Understanding LPS & Pathogen Die-Off

Lipopolysaccharide • Herxheimer Reaction • Binders • Immune Support • Recovery Protocol

LPS (lipopolysaccharide) is a toxic component found in the outer membrane of gram-negative bacteria. When treatment kills these bacteria, LPS floods the bloodstream triggering an immune response called the Herxheimer (die-off) reaction — producing symptoms like fatigue, body aches, brain fog, and inflammation. The good news: with the right support, you can move through this phase comfortably and emerge feeling significantly better.

What Is LPS & Why Does It Cause Symptoms?

Gram-negative bacteria (E. coli, H. pylori, Klebsiella, certain Lyme co-infections) have a double outer membrane containing lipopolysaccharide. When treatment kills these bacteria — through antimicrobials, ozone, herbals, or other protocols — LPS is released as cell walls break apart. The immune system detects LPS through TLR4 (Toll-like receptor 4) and mounts a rapid inflammatory cytokine response.

- Increases intestinal permeability — worsening systemic toxin entry
- Suppresses mitochondrial function — driving deep fatigue
- Disrupts blood-brain barrier — causing neurological symptoms
- Activates mast cells — contributing to histamine reactions in sensitive patients

Common Die-Off Symptoms

Symptoms typically begin within hours of treatment and peak at 24–72 hours:

- Fatigue and profound low energy — often worse than before treatment
- Body aches, muscle soreness, joint pain
- Brain fog, difficulty concentrating, word-finding difficulty
- Headaches — often frontal or generalized
- Chills, sweats, or low-grade fever
- Nausea, digestive upset, loose stools
- Skin flushing, rashes, or hives
- Mood changes — anxiety, irritability, or low mood

Die-off reactions typically resolve within 1–7 days. Severity depends on pathog
working — not a reason to stop.

Supportive Tools During Die-Off

Activated Charcoal

Binder — For Quick LPS Relief

Activated charcoal is a highly porous binder that adsorbs toxins like LPS in the gut, preventing their reabsorption and reducing systemic inflammatory burden.

- Quick method: Mix 1 tsp charcoal powder in 1 cup water, let sit 15 min, drink top ¾ slowly
- All-day sip: Mix 1 tsp charcoal powder in 16–20 oz water, sip throughout the day
- Capsules: Take 2 capsules twice daily

Take charcoal at least 1 hour away from all prescription medications, suppleme

Available in office (powder and capsules) or on Fullscript.

Fruit Anthocyanins Extract

Polyphenols — Calm the Immune Response

Fruit-based polyphenols — especially anthocyanins from bilberries and dark berries — reduce the overactive immune reaction to dying pathogens. They inhibit NF-κB, reduce TNF-α and IL-6, and provide antioxidant protection to tissues under inflammatory stress.

- Dose: 1 tsp twice daily — take directly or mixed with a splash of water
- Particularly helpful for neurological die-off symptoms: brain fog, headaches
- Also supports gut barrier integrity during high-LPS periods

Available in office.

Preparing Before Treatment

Starting support 1–2 weeks before antimicrobial treatment significantly reduces die-off severity:

- Ensure daily bowel movements — open drainage before starting
- Hydrate well — at least 64–80 oz water daily
- Begin binders several days before starting antimicrobials
- Support liver function — milk thistle, dandelion, NAC
- Reduce pathogen fuel — eliminate sugar, refined carbs, alcohol

Additional Support Supplements

Supplement	Dose	Why It Helps
Molybdenum	250–500 mcg/day	Neutralizes acetaldehyde from bacterial/yeast die-off
Tox-Affix	Per label	Broad-spectrum binder: zeolite, charcoal, and additional binders
NAC	600–1200 mg/day	Glutathione precursor — protects liver during heavy die-off
Magnesium Glycinate	200–400 mg/day	Supports detox enzymes, reduces aches, improves sleep
Liposomal Glutathione	250–500 mg/day	Neutralizes reactive oxygen species from LPS inflammation
Electrolytes (Quinton)	Per label	Replenishes minerals, supports adrenal function and hydration

Targeted Probiotics

Lower LPS & Balance Immune Response

Specific probiotic strains directly reduce LPS production and translocation, restore gut barrier integrity, and modulate immune response away from the overactivated inflammatory state caused by die-off.

- Bifidobacterium breve — reduces LPS translocation, restores tight junctions
- Lactobacillus rhamnosus GG — reduces systemic inflammation and gut permeability
- Saccharomyces boulardii — competes with pathogens, directly reduces LPS
- SEED Daily Synbiotic — comprehensive strain coverage with prebiotic support
- ProbioMed 50 — high-potency multi-strain for acute die-off periods

Available in office or on Fullscript.

Lactoferrin

Binds and Neutralizes LPS Directly

Lactoferrin is an iron-binding glycoprotein naturally found in colostrum and breast milk — one of the body's primary first-line defenses against bacterial infection and LPS toxicity.

- Binds directly to the lipid A portion of LPS — neutralizing its inflammatory signal before TLR4 activation
- Makes gram-negative bacteria more vulnerable to immune attack
- Reduces TNF-α and IL-6 independently of LPS binding
- Supports gut barrier and tight junction protein expression
- Antifungal properties — helpful during combined bacterial/yeast treatment

Recommended: Lactoferrin by Ecological Formulas (cow colostrum derived).
Available on Fullscript or ask at the office.

Die-off reactions are a sign your treatment is working — not a reason to stop. With proper binder support, hydration, and drainage, most patients move through Herxheimer reactions within a few days and emerge feeling significantly better than before.