

The Quiet Mechanics of Rest

A guide to the non-obvious postural physiology of ELC, POTS, and dysautonomia: venous return, sidedness, drainage, and timing

A longer look under the hood at the parts of rest physiology that rarely get explained: the plumbing of venous return, the body's left-right asymmetry, how blood leaves the head, and how digestion competes for the same volume.

What the community keeps noticing

This guide grew out of a running conversation in the Energy Lab community. Two threads kept surfacing: the Welltory battery can keep draining even after someone has sat down to rest, and rest itself often fails to refill the tank or leave people feeling restored. That is the starting point for a closer look at what actually happens to the circulation when a body stops to rest.

*Prepared 2026 * Energy Lab * general information from community and published research, descriptive*

THE SHORT VERSION

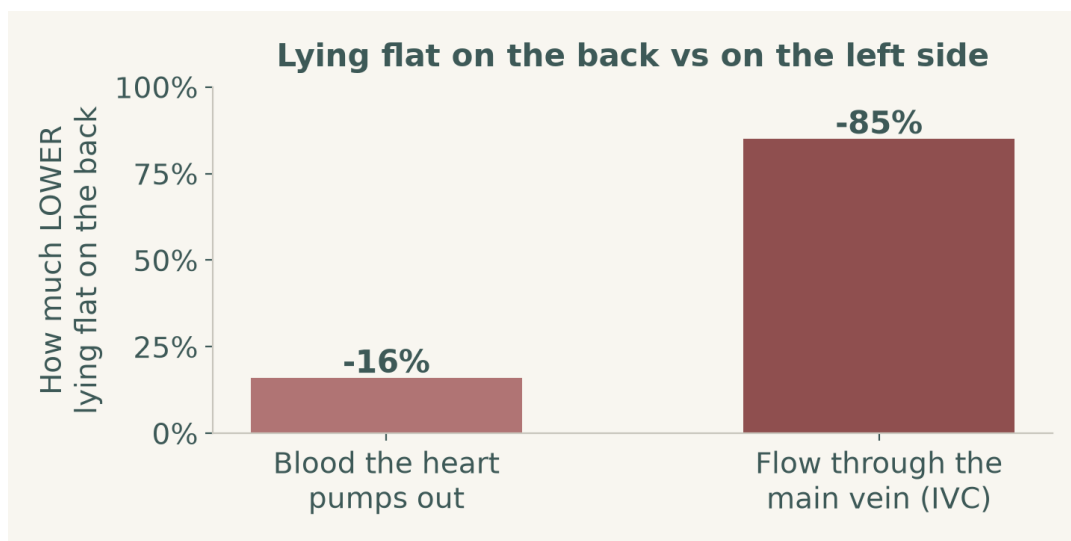
Three things the usual advice skips

The compression, pacing, and sleep basics are worth having and widely known. Underneath them sits a layer of plumbing that is rarely explained and genuinely useful. Here it is in three points, with one chart. Read whatever parts you have energy for, and skip the rest.

1. The body is not left-right symmetric. The big vein that carries blood back to the heart runs on the right, and the left leg's main vein is pinched where an artery crosses it. How you lie, and which side, changes venous return in ways the usual advice skips.

2. Rest is about drainage as much as supply. Lying down, blood leaves your brain through the big neck veins. Standing, those collapse and it reroutes along the spine. Posture changes the plumbing on the way out, not only the flow coming in.

3. Small, specific choices beat generic ones. A slight left bias, a supported neutral neck, tiny movements over perfect stillness, and horizontal time after meals each do real mechanical work. The popular "sleep on your left for your nervous system" idea is the weak one.



Lying flat on the back versus on the left side, measured in late pregnancy where the effect is largest. Source: Humphries et al. 2018.

PART I - WHY UPRIGHT IS THE LOAD

A right heart that cannot fill

The everyday explanation for lying down is relaxation. The mechanical one is more specific and more useful. In many of us the veins are slow to return blood from the legs and belly, so the right side of the heart never fills properly. Invasive exercise testing shows this filling shortfall, called preload failure, in the large majority of people with ME/CFS, and standing alone shifts about half a liter of blood downward into the legs and belly.

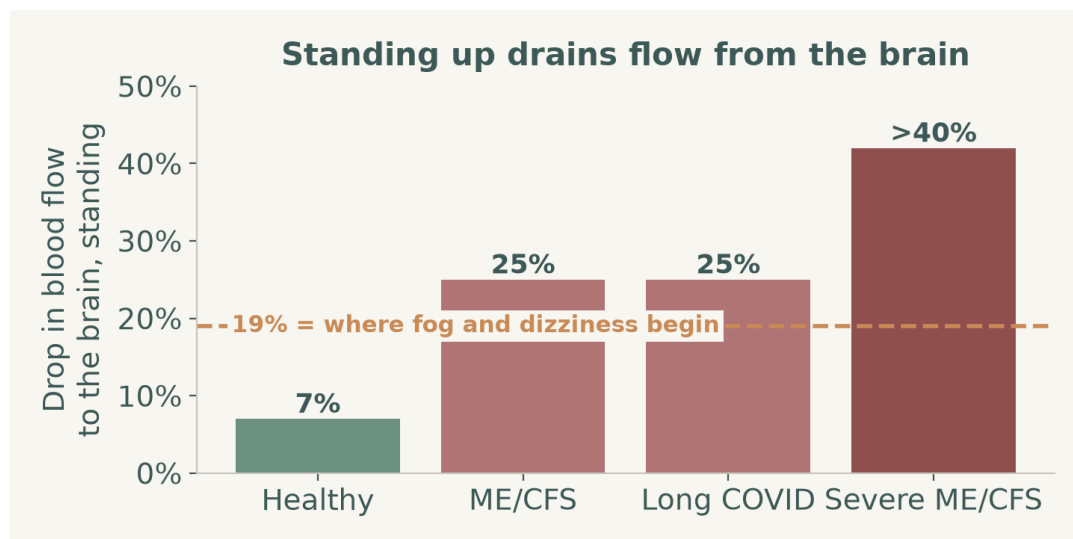
A heart with too little to pump speeds up to compensate, and even so the output falls short. Two systems normally prevent this: the veins tighten to push blood upward, and contracting leg muscles squeeze it back like a second pump. In ELC both tend to underperform, which is the real reason horizontal helps. Lying down removes the gravitational gap the failing systems cannot bridge, and blood returns to a heart that can finally fill.

PART I - WHY UPRIGHT IS THE LOAD

What the brain loses when you stand

That filling problem lands hardest on the brain. On a tilt table, blood flow to the brain drops around 25% in many of us with ME/CFS or Long COVID, next to about 7% in people without these conditions, and it crosses the roughly 19% mark where fog and dizziness reliably set in. Severe cases can exceed 40%.

The striking part is that this often happens while blood pressure reads normal, so a standard cuff misses it entirely. The mechanism is either a failure of the brain's own flow control or over-breathing that lowers carbon dioxide and narrows the brain's vessels. Either way, the fix is the same at the level of posture: getting horizontal restores the flow a cuff never showed was missing.



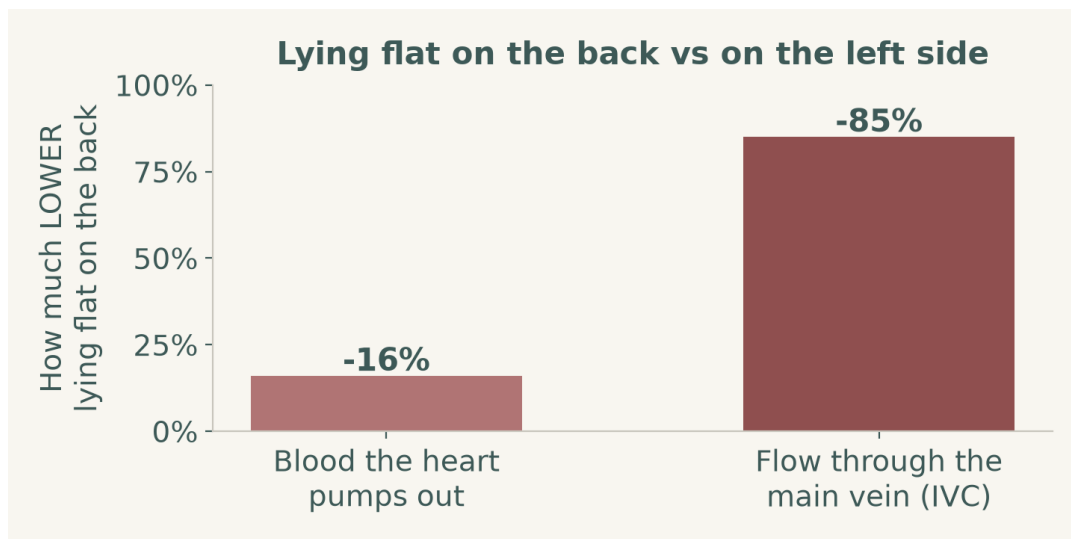
How far blood flow to the brain falls on standing, by group. The dashed line marks where symptoms usually begin. Sources: van Campen, Rowe & Visser 2020; community research synthesis.

PART II - THE NON-OBVIOUS CORE

The vena cava runs on the right

Here is the piece that surprises people. Your body is not a mirror image inside. The inferior vena cava, the wide vein carrying blood from the lower body back to the heart, sits to the right of the spine. Lying flat on the back can let the weight of the abdomen press on it, and turning onto the left side lifts that weight off.

The clearest measurements come from late pregnancy, where the effect is largest: lying flat on the back, compared with lying on the left, dropped the heart's output by about 16% and cut flow through the vena cava sharply, while a backup vein along the spine ramped up by over 200% to compensate. Most of us are not carrying that load, so the everyday effect is gentler. The anatomy is identical though, and it is why flat-on-the-back is not automatically the most restful position, and why a slight left bias can ease things when the belly feels involved.



Lying flat on the back versus on the left side, measured by MRI in late pregnancy where the effect is largest. The anatomy is the same in everyone; the size of the effect is not. Source: Humphries et al. 2018.

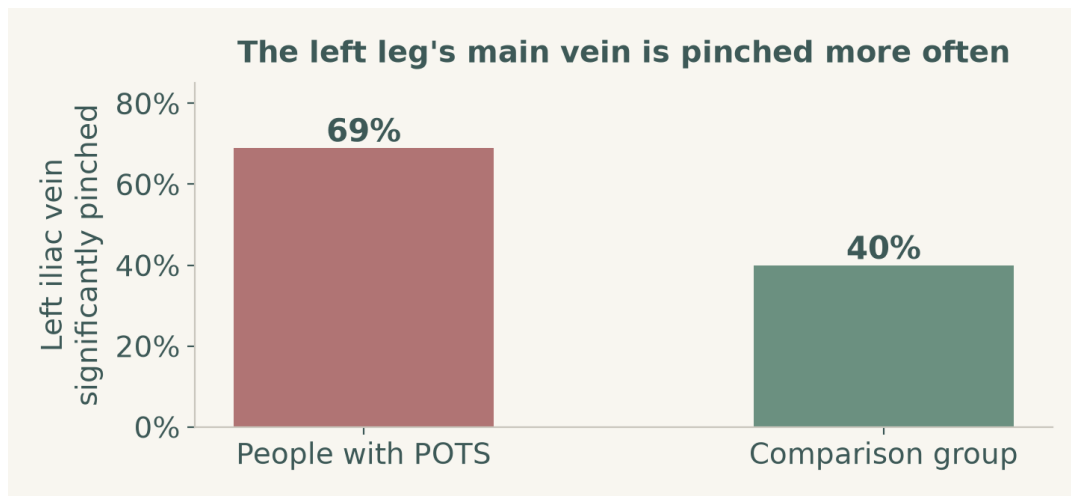
PART II - THE NON-OBVIOUS CORE

The left leg pools more, by design

The asymmetry continues lower down. The left leg's main vein passes under a crossing artery and gets squeezed at that spot, a common anatomical quirk. In people with POTS this squeeze is present far more often than in others, which tips the left leg and pelvis toward pooling and pulls blood away from the center.

This pelvic and leg vein congestion is under-recognized, and reviews find that when it is identified and treated, orthostatic symptoms often ease, with cognitive symptoms improving in some. The point for rest is not a procedure. It is a lens: for a real subset of us, the pooling that makes upright so costly is partly a plumbing bottleneck, which is one more reason getting horizontal and

elevating the legs does genuine mechanical work, well beyond simple comfort.



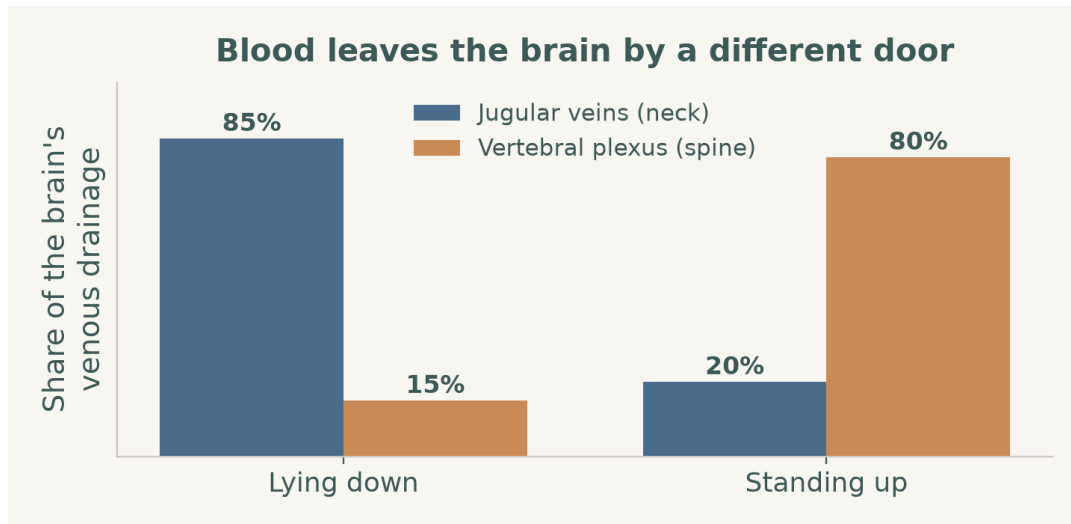
How often the left leg's main vein is significantly pinched, in POTS versus a comparison group. Source: Knutinen et al. 2020.

PART II - THE NON-OBVIOUS CORE

How blood leaves your head

Almost every rest conversation is about getting blood up to the brain. The other half is how it drains away, and posture flips the route entirely. Lying down, blood leaves the brain mostly through the large jugular veins in the neck. Standing up, those veins collapse under their own column of blood, and drainage shifts to a plexus of small veins running along the spine.

That shift also moves spinal fluid and changes pressure inside the head, part of a normal balancing act. It reframes brain fog and head pressure as partly a drainage story, and it explains why a neutral, supported neck matters as much as being flat. A head cranked forward on a stack of pillows can kink the very veins you are trying to keep open. This is standard physiology from healthy studies; how much it drives symptoms in any one body varies, and it is most relevant for those with neck and craniocervical involvement.



Which veins carry blood out of the brain flips with posture. Shares shown are illustrative of the pattern. Sources: Gisolf et al. 2004; Valdueza et al. 2000.

PART II - THE NON-OBVIOUS CORE

Right side, left side, and the nervous system

So does one side calm the nervous system. The honest answer is that the effect is small. In a database of over 130,000 overnight recordings, resting heart rate ran slightly lower lying on the left and slightly higher on the right, with the other autonomic measures showing consistent but small differences. An older careful study found no difference at all between sides.

So the vagal-tone case for a particular side is weak, and chasing it is not worth the energy. The reasons to favor a side are the concrete ones already covered: the left eases pressure on the vena cava and helps with reflux and airway, and joint comfort with a pillow between the knees matters for hypermobile bodies. Pick a side for the plumbing and the comfort, and let the nervous-system folklore go.

PART II - THE NON-OBVIOUS CORE

Digestion is a postural event

One more overlooked piece. Eating is a circulatory event. A meal pulls a large share of blood to the gut, and the body is supposed to tighten other vessels to keep the brain supplied. In POTS and dysautonomia that compensation falls short, so blood pools in the belly on top of any pooling from being upright, a pattern described in the literature as meal-induced splanchnic pooling.

This is why a meal can flatten you as hard as standing does, and why the half hour to hour after eating is a real danger window. Smaller, more frequent meals ask less of the system at once, and lying down or reclining through the post-meal window gives the circulation room while digestion takes its cut. Many of us already sense this and have never been told why.

PART II - THE NON-OBVIOUS CORE

Small movements beat perfect stillness

A counterintuitive point falls out of the preload story. Because contracting leg muscles are the body's second pump for venous return, lying perfectly rigid switches that pump fully off. Complete stillness is not the goal of rest.

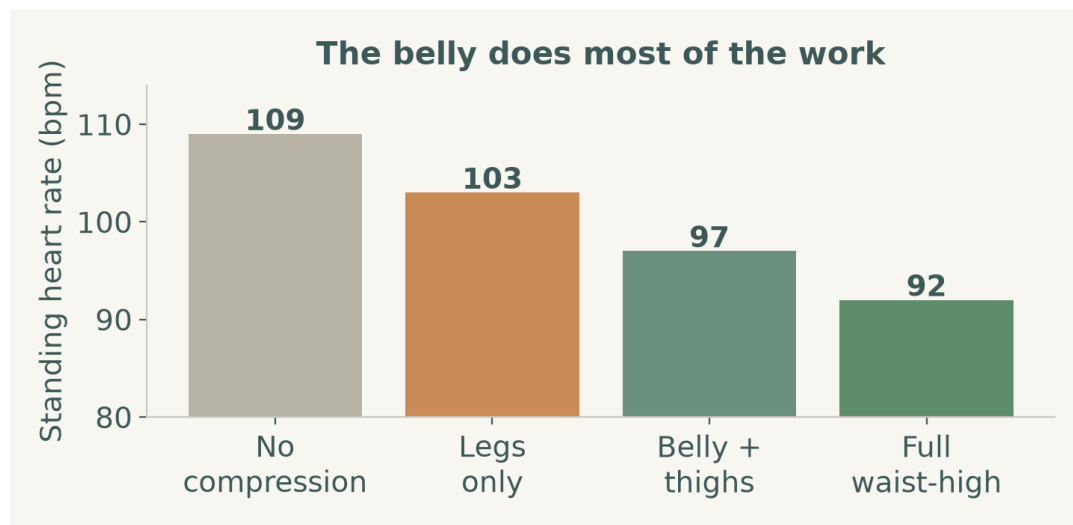
Slow ankle pumps, gentle calf and glute squeezes, a handful of easy repetitions while you are horizontal, recruit the muscle pump at almost no energy cost and lift venous return. Small pilot programs built around simple calf activation have improved orthostatic measures in this population. The move is gentle and within the envelope, and it turns rest from frozen stillness into quiet circulation.

PART II - THE NON-OBVIOUS CORE

Why the belly is the center of it all

Tie these threads together and one region keeps appearing: the abdomen. The vena cava runs through it, the largest reservoir of pooled blood sits in its splanchnic veins, digestion draws on it, and the left-side vein bottleneck feeds into it.

That is the anatomical reason abdominal support does more than leg-only measures. In a controlled trial, adding compression over the belly and thighs dropped standing heart rate far more than the legs alone, from 109 down toward 92 beats a minute. So many of these levers, going horizontal, a left bias, leg elevation, timing around meals, abdominal support, converge on one thing: managing the volume of blood held in the middle of the body.



Standing heart rate falls step by step as compression covers more of the body, with the belly doing most of the work. Source: Bourne et al. 2021.

PART III - TAILORING TO YOUR BODY

One posture will not fit everyone

None of this is a prescription, and there is no position that is correct for everyone. ELC comes in flavors, the venous anatomy varies, and posture meets each variation a little differently.

With POTS, some bodies run low on circulating volume, where fluids, salt, and compression do most of the work; others hold near-normal volume with leaky vessels, where getting flat, leg elevation, and belly compression matter more; and a third group runs on sympathetic overdrive, where a calm, dim, predictable setup and easing slowly out of horizontal help as much as the plumbing. Dysautonomia with falling blood pressure responds to flat and legs-up, with one caution: a subset run high blood pressure when lying flat, and for them a slight head-of-bed tilt overnight is the safer default. ME/CFS tends to be preload-dominant, so recumbent time and horizontal micro-rest after triggers carry a lot of weight. The Long COVID pattern more often involves over-breathing that narrows brain vessels, where slow, quiet nasal breathing while resting can help. Hypermobile and fibro bodies pool more through lax veins, so the venous levers matter more, alongside joint support with pillows under the knees, low back, and neck, and a sensory-neutral space. And how strongly any of this registers tracks how a body reads its own signals, so two people with identical readings can feel worlds apart.

PART IV - PUTTING IT TOGETHER

A practical map

Here is the whole thing turned into levers you can test, each with the reason behind it so you can tell whether it fits your body.

If standing or sitting drains you: get horizontal, legs up on a cushion or the wall. Restores preload and brings flow back to the brain.

If the belly feels heavy or reflux is in play: a gentle left bias. Eases pressure on the vena cava and on the stomach.

If mornings are the worst part: a slight, whole-bed head-up tilt overnight. Holds a little more volume in circulation for the moment you stand.

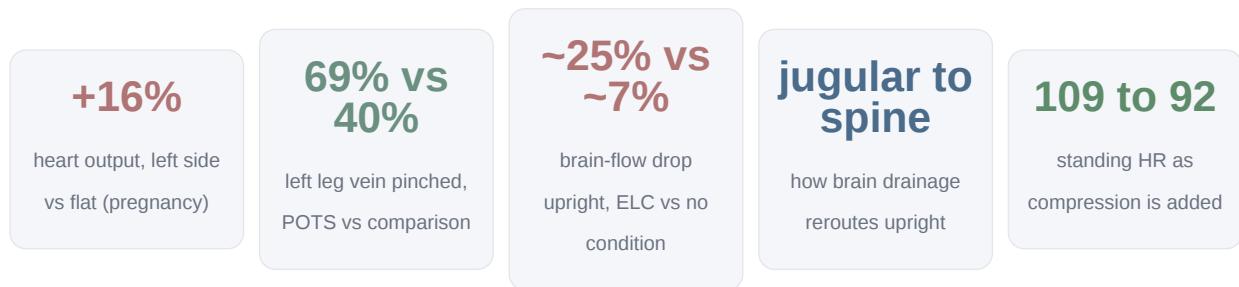
If meals flatten you: smaller and more frequent, and recline through the half hour to hour after eating. Gives the circulation room while the gut takes its share.

If brain fog or head pressure is prominent: a neutral, supported neck, and skip the pillow tower. Keeps the drainage route out of the head open.

If a crash has you flat for a long stretch: slow ankle pumps and gentle squeezes now and then. Keeps the muscle pump alive so blood keeps moving.

If you are choosing a sleep side: choose for reflux, venous ease, and joint comfort. The side-for-your-vagus idea can go.

Keep whatever your own body confirms, and let go of what it does not. Your body is the reference.



What this changes

Rest is not only lying down and switching off. The body is asymmetric plumbing: the main vein runs on the right and can be pressed flat on the back, the left leg vein is pinched by design, blood leaves the brain by different routes depending on posture, and digestion competes for the same volume.

So the levers get specific and a little surprising: flat with legs supported and the neck neutral, a gentle left bias when the belly or reflux is in play, small movements over perfect stillness, and horizontal time through the post-meal window. The side-for-your-vagus idea can go. Your own body stays the reference.

EVIDENCE AND LIMITS

How solid each piece is

This guide leans on the less-cited corners of postural physiology, so the evidence varies in strength and is worth naming piece by piece. The tilt-testing drop in brain blood flow and the preload-failure finding are well replicated across cohorts. The compression dose-response is from a randomized trial. The left iliac vein and pelvic-vein findings are strong in POTS cohorts, with treatment benefit drawn from case series and reviews. The vena cava and cardiac-output numbers are largest in late pregnancy, where a gravid uterus loads the vein; the same anatomy applies to everyone at a gentler scale. The cerebral venous outflow findings come from healthy-subject imaging and modelling and describe normal physiology, with the symptom link strongest in those with craniocervical involvement. The side-versus-autonomic-tone comparison is shown as weak on purpose, because that is what the data support. The muscle-pump micro-movement idea rests on mechanism plus small pilots. Across all of it, individual variation is the rule. General information from community and published research, not a substitute for medical advice.

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