

# PARKINSON'S DISEASE AND THE BRAIN'S DRAINAGE SYSTEM



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## COULD LYMPHATIC WORK SUPPORT CLEARANCE?

### REFRAMING PARKINSON'S

Parkinson's disease affects a large and growing number of people worldwide. The World Health Organization reports that global disability and death related to Parkinson's disease are increasing faster than for any other neurological disorder, and recent Global Burden of Disease data estimated 11.77 million prevalent cases worldwide in 2021 (World Health Organization, *Frontiers in Aging Neuroscience*). In the United States, the Parkinson's Foundation estimates that 1.2 million people will be living with Parkinson's by 2030 (Parkinson's Foundation).

Parkinson's disease is usually discussed through the lens of dopamine. But the brain is also a fluid-filled organ that depends on movement, sleep, circulation, and drainage to clear metabolic waste. One protein in particular, alpha-synuclein, has become central to the conversation.

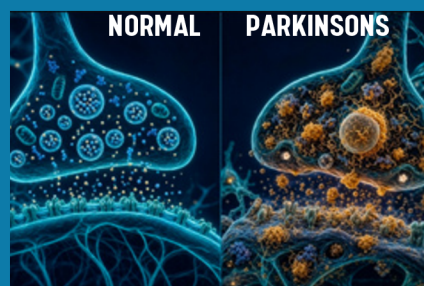
Medication is often central to Parkinson's management, but medication alone does not address every part of the disease experience.

People living with Parkinson's commonly rely on a broader care team that may include physical therapy, occupational therapy, speech therapy, exercise programs, movement therapies,

pain support, adaptive strategies, and complementary approaches to help maintain function and quality of life (Parkinson's Foundation, American Parkinson Disease Association).

Physical therapy, occupational therapy, and structured exercise already have an important place in this larger model.

### PARKINSON'S DISEASE, ALPHA- SYNUCLEIN, AND THE CLEARANCE PROBLEM



At the center of this conversation is alpha-synuclein, a normal nervous system protein that can become problematic when it misfolds, aggregates, and accumulates in the brain and nervous system. Alpha-synuclein aggregation is closely associated with Lewy bodies and Lewy neurites, which are pathological hallmarks of Parkinson's disease and related synuclein disorders (Cell Death & Disease).

## **PARKINSON'S DISEASE, ALPHA-SYNUCLEIN, AND THE CLEARANCE PROBLEM**

The Parkinson's Foundation describes exercise as a vital part of Parkinson's management that can help maintain balance, mobility, flexibility, and quality of life, while rehabilitation therapies can help people maintain independence and daily function (Parkinson's Foundation, Parkinson's Foundation).

The American Parkinson Disease Association also describes physical, occupational, and speech therapy as important partners in Parkinson's treatment planning (American Parkinson Disease Association).

Manual therapy belongs in this broader conversation. A 2022 systematic review and meta-analysis found that therapeutic massage and manual therapies improved motor outcomes in Parkinson's disease compared with control interventions, although the authors emphasized limitations such as heterogeneity, limited follow-up, and the need for more standardized trials (Frontiers in Neurology).

Manual lymphatic drainage and Lymphatic Restoration Therapy deserve a fair look within this model. They should not be presented as a cure or a replacement for medication, neurology, exercise, PT, OT, or speech therapy.

They should be considered as supportive therapies that may help address fluid movement, tissue congestion, autonomic regulation, sleep readiness, inflammation balance, comfort, and quality of life.

The reason this matters is that Parkinson's disease may involve more than dopamine loss. A growing body of research points to impaired clearance of abnormal proteins, inflammatory signals, and metabolic waste from the brain and nervous system (Nature Medicine, Translational Neurodegeneration).

At the center of this conversation is alpha-synuclein, a normal nervous system protein that can become problematic when it misfolds, aggregates, and accumulates in the brain and nervous system. Alpha-synuclein aggregation is closely associated with Lewy bodies and Lewy neurites, which are pathological hallmarks of Parkinson's disease and related synuclein disorders (Cell Death & Disease).

This matters because Parkinson's may not be only a disease of protein production or dopamine loss. It may also be a disease of impaired protein handling, impaired drainage, neuroinflammation, and reduced ability to clear what the nervous system no longer needs (Nature Medicine, Frontiers in Aging Neuroscience).

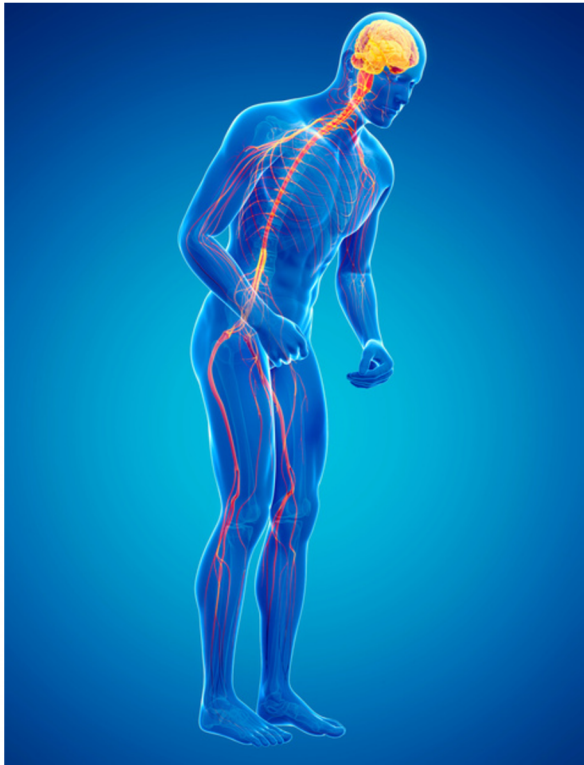
For therapists, this opens an important clinical question: if impaired clearance contributes to the disease environment, how can manual therapy, lymphatic work, and nervous system regulation support the body's natural clearance pathways?

## **THE CLEARANCE ISSUE IN PARKINSON'S DISEASE**

Alpha-synuclein is not inherently "bad." It is a normal protein involved in nerve cell function, especially around synaptic activity and communication between neurons (Cell Death & Disease).

The problem begins when alpha-synuclein changes shape, becomes misfolded, and starts to aggregate. These abnormal forms can accumulate inside and around neurons, disrupt cellular function, activate immune responses, and contribute to neurodegenerative changes over time (Cell Death & Disease, Frontiers in Aging Neuroscience).

In Parkinson's disease, the imbalance between alpha-synuclein production and clearance appears to play a key role in disease pathology.



One imaging study described this imbalance as central to Parkinson's pathogenesis and suggested that diminished alpha-synuclein clearance may be partly related to impaired interstitial fluid movement (Frontiers in Aging Neuroscience).

This is where the glymphatic and lymphatic systems become clinically relevant.

The glymphatic system is a brain-wide fluid clearance pathway that helps move cerebrospinal fluid through perivascular spaces and supports the removal of metabolic waste from brain tissue. This system interacts with meningeal lymphatic vessels, which drain central nervous system waste products toward deep cervical lymph nodes (Frontiers in Molecular Neuroscience, Nature Medicine).

In simple terms, the brain does not have unlimited storage space for cellular debris. It depends on fluid movement, pressure gradients, vascular pulsation, sleep, respiration, autonomic regulation, and lymphatic drainage pathways to maintain a healthier internal environment (Frontiers in Molecular Neuroscience, Journal of Cerebral Blood Flow & Metabolism).

## WHAT THE RESEARCH SHOWS

Several studies support the idea that clearance dysfunction is relevant to Parkinson's disease. In a 2019 mouse study, researchers blocked meningeal lymphatic drainage by ligating the deep cervical lymph nodes in A53T mice that overexpress mutated human alpha-synuclein. Blocking this drainage worsened glymphatic dysfunction, increased alpha-synuclein accumulation, increased glial activation and inflammatory cytokines, worsened dopaminergic neuron loss, and aggravated motor deficits (Translational Neurodegeneration).

This animal study is especially important for lymphatic therapists because it connects deep cervical lymphatic drainage with the brain's ability to manage alpha-synuclein burden. It does not prove that manual lymphatic drainage removes alpha-synuclein from the human brain, but it does show that when cervical lymphatic outflow was experimentally disrupted in a Parkinson's-like model, pathology worsened (Translational Neurodegeneration).

In a 2021 Nature Medicine study, researchers used dynamic contrast-enhanced MRI to evaluate meningeal lymphatic flow in people with idiopathic Parkinson's disease, atypical parkinsonian disorders, and cognitively normal controls. The study found that patients with idiopathic Parkinson's disease had significantly reduced meningeal lymphatic flow and delayed deep cervical lymph node perfusion compared with relevant comparison groups (Nature Medicine).

The same Nature Medicine study also used an alpha-synuclein preformed fibril mouse model and found that alpha-synuclein pathology was followed by delayed meningeal lymphatic drainage, meningeal inflammation, and structural changes in lymphatic endothelial tight junctions. When meningeal lymphatic flow was blocked in those mice, alpha-synuclein pathology and motor and memory deficits worsened (Nature Medicine).



*Several studies support the idea that clearance dysfunction is relevant to Parkinson's disease.*

Other imaging studies point in the same direction. A 2022 study using diffusion tensor imaging analysis along the perivascular space, also called DTI-ALPS, found that patients with Parkinson's disease had a reduced ALPS index compared with healthy controls, suggesting compromised glymphatic activity (CNS Neuroscience & Therapeutics).

That same study found that the ALPS index was negatively correlated with age, age at disease onset, Parkinson's sleep scale scores, and history of diabetes mellitus, and the authors interpreted reduced ALPS index as evidence of compromised glymphatic activity, especially in older patients and those with sleep disorders (CNS Neuroscience & Therapeutics).

A 2020 study from the Parkinson's Progression Markers Initiative found that people with Parkinson's had more dilated perivascular spaces in the substantia nigra and basal ganglia than healthy controls. The authors suggested that dilated perivascular spaces in the substantia nigra may reflect dopaminergic neuron degeneration and may relate to impaired interstitial fluid clearance (Frontiers in Aging Neuroscience).

Taken together, these studies support a developing model: Parkinson's disease involves alpha-synuclein accumulation, and impaired glymphatic, meningeal lymphatic, cervical lymphatic, and interstitial fluid clearance may worsen the tissue environment in which neurodegeneration occurs.

## WHERE MANUAL THERAPY AND LRT FIT

Lymphatic Restoration Therapy (LRT), manual lymphatic drainage (MLD), and related manual therapies should not be presented as cures for Parkinson's disease. They should be understood as supportive therapies that may help optimize the conditions that allow fluid movement, tissue drainage, autonomic regulation, and nervous system recovery to occur.

The goal is not to claim that a therapist can manually "drain alpha-synuclein out of the brain." The more clinically responsible goal is to support the body systems that influence clearance, including cervical lymphatic pathways, venous angle drainage, diaphragmatic motion, thoracic mobility, autonomic tone, sleep readiness, and inflammatory load.

In the context of Parkinson's, this makes the neck, clavicular region, thoracic inlet, diaphragm, cranial base, jaw, face, and upper chest clinically meaningful. These regions influence lymphatic return, venous return, breathing mechanics, autonomic state, and the peripheral drainage routes that interact with central nervous system outflow.



Manual therapy can also support the person, not only the pathology. People with Parkinson's may experience rigidity, reduced trunk rotation, forward-flexed posture, constipation, sleep disruption, anxiety, pain, edema, reduced mobility, altered breathing mechanics, and autonomic symptoms. Gentle lymphatic and manual approaches can be integrated to support comfort, mobility, relaxation, and participation in care.

## WHAT STUDIES EXIST ON MANUAL THERAPY AND PARKINSON'S?

Direct studies on LRT or MLD specifically clearing alpha-synuclein in human Parkinson's disease have not yet been established in the clinical literature cited here. However, several related bodies of evidence are relevant for therapists.

A 2022 systematic review and meta-analysis evaluated therapeutic massage and other manual therapies for motor symptoms in Parkinson's disease. The review included seven studies with 363 Parkinson's participants and found that therapeutic massage improved UPDRS-III motor scores and total UPDRS scores compared with controls, although the authors noted heterogeneity, limited follow-up, variable massage techniques, and the need for more standardized randomized controlled trials (Frontiers in Neurology).

This review does not prove a glymphatic or lymphatic mechanism, but it does support the broader idea that manual therapy can be clinically meaningful for people with Parkinson's.

For therapists, this means manual work may have value for motor comfort, movement quality, rigidity, and function while lymphatic-focused protocols may add another layer of support aimed at fluid movement and nervous system regulation (Frontiers in Neurology).

A 2020 randomized, double-blinded clinical trial studied different neck manual lymph drainage maneuvers in 24 healthy participants. The study found short-term changes in heart rate, respiratory rate, systolic blood pressure, and pressure pain threshold depending on the technique used, and no adverse effects were described during the study (Journal of Clinical Medicine).

This neck MLD study is relevant because it shows that gentle supraclavicular lymphatic maneuvers can influence autonomic and physiological variables, although the participants were young and healthy rather than people with Parkinson's disease. The findings should therefore be interpreted as mechanistic support, not Parkinson's-specific evidence (Journal of Clinical Medicine).

A 2024 retrospective case series used noninvasive imaging to assess manual lymphatic drainage during a 6-degree head-down tilt spaceflight analog. In 15 healthy university students, MLD appeared to reverse trends in head, neck, and upper body fluid redistribution, and the authors concluded that MLD may be useful for managing fluid shifts in simulated weightlessness (npj Microgravity).

This study does not involve Parkinson's disease, but it is clinically interesting because it used imaging tools to observe fluid distribution, perfusion, and temperature changes in the head, neck, upper torso, and legs before and after MLD. For lymphatic therapists, it supports the plausibility that manual lymphatic work can influence measurable fluid dynamics in regions relevant to head and neck drainage (npj Microgravity).

Osteopathic literature has also begun discussing manual approaches in relation to the glymphatic environment. A 2021 Cureus study in severe traumatic brain injury reported changes in intracranial pressure-related measures after osteopathic manipulative treatment and proposed that OMT may help optimize the glymphatic environment, although this was not a Parkinson's study and should be considered early exploratory evidence (Cureus).

## HOW LRT WITH MLD MAY ASSIST BRAIN CLEARANCE SUPPORT

LRT with MLD may be helpful in Parkinson's support because it addresses several systems that influence clearance, even if it has not yet been proven to remove alpha-synuclein directly from the human brain.



*Gentle manual drainage techniques, when combined with other soft manual therapies such as Myofascial release and cranial techniques, work together to alleviate restrictions that hinder efficient drainage of the head and brain.*

## SUPPORTING CERVICAL LYMPHATIC OUTFLOW

Meningeal lymphatic vessels drain toward deep cervical lymph nodes, and Parkinson's studies have identified impaired meningeal lymphatic drainage and delayed deep cervical lymph node perfusion in idiopathic Parkinson's disease (Nature Medicine). This makes the cervical region clinically relevant for therapists trained in lymphatic pathways.

LRT protocols that address the supraclavicular region, venous angles, anterior and lateral neck, deep cervical chain, occipital region, jaw, face, and thoracic inlet may help reduce peripheral restrictions that could limit optimal drainage mechanics. This should be understood as supporting the surrounding drainage environment rather than directly accessing intracranial lymphatic vessels.

## REDUCING MECHANICAL CONGESTION AROUND THE NECK AND THORACIC OUTLET

Many people with Parkinson's develop forward head posture, thoracic rigidity, reduced arm swing, shallow breathing, and decreased trunk rotation.

These mechanical patterns may influence lymphatic and venous return by reducing normal tissue glide, respiratory pump function, and upper thoracic mobility.

Gentle manual therapy can be used to improve soft tissue mobility, encourage rib cage and diaphragmatic motion, and reduce fascial restriction around the thoracic inlet. This matters because lymphatic return is strongly influenced by pressure changes, breathing, tissue movement, and unobstructed central drainage.

## SUPPORTING THE AUTONOMIC NERVOUS SYSTEM

Parkinson's disease commonly includes non-motor symptoms such as sleep disturbance, constipation, anxiety, pain, and autonomic dysregulation.

The lymphatic system is strongly linked to sleep and physiological states that allow the brain to shift into repair and waste-clearance activity (Journal of Cerebral Blood Flow & Metabolism, CNS Neuroscience & Therapeutics)

Gentle lymphatic work is slow, rhythmic, and non-threatening to the nervous system. When performed skillfully, LRT and MLD may support parasympathetic tone, reduce protective guarding, soften sympathetic arousal, and help the body prepare for better rest and recovery.

## IMPROVING SLEEP READINESS

Sleep is one of the most important natural drivers of brain clearance.

Reviews of glymphatic function emphasize that this system is more active during sleep and that vascular health, sleep quality, and lifestyle factors are relevant to brain waste removal (Journal of Cerebral Blood Flow & Metabolism).

For people with Parkinson's, improving comfort, reducing rigidity, supporting respiration, and calming the autonomic system may help create better conditions for sleep.

LRT does not replace sleep medicine, neurology, or Parkinson's care, but it may be a valuable supportive therapy when sleep disruption, tissue tension, and autonomic stress are part of the clinical picture.

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# Clinical Framework: LRT + MLD in Parkinson's Support

A supportive model for drainage, nervous system regulation, movement, and quality of life

## 1 Central Drainage

### Clinical focus

Supraclavicular region, venous angles, thoracic inlet

### Why it matters

Prepares the main pathways before head and neck work.

## 2 Cervical Lymphatics

### Clinical focus

Deep and superficial neck pathways

### Why it matters

Supports the drainage environment for head and neck flow.

## 3 Cranial + Facial Drainage

### Clinical focus

Occiput, jaw, face, scalp, cranial base

### Why it matters

Addresses tissue tone and regional fluid movement.

## 4 Respiratory Pump

### Clinical focus

Diaphragm, ribs, thorax

### Why it matters

Supports pressure gradients for lymph and venous return.

## 5 Autonomic Regulation

### Clinical focus

Slow rhythm, light pressure, safety cues

### Why it matters

Encourages parasympathetic tone and sleep readiness.

## 6 Movement Integration

### Clinical focus

Walking, breathing, trunk rotation, posture

### Why it matters

Helps maintain fluid movement between sessions.

Use alongside neurology, medication management, PT, OT, speech therapy, exercise, and individualized medical care.

LRT = Lymphatic Restoration Therapy • MLD = Manual Lymphatic Drainage

## HELPING THE WHOLE PERSON MOVE FLUID

The lymphatic system depends on movement, breath, muscle contraction, skin stretch, and pressure gradients. Parkinson's can reduce spontaneous movement, alter gait, decrease trunk rotation, and restrict respiratory mechanics, all of which may affect global fluid movement and tissue health.

LRT can be paired with gentle breathing, guided movement, walking, postural support, and self-care strategies. This combination helps translate hands-on work into daily habits that keep lymphatic and circulatory systems more active between sessions.

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## A CLINICAL FRAMEWORK FOR THERAPISTS

The best results are likely to come from a whole-person approach. LRT should be integrated with neurological care, exercise, physical therapy, occupational therapy, speech therapy, medication management, sleep support, nutrition, hydration, and appropriate medical monitoring.

## WHAT THERAPISTS NEED TO LEARN

Therapists must approach Parkinson's lymphatic work with clinical reasoning and neurological awareness, avoiding generic techniques. Key considerations include symptoms like orthostatic hypotension, fatigue, fall risk, and cognitive changes, which can affect treatment approaches.

Understanding the distinction between evidence, mechanism, and clinical application is crucial, as research supports the role of impaired brain clearance in Parkinson's and indicates that manual therapies can positively influence symptoms and physiological responses.



*What has not yet been proven is that MLD or LRT directly clears alpha-synuclein from the human brain in Parkinson's disease. That distinction matters because responsible clinical practice requires both hope and honesty.*

## WHY LRT PROTOCOLS MATTER

This is why specialized protocols are needed. Lymphatic work for neurological conditions requires more than memorizing strokes; it requires knowing when to open central pathways, how to pace the nervous system, how to work around the head and neck safely, and how to integrate breath, posture, autonomic regulation, and drainage sequencing.

LRT protocols are designed to help therapists move beyond isolated techniques and into structured clinical thinking. For Parkinson's support, that means understanding how to work with cervical drainage, cranial and facial pathways, thoracic mechanics, diaphragmatic support, and nervous system regulation in a way that respects the complexity of the condition.

Therapists who want to serve clients with Parkinson's disease, neurodegenerative conditions, post-concussion symptoms, head and neck congestion, or autonomic dysregulation should seek out advanced lymphatic training. The future of manual therapy will belong to practitioners who understand fluid flow, inflammation, neurological vulnerability, and the body's clearance systems.

## A GROUNDED CONCLUSION

Parkinson's disease is complex. It cannot be reduced to dopamine alone, and it cannot be solved by one therapy alone.

The research on alpha-synuclein, glymphatic dysfunction, meningeal lymphatic drainage, and cervical lymphatic outflow gives therapists a new lens for understanding neurological health. It suggests that clearance matters, drainage matters, sleep matters, inflammation matters, and the neck may be more important than many clinicians once realized.

LRT with MLD and other gentle manual therapies may offer meaningful support by improving the body's drainage environment, calming the nervous system, supporting sleep readiness, improving fluid movement, and helping clients feel more comfortable in their bodies.

This is not about promising a cure. It is about expanding the conversation and giving therapists better tools to support the whole person.



**For therapists, this is the invitation: learn the protocols, study the research, respect the nervous system, and understand how lymphatic work can be integrated into neurological care with clarity, caution, and purpose.**

Laine Kristin Miller is a lymphatic therapist who operates her practice in Boca Raton, Florida. She is dedicated to educating both therapists and the public about lymphatics. If you would like to learn more, feel free to join her Facebook page, **\*\*Lymphatic Restoration Therapy\*\***.

**Disclaimer:** This article is for educational purposes only and is not medical advice. Parkinson's disease should be evaluated and managed by a qualified medical provider, and any supportive therapies should be discussed with the appropriate healthcare team.

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