodes; can happen 4–6 times in a lifetime

Adjustment disorder:

- Triggered by a specific event; symptoms outlast a normal recovery or grieving period

Dysthymia:

- Fewer, less severe symptoms; can last for years at a time

Bipolar disease

- Also called manic depression, manic depressive psychosis
- Mood swings from major depression to mania: heightened energy, elation, irritability, racing thoughts, increased sex drive,

Also

- Increases risk for stroke, heart attack
- Predicts recovery from stroke
- Accompanies other long-term diseases

Diagnosis of depression can make other diseases more manageable

antidepressants: Elavil

Two major disadvantages:

- Take several weeks to establish changes
- Produce side effects before benefits appear

Lithium: for bipolar

Psychotherapy

Cognitive-behavioral therapy: life skills

Interpersonal therapy: relationships

Psychodynamic: unresolved inner conflict

Other therapies

Light therapy for SAD

Electroconvulsive therapy (ECT) (unclear why it works, but it does for some)

St. John's Wort may be effective for dysthymia

Others: transcranial magnet stimulation; vagus nerve stimulation; SAM-e, omega-3 fish oil; 5-HTP, others

decreased inhibitions, unrealistic or grandiose notions that lead to decisions made with extremely poor judgment Seasonal affective disorder (SAD) Absence of sunlight, low levels of melatonin Postpartum depression Sleep deprivation, hormonal shifts, unmet expectations Major depression with fear of harm, doing harm to baby Can lead to psychosis			

Eating Disorders

Anorexia nervosa: self-starvation ; Bulimia nervosa: normal or high calorie consumption, with compensatory activities to prevent absorption ; Binge eating: overeating without compensatory activity

Etiology

Anorexia and bulimia

- High expectations, overachievers
- Athletes (dance, gymnastics, track)
- Power issue: patients can control what goes in their mouth ; May have some brain chemistry issues
- Prolonged eating habits can become permanent, difficult to reverse, terminal

Binge eating

Mixture of physical/psychological issues

- Touch: “hugging” inner skin
- Protection: from hostile world
- May relate to history of touch abuse

Demographics

Anorexia, bulimia: girls 12–35 years old

1% may have anorexia

2–5% may have bulimia

Females > males 10:1

Binge eating: hard to guess

2–5% of the United States population binges within any 6-month period

64% of United States adults are overweight

59 million in the United States are obese (body mass index 30+)

more Eating Disorders

Signs and Symptoms	Diagnosis	Treatments	Massage
Anorexia Avoid eating in public Baggy, shapeless clothes Restrictive: not enough calories Purge type: barely enough calories and purge behaviors Lanugo Bulimia Eat normally in public; binge in private Triggered by emotional stress Purge type: use laxatives, diuretics, vomiting Non–purge type: excessive exercise, fasting No extensive weight loss; more internal	Anorexia Refusal to maintain weight at or above a normal level; weight is below 85% of normal body mass index Intense fear of gaining weight Distorted self-perception; the patient sees herself as heavier than she is Menstrual periods stop (amenorrhea) for at least 3 months in a row Bulimia Recurrent episodes of binge eating A sense of lack of control; the patient couldn't stop eating even if she wanted to Inappropriate compensatory behaviors, including self-induced vomiting, laxative or enema use, or excessive exercise (persisting in exercise when exhaustion or injury are present)	Address control issues, not weight management Education, therapy Neurotransmitter balance?	Within resilience, can be beneficial: Positive touch Self-awareness Good experience of living in the body Risks CV problems, other complications

damage

Binge eating

Public, private, both

Triggered by stress, feeling out of control

Weight gain, possibly over short time

Long-term dangers are more reversible than with anorexia, bulimia

Complications

Mental/emotional

Depression, irritability, sleep disorders, anxiety (especially OCD)

Physical

Anorexia

Bradycardia, hypotension, arrhythmia

Amenorrhea, osteopenia, osteoporosis

Colon dysfunction

Tooth damage, esophageal damage, imbalanced electrolytes

A binge/compensation pattern occurs at least twice a week for at least three months in a row

Behaviors are influenced by body image

Special risk for girls with type 1 diabetes Bulimia Related to vomiting, laxative use Tooth erosion, callus on knuckles Esophageal ulcers, stricture, rupture Colon dysfunction Permanent difficulty with keeping food down Binge eating Cardiovascular (CV) disease Type 2 diabetes Osteoarthritis Can be reversed if habits change			

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Nervous System Injuries

Bell Palsy

Cerebral Palsy

Complex Regional Pain Syndrome

Spina Bifida

Spinal Cord Injury

Stroke

Traumatic Brain Injury

Trigeminal Neuralgia

Bell Palsy

Damage to cranial nerve (CN) VII, the facial nerve; Mostly motor

Etiology

Type of peripheral neuritis

CN VII is inflamed, irritated at some point in pathway

Usually preceded by herpes outbreak or cold: inflammation presses on nerve

Leads to flaccid paralysis of one side of face, platysma

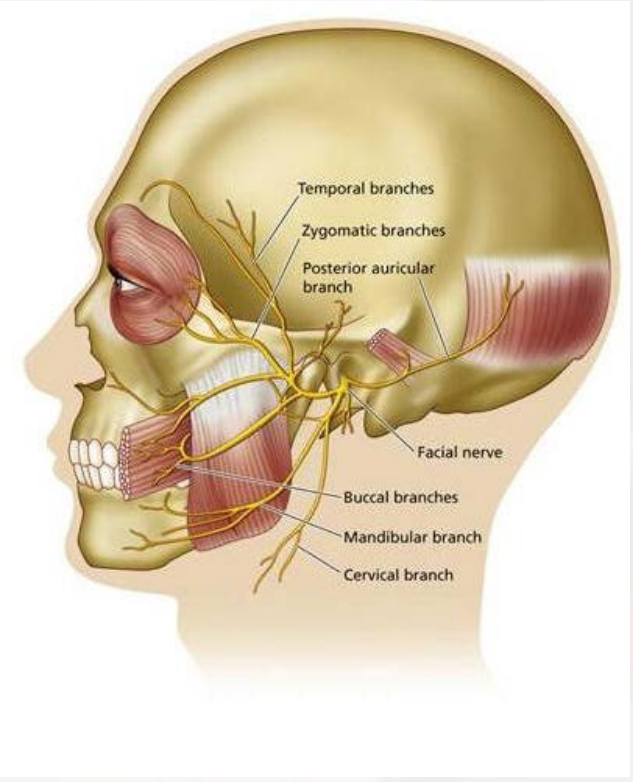
Nerve heals; most people have full or nearly full recovery

Demographics

40,000/year in the United States

Mostly young, middle-aged adults

Especially pregnant women, people with diabetes, immunosuppressed



more Bell Palsy

Signs and Symptoms	Diagnosis	Treatments	Massage
Sudden onset of flaccid paralysis to one side of face Hard to eat, drink, blink Distorted taste Hyperacusis May be painful—because of muscular drag, not attack on sensory neurons Complications 85% have full, nearly full recovery within a few months Can damage eye (inadequate lubrication, blinking) As nerve heals, it makes new connections Unpredictable muscle activity of face (synkinesis) Excessive	Through client history Herpes, Lyme disease, other pathogens may be trigger Bilateral symptoms probably not Bell palsy: Guillain-Barré syndrome, sarcoidosis, tumors, Ramsay-Hunt syndrome	Steroidal anti-inflammatories, acyclovir to shorten viral activity Take care of affected eye Massage to stretch, mobilize muscles while nerve heals	Indicated for muscle health; sensation is intact

tears with salivation			

pt 6

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Cerebral Palsy

Group of brain injuries that happen during gestation, birth, early infancy

Demographics

2–4 in 1,000 live births in the United States

500,000–1 million patients in United States

8,000 babies, 1,500 toddlers diagnosed/year

Etiology

Damage to motor areas at basal ganglia, cerebrum

Prenatal causes

Most cases develop during pregnancy: maternal infection, diabetes, hyperthyroidism, Rh sensitization, abdominal trauma, PIH

Birth trauma

Anoxia, asphyxia, head trauma during birth (relatively rare)

Acquired CP

Develops in infancy: jaundice, head trauma, infection, brain hemorrhage, neoplasms in brain

Types

Spastic cerebral palsy

Most common form (50–80%)

Spasticity in some areas

Athetoid cerebral palsy

Weak muscles, involuntary writhing movements

Ataxic cerebral palsy

Rare: shaking, intention tremor, poor balance

Dystonic cerebral palsy

Slow, involuntary twisting movements of trunk, extremities

Mixed cerebral palsy

Combinations of forms

Complications

Many patients have changes in sensation (hearing, vision loss); digestive difficulties; possibility of cognitive problems, seizures, contractures, pain from disorder and treatment interventions

more Cerebral Palsy

Signs and Symptoms	Treatments	Massage
Vary, depending on type, area of brain damage Hypotonicity, hypertonicity, poor coordination, poor control, weak muscles, random movements, etc.	Skills, equipment to live as functionally as possible: Braces, other aids OT, PT, speech therapy Adapted computers Extensive massage/physical therapy may yield surprising results: interferes with proprioceptive limitations Medication: Antiseizure, reduce muscle spasm, Botox for excessive salivation, involuntary muscle contractions Surgery for dislocations, bone corrections Adults with Cerebral Palsy Essentially a new population group: longer lifespan than ever before Age faster, more vision problems Fatigue, exhaustion, overuse syndromes	Many benefits: can work with proprioceptors to increase ROM, maintain function Be careful about communication, nonverbal signals for people who can't speak clearly

Complex Regional Pain Syndrome

Collection of signs and symptoms: long-lasting pain and changes to the skin, muscles, joints, nerves, and blood vessels of the affected areas : CRPS 1 = mostly in extremities (used to be called RSDS) ; CRPS 2 = pain outlives nerve injury, spills over boundaries of affected nerve (used to be called *causalgia*)

Demographics

Most are 40–60 years old

Women > men 3:1

Etiology

Initial trauma (usually to hand or foot) starts a pain stimulus

- Bullet, shrapnel
- Also minor strains/sprains, post surgery, fracture, injection site, disc disease, post stroke, no trigger

Sympathetic response reinforces pain; pain sensors become more sensitive

- Pain becomes self-fulfilling prophecy

Physiological changes may become irreversible; may spread proximally or to contralateral limb

- Sympathetically maintained pain (SMP)

Source of pain is sympathetic nervous system (SNS) activity; blocking SNS nerves stops pain

- Sympathetically independent pain (SIP)

Pain is more resistant; SNS blocks don't work

Comes as late-stage CRPS

Nerves may develop fibrosis where nerve blocks are injected

more Complex Regional Pain Syndrome

Signs and Symptoms	Diagnosis	Treatments	Massage
Vary widely; three main issues: Burning pain at site of injury Autonomic dysfunction: changes in skin temperature, texture, edema, hair and nail growth, bone density loss, Motor dysfunction: weakness in local muscles, goes to stiffness, contractures, atrophy CRPS 1: 3 stages (progression varies) Stage I: 1–3 months, severe burning at site, muscle spasm, reduced range of motion (ROM), hair growth, hot red skin Stage II: 3–6 months; painful	History and physical examination Triple-phase bone scan, thermography New diagnostic criteria for more standardized research: An initiating trigger or event (type 1) or a specific nerve injury (type 2) Persistent pain that outlasts a typically healing process; in type 2 the pain may exceed the boundaries of the affected nerve Marked edema, sweating, hair or nail growth, shiny skin, discoloration, and temperature differences in the affected area (this also includes changes in bone density as regulated by local blood vessels) No other contributing factors can be identified (these would include simple nerve entrapment, arthritis, thrombophlebitis, or	PT, OT to preserve function, delay atrophy Psychotherapy for depression, anxiety, sleep disorders Chemical nerve blocks Intrathecal pumps Sympathectomy	Local contraindication wherever stimulus is too intense Anything well tolerated can be helpful

swelling spreads proximally; hair stops growing, skin turns blue, muscles atrophy Stage III: Bones become brittle, joints are immobile, muscle contractures; Symptoms spread elsewhere Pain is self-sustaining	local infection		

Spina Bifida

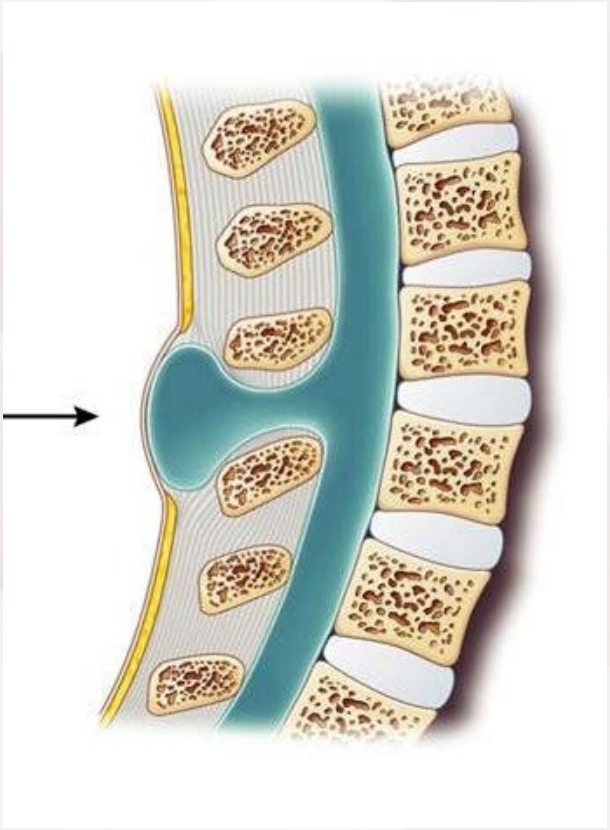
Cleft spine: neural tube defect in which the vertebral arch fails to close completely over the spinal cord ; Ranges from subtle to severe

Demographics

1:1,000 live births

1,500–2,000/year in the United States

Hispanics and European whites have highest rates



Etiology

Neural tube defects occur day 14–28 of gestation: fetus is the size of grain of rice

Main risk factor is folate deficiency

Spina bifida occulta (SBO)

Vertebral arch may not completely fuse; no signs are visible

May not know until radiography for something else

May be common: 5–10% of population?

May show dimple, tuft of hair at low back

Can be serious: tethered cord

Spina bifida meningocele

Rarest form

Only dura, arachnoid press through cleft to form a cyst visible at birth

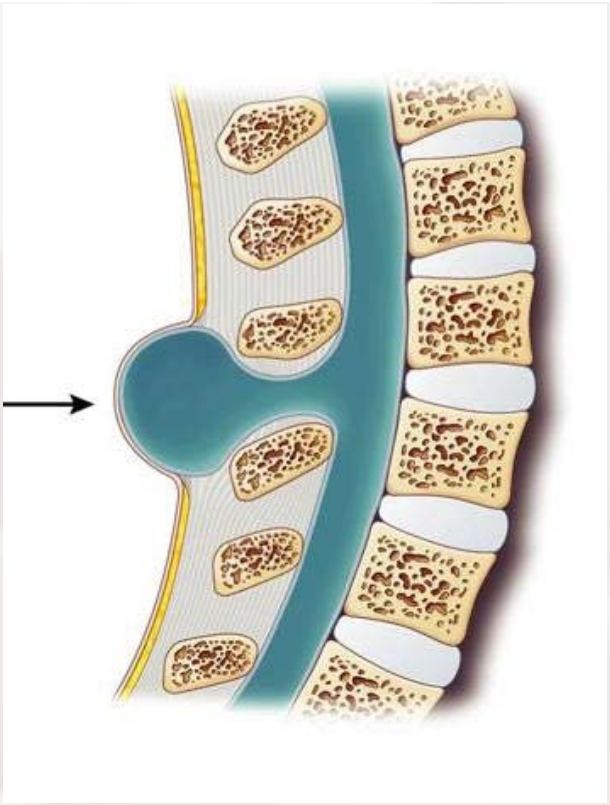
Repaired with surgery, few long-term consequences

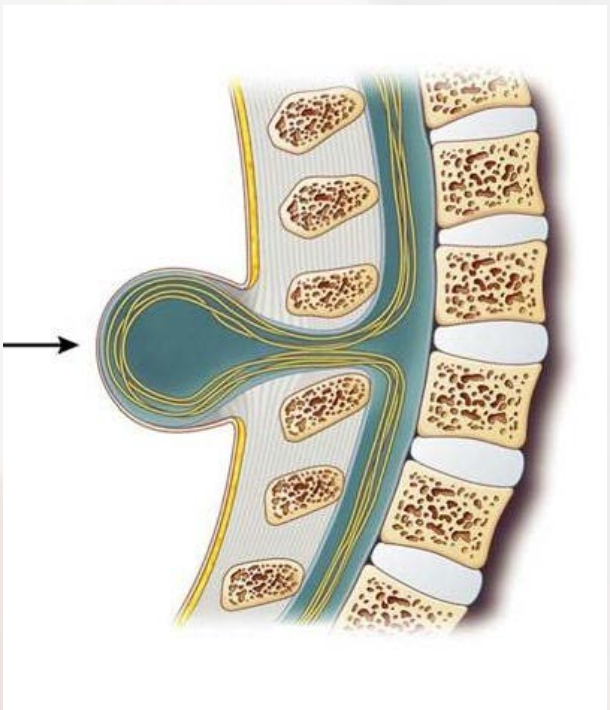
Spina bifida myelomeningocele

Most common, most serious diagnosed form: 94% all cases

Cauda equina protrudes with meninges through cleft

Skin may or may not cover cyst (risk of CNS infection)





more Spina Bifida

Signs and Symptoms	Diagnosis	Treatments	Massage
SBO may be silent Cystic SB is obvious, usually at lumbar spine Complications 85% of patients have hydrocephalus Treated with a shunt Some may have cognitive impairment Latex hypersensitivity can become dangerous Decubitus ulcers, GI problems, urinary problems, obesity, muscle imbalances, scoliosis	Can be detected prenatally Some cases can be corrected in utero; high risks, of course	Surgery to reduce cyst within a few days of birth PT to retain function, build leg muscles Assistive equipment as necessary Additional surgeries to release tethered cord, deal with hydrocephalus, etc.	Depends on sensation, level of function, other complications Can be helpful in the context of PT to promote good function

Spinal Cord Injury

Self-evident ; Concussion, contusion, compression, laceration, transaction ; Paraplegia, tetraplegia, quadriplegia

Demographics

10,000–11,000/year

250,000 living with SCI

Male > female 4:1

MVA → 50%

Gunshot wound (GSW), violence → 11%

Falls → 24%

Sports → 9%

Other: nontraumatic

Arthritis, bone spurs, tumors

Etiology

Usually starts with crushing blow

Could also be slow compression

New injury → spinal cord shock

- Blood pressure is low, bradycardia, peripheral vasodilation
- Muscles may be flaccid

When inflammation subsides

- Muscles supplied by damaged axons tighten
- Reflexes become hyperreactive
- Spasticity

(Flaccid paralysis indicates PNS damage; spastic paralysis indicates CNS damage—both may occur with cauda equina/spinal cord pressure)

Secondary problems

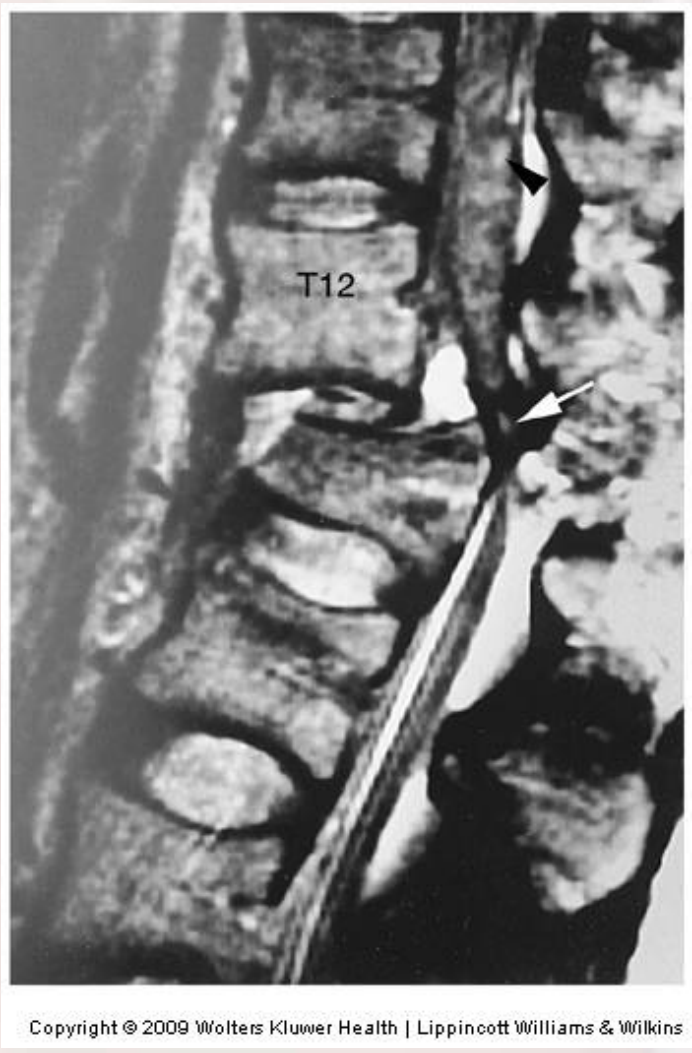
A lot of damage occurs post trauma with inflammation, other processes

Limiting this improves prognosis

Excessive bleeding can cause pressure in CNS, low blood pressure

Local edema can damage neurons through pressure or hypoxia

Free radical activity: destroys cell membranes



Excitotoxicity: excessive glutamate damages motor neurons

Immune system activity: inflammatory cytokines damage cells, lead to scar tissue

Apoptosis: especially of oligodendrocytes (myelin in CNS)

more Spinal Cord Injury

Signs and Symptoms	Treatments	Massage
Higher the lesion → more damage Anterior cord → motor damage Posterior, lateral cord → sensory damage Complications Respiratory infection Especially if injury is above T12; leading cause of death for SCI patients is pneumonia Deep vein thrombosis, pulmonary embolism Pulmonary embolism is number 2 cause of death for SCI patients Urinary tract infection Neurogenic bladder, catheter use carries high risk of urinary tract infection (UTI), kidney infection Decubitus ulcers High risk for infection, blood poisoning Heterotopic ossification Usually around hips, knees; can be painful Corrected surgically	Acute: remove pressure on spinal cord Limit inflammation, secondary damage Later Implant electrodes in muscles; surgical transfer of healthy tendons, work with spinal reflexes Work to provide living skills New branches of research: influence growth medium in CNS for regeneration of damaged cells	Respect complications Otherwise indicated for improved function, pain relief, proprioceptive training

Autonomic hyperreflexia Especially with damage above T6 Minor stimulus creates sympathetic reaction: pounding headache, increase heart rate, high blood pressure; can be medical emergency Cardiovascular disease Related to immobility Numbness Allows minor injuries to be ignored; risk of infection Pain From damaged nerve tissue, secondary injury, heterotopic ossification, musculoskeletal injury Spasticity, contractures Some is related to CNS damage Can be reinforced by proprioceptive messages (Some of this may be interruptible with PT, massage) Damaged sensation may → painful temporary spasms)		

Stroke

Also called brain attack, cerebrovascular accident (CVA) ; Damage to brain cells due to oxygen deprivation

Etiology

Oxygen deprivation from bleeding or ischemia

Ischemic strokes (about 80%):

Cerebral thrombosis: blood clot forms in cerebral arteries, obstructs blood flow

Embolism: Clot or other debris travels from elsewhere (heart, carotid artery)

TIA is warning sign

PFO: patent foramen ovale allows blood to cross the atrial septum: a factor in strokes in people < 55 years old.

Hemorrhagic strokes (about 20%)

Intracerebral hemorrhage: rupture of blood vessel inside the brain

Subarachnoid hemorrhage: rupture of blood vessel on surface of the brain

Secondary damage from inflammation, free radicals causes a lot of damage; limiting these can improve prognosis

Risk factors that can be controlled

High blood pressure: chronic high blood pressure raises risk by 400–600%

Smoking: nicotine constricts blood vessels and raises blood pressure

Demographics

Most common CNS disorder

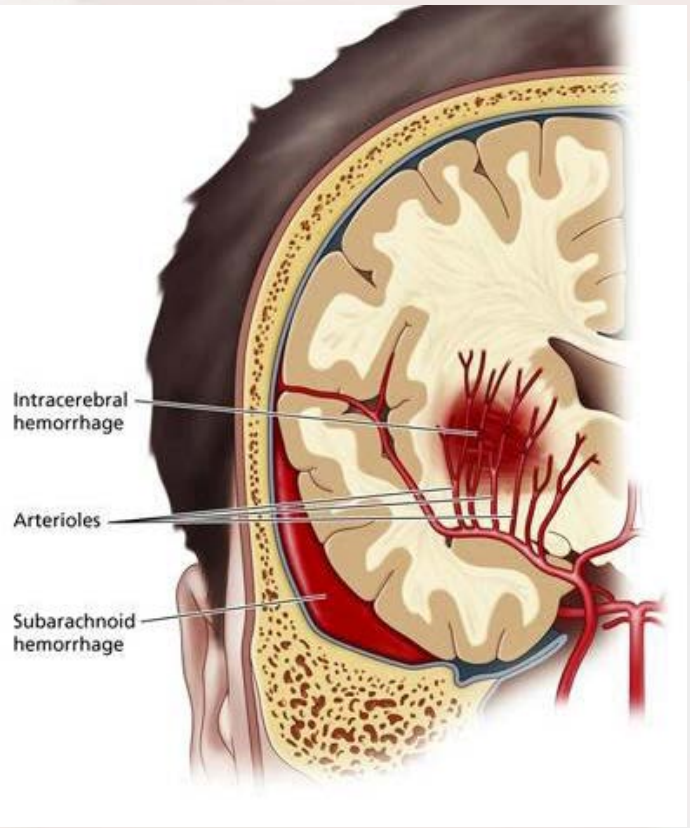
Number 3 cause of death in the United States

Number 1 cause of adult disability

700,000/year (1:45 seconds)
160,000 deaths/year

Of survivors: 15–30% disabled
20% need institutional care

4.7 million stroke survivors alive today



Atherosclerosis, high cholesterol: contributes to high blood pressure, raises risk of emboli

C-reactive protein (CRP): associated with long-term inflammation

Atrial fibrillation: forms emboli that may travel to brain

High alcohol consumption: >2 drinks/day

Drug use: cocaine, crack, and marijuana

Obesity and sedentary lifestyle

Diabetes: untreated or poorly treated raises risk 300%

High-estrogen birth control pills, especially when taken by a smoker

Hormone replacement therapy

Depression

Overall stress

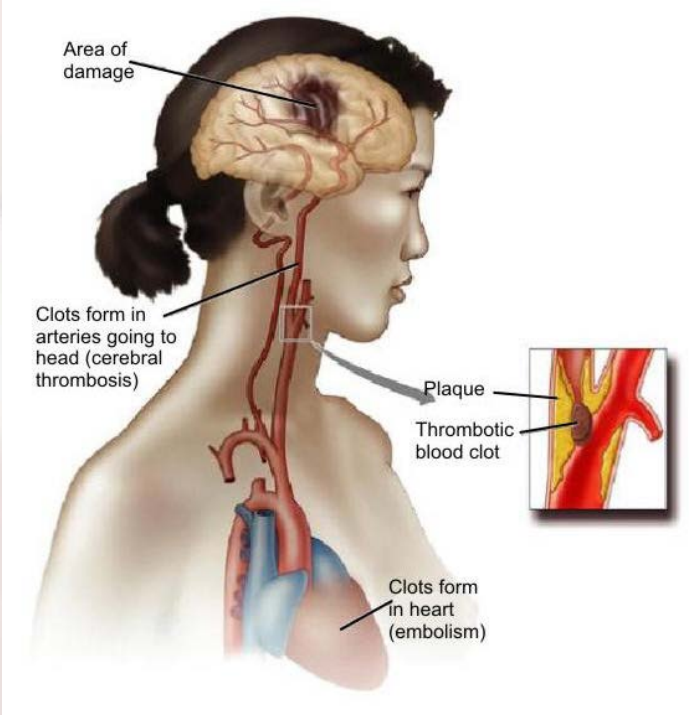
Risk factors that can't be controlled

Age: Three-fourths > 65 years; risk doubles each decade after 55

Gender: men > women; women more likely to die

Race: African Americans two times more likely to have stroke than whites, almost two times more likely to die

Family history: genetic influence on cardiovascular disease, strength of blood vessels



Previous stroke

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more Stroke

Signs and Symptoms	Diagnosis	Treatments	Massage
Sudden onset of unilateral weakness, numbness or paralysis on the face, arm, leg or any combination of the three Suddenly blurred or decreased vision in one or both eyes; asymmetrical dilation of pupils Difficulty in speaking or understanding simple sentences; confusion Sudden onset of dizziness, clumsiness, vertigo Sudden very extreme headache Possible loss of consciousness TIA looks like stroke: temporary Pursue it as medical emergency to limit damage Complications Partial, full paralysis of	Determine whether ischemic or hemorrhagic (impacts treatment options) Physical examination, CT, MRI, arteriography, blood tests	Prevention Identify who is at risk, change what factors are possible For ischemic stroke Thrombolytics For aneurysm Repair before rupture After stroke PT, OT, speech therapy, massage	Get information on cardiovascular health Be cautious with paralysis, numbness, problems with language Otherwise, massage can help with recovery, proprioceptive training, etc.

one side (hemiparesis, hemiplegia) Aphasia Dysarthria Memory loss Personality changes Sensory problems: numbness, vision loss Depression (can predict recovery)			

Traumatic Brain Injury

Some damage to brain not from congenital or degenerative condition ; Altered consciousness, cognitive impairment, disruption of function ; Mostly from MVAs, GSWs, sports, fall, violence

Demographics

1.5 million diagnosed/year

1 million emergency department visits

270,000 rated as moderate to severe

80,000 are disabled, 60,000 develop seizures, 70,000 people die/year

2.5 million to 6.5 million TBI patients alive today

Etiology

Skull fracture

Bones of cranium are broken

Open injury less dangerous than closed

Penetrating injury

GSW, knife wound

High mortality

Concussion

Most common form of TBI, 300,000/year

Jarring of cranium

Can lead to second impact syndrome: more serious

Contusion

Bruising inside cranium

Coup-contrecoup

Diffuse axonal injury

Internal tearing of nerve tissue in brain

Whiplash accidents, shaken baby syndrome

Anoxic brain injury

Complete oxygen deprivation: airway obstruction, sudden apnea

Hypoxic brain injury

Inadequate oxygen: stroke, edema, toxins (carbon monoxide)

Hemorrhage

Bleeding inside brain, ruptured aneurysm

Hematoma

Blood coagulates in brain or cranium

Edema

Secondary inflammatory response; can cause more damage than initial trauma

more Traumatic Brain Injury

Signs and Symptoms	Treatments	Massage
Vary, according to area affected and severity Frontal lobe is most common, → language, motor dysfunction Brainstem → massive loss of autonomic function At trauma: CSF may leak from ears, nose; asymmetrical pupils; visual disturbances; dizziness and confusion; apnea or slowed breathing; nausea and vomiting; slow pulse and low blood pressure; loss of bowel and bladder control; possible seizures, paralysis, numbness, lethargy, or loss of consciousness Long-term: mild to severe cognitive dysfunction, memory, learning; movement disorders; seizures; behavior/personality changes; at brainstem: coma, persistent vegetative state	Surgery to remove pressure PT, OT, speech, recreational therapy Prevention Most related to transport injury: altercation between wheeled vehicles Drive alert, sober; wear helmets etc. Store firearms carefully Make homes safe for children, elderly	Depends on client's ability to adapt Watch for numbness, language difficulties Massage can work with PT, other therapies to restore motor function, improve mood, work with proprioception For comatose clients: can help prevent bedsores (with caution!) Work with health care team

Trigeminal Neuralgia

Neuro-algia (nerve pain) along one or more of the three branches of CN V ; Also called tic douloureux

Demographics

40,000 in the United States

Women > men 3:2

Usually 60–70 years old

Etiology

Primary or secondary

CN V is irritated → sharp, electrical, burning or stabbing pain on one side of the face

Cause is questionable

Artery or vein wraps around CN V as it emerges from pons

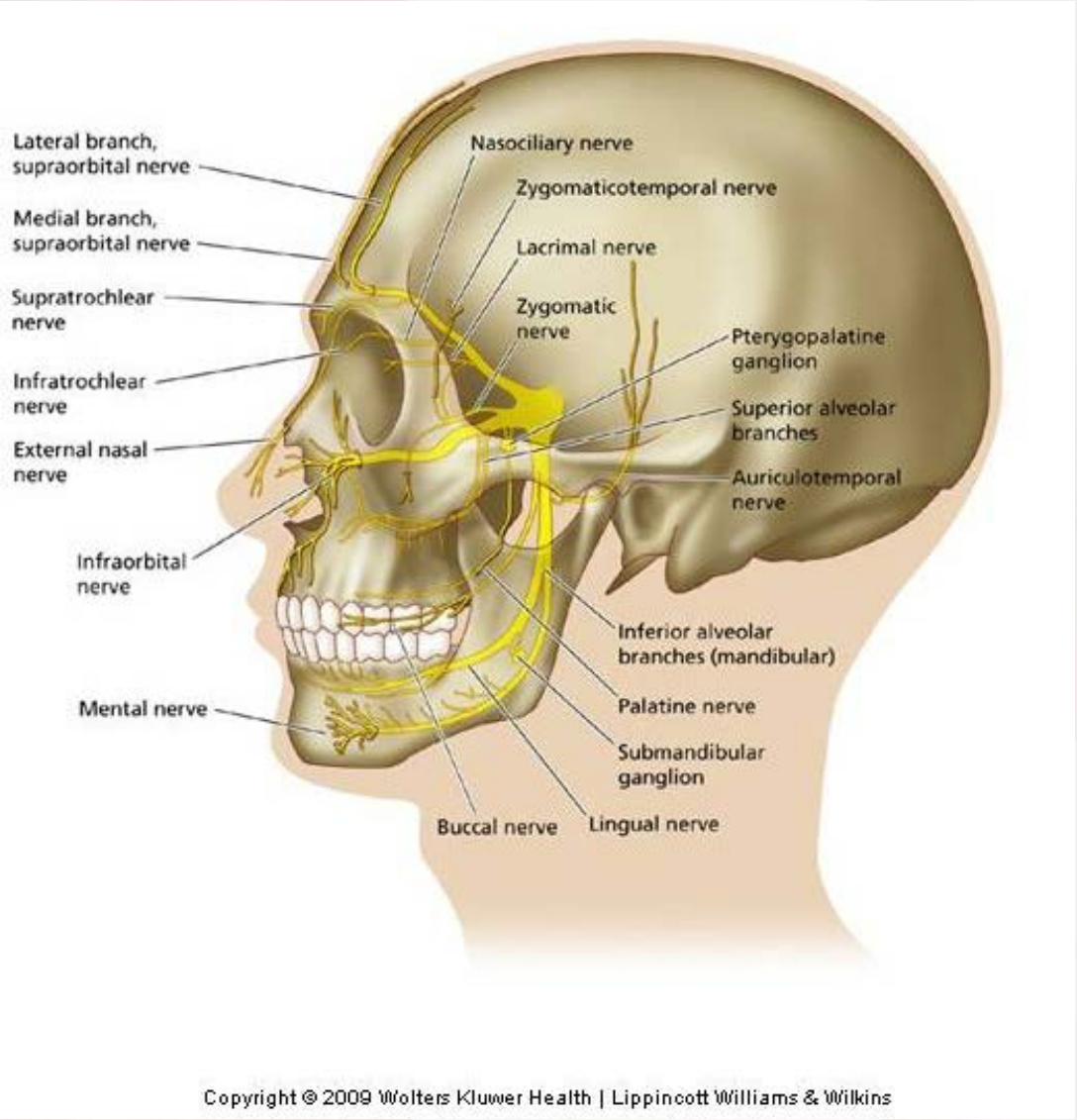
(not completely consistent)

Blood vessel may wear away myelin, causing misfires

Can be secondary to bone spur, infection, multiple sclerosis

Type 1: sharp blasts of pain on one side of face related to mild trigger

Type 2: long-lasting burning pain, ache, with occasional bolts of extreme pain



more Trigeminal Neuralgia

Signs and Symptoms	Treatments	Massage
Sharp, electrical stabbing or burning sensations 10 seconds to 2 minutes or several jabs in succession Muscular tic may accompany pain Triggers: chewing, swallowing, speaking, a draft, light touch Episodes may come and go over years No pain during sleep, no numbness, weakness or hearing loss	Rule out sinus, tooth infection Acupuncture Anticonvulsant drugs (often temporary) Controlled destruction of parts of the trigeminal nerve Microvascular surgery	Local contraindication; face cradles may also be problematic Otherwise massage is safe and appropriate

Other Nervous System Conditions

Guillain-Barre Syndrome

Headaches

Meniere Disease

Seizure Disorders

Sleep Disorders

Vestibular Balance Disorder

Guillain-Barre Syndrome

Acute inflammation and destruction of the myelin layer of peripheral nerves

Demographics

Mostly 15–35 years old or 50–75 years old

Men > women

3,000/year in the United States

Etiology

Usually preceded by infection of respiratory or GI tract

May stimulate an immune system attack directed at Schwann cells

Linked to infection with

- Campylobacter jejuni, Haemophilus influenzae, Mycoplasma pneumoniae, Borrelia burgdorferi, cytomegalovirus, Epstein-Barr virus, HIV

Also seen with pregnancy, surgery, some vaccines (swine flu, 1976)

Myelin on peripheral nerves is attacked and destroyed by macrophages and lymphocytes

Damage progresses proximally

May affect cranial nerves

Many patients need ventilator before resolution

GBS includes several demyelinating diseases

- Acute inflammatory demyelinating polyneuropathy (AIDP) (90% of diagnoses)
- Acute motor axonal neuropathy (AMAN)
- Acute motor-sensory axonal neuropathy (AMSAN)
- Miller-Fisher syndrome

more Guillain-Barre Syndrome

Signs and Symptoms	Diagnosis	Treatments	Massage
Unpredictable Fast, severe onset (hours to days) Symmetrical Progresses proximally from extremities to trunk Weakness, tingling in limbs Reflexes diminish If GBS is at cranial nerves: facial weakness, pain, speech, swallowing difficulty Respiratory control is lost Symptoms peak 2–3 weeks after onset, linger, then subside	Signs/symptoms are distinctive Spinal tap Nerve conduction tests	<u>Plasmapheresis</u> Patients diagnosed early in the course of the disease and those who are acutely ill often respond well to blood plasma exchange Plasmapheresis is thought to remove the substances that damage myelin. It can shorten the course of GBS, alleviate symptoms, and prevent paralysis. <u>Immunoglobin</u> Large doses of immunoglobin given intravenously can help shorten the duration of symptoms. Overall, about 70% of patients respond to plasmapheresis or immunoglobin.res. <u>Medication</u> Over-the-counter analgesics such as aspirin. If necessary, stronger pain medication (e.g., acetaminophen with hydrocodone) may be prescribed. Muscle spasms can be controlled with relaxants such as diazepam (Valium®).	Contraindicated for circulatory work while acute Later with PT etc. can be helpful Work with health care team

		Prognosis Most have full or nearly full recovery Some have permanent loss of function 5–10% have permanent disability 10% have relapse later 5–7% die	

Headaches

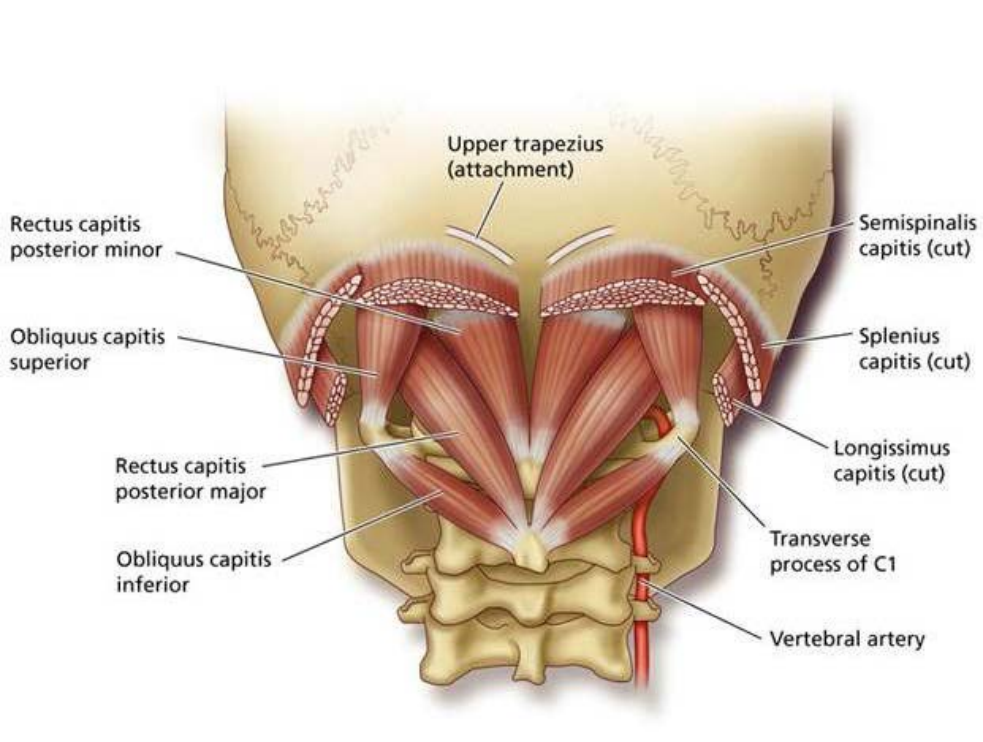
Most are self-contained temporary problems ; Some are related to serious underlying conditions

Etiology

For tension and vascular

- Serotonin activity leading to vasodilation in arteries in the periphery of brain
- Prostaglandin release → inflammatory response

Main difference between tension and vascular: trigger, throbbing



Types of headaches:

Primary versus secondary

Primary = freestanding

Secondary = symptom of another problem

Classifications (with overlap):

Tension-type headaches

Most common type of headache (90–92%)

Triggered by muscle tension, bony misalignment, postural patterns, eyestrain, temporomandibular joint (TMJ) disorders, myofascial pain syndrome, ligament irritation, other musculoskeletal imbalances

May be episodic or chronic

Vascular headaches

Any collection of too much fluid in the head

Classic/common migraines, cluster headaches, sinus headaches

Migraine/cluster: triggered by stress, food sensitivities, alcohol use, hormonal shifts

Vasoconstriction (prodrome) followed by vasodilation and pain

Hemi-craine: half of head

28 million in the United States get migraines; women > men

(Men > women for cluster headache)

Sinus headaches: allergies, infection of sinuses (Chapter 7)

Chemical headaches

Low blood sugar (hunger headache), hormone shifts, and dehydration, including dehydration brought about by alcohol use (hangovers)

Rebound headaches (also called medicine overuse headaches)

Exposure to toxins

Traction-inflammatory headaches

Indicate serious underlying problem: tumor, aneurysm, stroke, hemorrhage, infection

more Headaches

Treatments	Massage
Avoid/manage triggers Headache journal for chronic situations Medication to manage pain Can be problematic for migraine (nausea) NSAIDs for tension when necessary	Depends on type of headache Tension types respond extremely well Vascular usually prefer not to receive touch, stimulus (hydrotherapy works)

Meniere Disease

Inner ear dysfunction leading to vertigo, tinnitus, hearing loss

Etiology

Still being explored

Accumulation of excess fluid in the endolymph inside the membranous labyrinth

Idiopathic endolymphatic hydrops

Possible causes

- Rupture of the membranous labyrinth
- Autoimmune activity
- Viral infection
- Pressure from a tiny blood vessel wrapping around the vestibulocochlear nerve

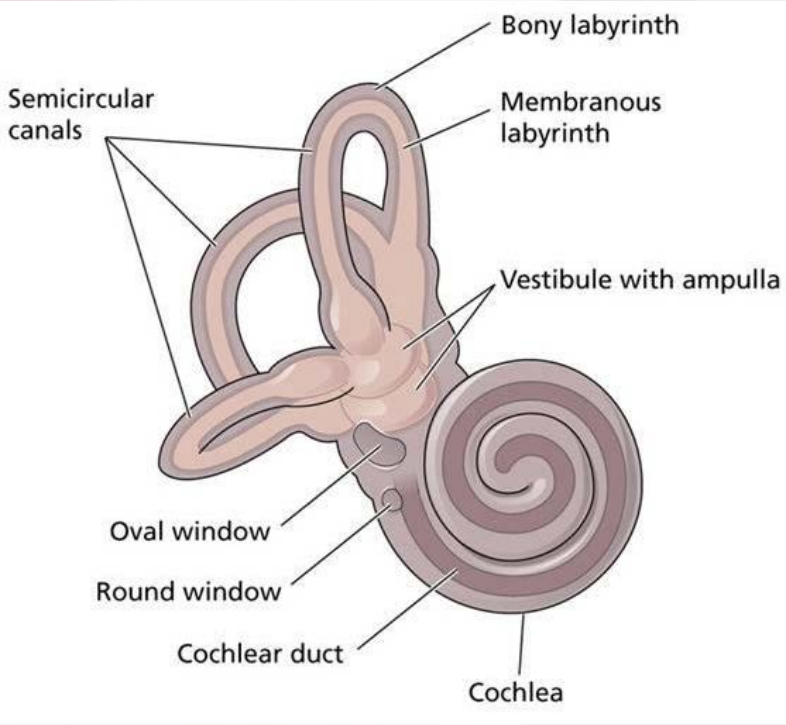
Demographics

Mostly 20s–50s

625,000 in the United States

45,000 diagnoses/year

Men = women



more Meniere Disease

Signs and Symptoms	Diagnosis	Treatments	Massage
Four major symptoms Starts in one ear, can progress to the other Usually fast onset Ménière attack can last 20 minutes to 24 hours Hearing loss Tinnitus A sense of fullness in the middle ear Rotational vertigo	Rule out any other possibilities: multiple sclerosis, neuroma Two episodes of vertigo and feeling of fullness > 20 minutes Documented hearing loss	Symptomatic control Identify triggers if possible Avoid food/habits that raise blood pressure Medication to manage vertigo Disable vestibulocochlear nerve	No contraindications as long as client is comfortable on table

Seizure Disorders

Any kind of problem that can cause seizures ; Epilepsy is one type ;Two or more seizures with no other medical problem

Etiology

Interconnecting neurons in brain give off bursts of energy

Triggers vary:

Changes in light, strobe effect, flashing, sounds, anxiety, sleep deprivation, hormonal changes, infection

Causes

Some can be linked to specific problems in brain

Birth trauma, traumatic brain injury, stroke, tumor, penetrating wounds, toxic exposure

Demographics

10% of the U.S. population will have a seizure at some time

2.7 million diagnosed with epilepsy

200,000 new diagnoses/year

more Seizure Disorders

Signs and Symptoms	Diagnosis	Treatments	Massage
Partial seizures Motor cortex, temporal lobes most often affected Simple partial Complex partial Generalized seizures Absence seizures Tonic-clonic seizures Myoclonic seizures Status epilepticus	EEG, CT, MRI Rule out migraines, stroke, fainting, arrhythmia, narcolepsy, hypoglycemia, etc.	Anticonvulsant medication High-fat low-fiber ketogenic diet Surgery if specific mass is determined to be cause Vagus nerve stimulation	Contraindicated during seizure; consult with client for best strategies Other times massage is fine

Sleep DIsorders

Anything that interferes with falling asleep, staying asleep, or waking refreshed ; 70 types defined; five discussed here

Demographics

40 million in the United States

Increases with age

Etiology

Humans cannot adapt to insufficient sleep

Sleep deprivation → slowed reflexes, lowered cognitive skills, poor immune system efficiency, fibromyalgia, chronic pain, depression, hallucinations, psychosis

Now being linked to weight gain, increased risk of type 2 diabetes

Circular relationship:

A person doesn't feel well; doesn't sleep well; doesn't feel well

Stages of Sleep

Stage I: light sleep

Stage II: eyes stop moving

Stage III: delta waves appear

Stage IV: only delta waves; growth hormone (GH) is secreted

REM sleep: breathing is rapid, shallow, irregular; heart rate, blood pressure near waking levels; dreaming

Cycle is completed in 90–100 minutes

Healthy balance:

Types of sleep disorders

Parasomnia: disruption of sleep (night terrors, etc.)

Dyssomnia: can't initiate, maintain sleep (this discussion)

Insomnia ; Lack of sleep can be transient or chronic

Obstructive sleep apnea

Apnea = absence of breath.

Estimated 18 million in the United States

Air passage collapses during sleep; when oxygen levels fall, muscle tighten (gasp, snore)

May happen hundreds of time in a night

Central sleep apnea

Neurological problem: decreased respiratory drive

Can cause brain damage

Restless leg syndrome (RLS)

Can be genetic

Associated with pregnancy, diabetes, anemia, fibromyalgia, attention deficit hyperactivity disorder (ADHD)

Sensation in legs relieved by pressure, rubbing

Similar to periodic limb movement disorder (PLMD)

An estimated 12 million in the United States

Responds to drugs for Parkinson disease: movement disorder

Narcolepsy

Narco = stupor, *lepsis* = seizure

Sleep attacks in response to stress, laughing, anger

An estimated 350,000 in the United States

20–25% in REM

50% stage II

30% other stages

Cataplexy, sleep paralysis, hypnagogic hallucinations

Circadian rhythm disruption

Activity outside of daylight cycle

Shift work, travel

25 million in the United States don't work a day shift

Higher than normal risk for MVA, job injuries, cold, flu, hypertension, weight gain, irregular menstrual cycle, GI problems

more Sleep Disorders

Signs and Symptoms	Diagnosis	Treatments	Massage
Excessive daytime sleepiness Irritability, decreased ability to focus or concentrate, mood changes, poor short-term memory Complications 100,000 MVAs/year Job injuries, other problems (psychosis, fibromyalgia, poor healing, etc.)	Check for sleep apnea Rule out other disorders Polysomnograph	Sleep hygiene: quiet bedroom, no caffeine, exercise close to bedtime, etc. Sleeping aids generally discouraged if possible Habit forming, may suppress respiratory drive For sleep apnea: surgery, CPAP (continuous positive airway pressure) machine	Indicated! Increases time in stages III and IV May recognize sleep apnea breathing patterns

Vestibular Balance Disorders

Dysfunction of vestibular branch of CN VIII → vertigo ; May last seconds to hours

Demographics

Most common in elderly

2 million doctor visits/year

Leading cause of falls, accidental deaths among elderly

Etiology

Changes in vestibule, other problems can → vertigo

Benign paroxysmal positional vertigo (BPPV)

- Small bits of calcium debris are displaced into the semicircular canals; maneuver may move the otoliths back into place

Labyrinthitis

- Inflammation inside bony or membranous labyrinth; lasts a few days or weeks, and then gradually subsides

Acute vestibular neuronitis

- Inflammation of the vestibular portion of CN VIII
- May involve hearing loss
- Usually self-limiting

Ménière disease: discussed elsewhere

Head injury

- Inner ear fluid can leak into middle ear

Others

- Stroke, tumor, multiple sclerosis, migraines, allergies, anxiety, depression, medications, some drugs

more Vestibular Balance Disorders

Signs and Symptoms	Diagnosis	Treatments	Massage
Perception that the world is spinning or tilting Nystagmus Nausea, vomiting	Can be difficult: many causes, may overlap MRI, CT to rule out CNS problems Hearing, blood tests, electronystagmogram, posturography	Depends on type of disorder BPPV: head maneuvers Drugs for nausea, vomiting Exercises for CNS adaptation	Appropriate if client is comfortable BPPV maneuvers may be helpful Some neck trigger points may mimic symptoms

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