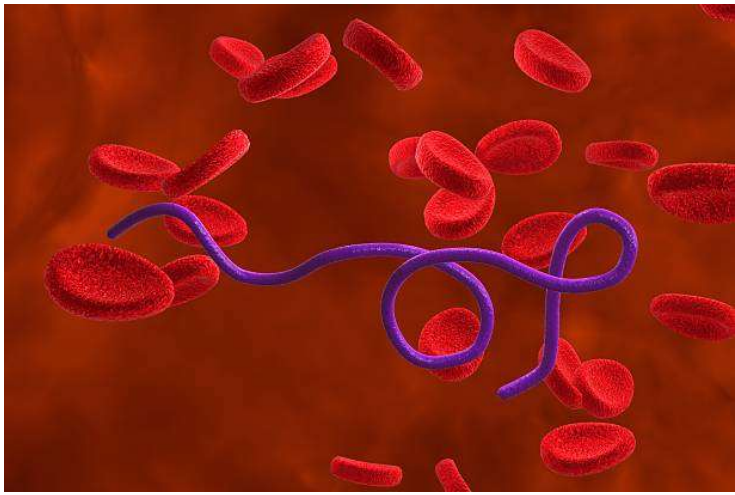
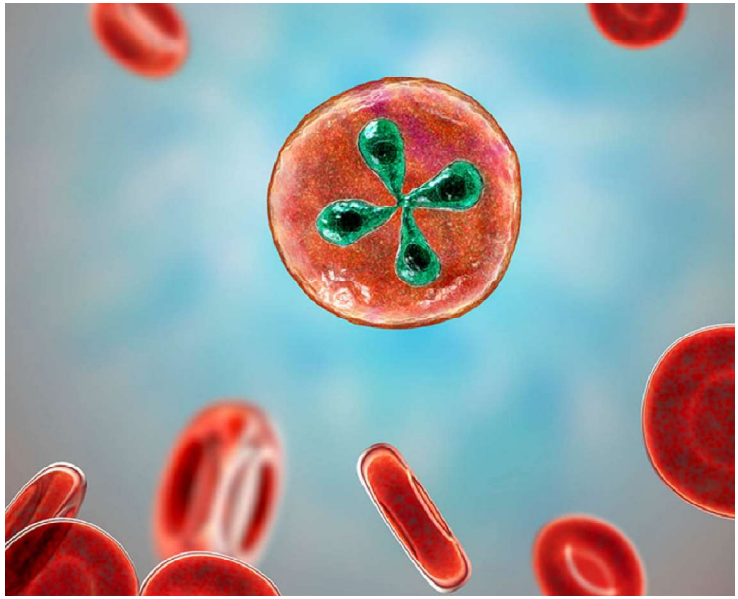
The Pathophysiology of Lyme Disease and Babesia and the MOAs of Herbal Intervention

presented by Myriah Hinchey, ND, FMAPS





Disclosures

I disclose the following relevant financial or non-financial relationships:

- TAO: Center for Vitality, Longevity, & Optimal Health (Founder, Owner, Medical Director)
- LymeCore Botanicals (Co-founder, Owner)
- LymeBytes (Founder, Owner)

Any reference to off-label or non-FDA approved usage in this presentation will be noted and disclosed.

Behind the Disappointing Clinical Outcomes

IMMUNE DYSFUNCTION

Disable immune recognition and the ability to target infection

Ongoing inflammation

Increased invasion, proliferation, and immune suppression

Why do most treatments fail?

- Focus is on killing the organism instead of healing the patient

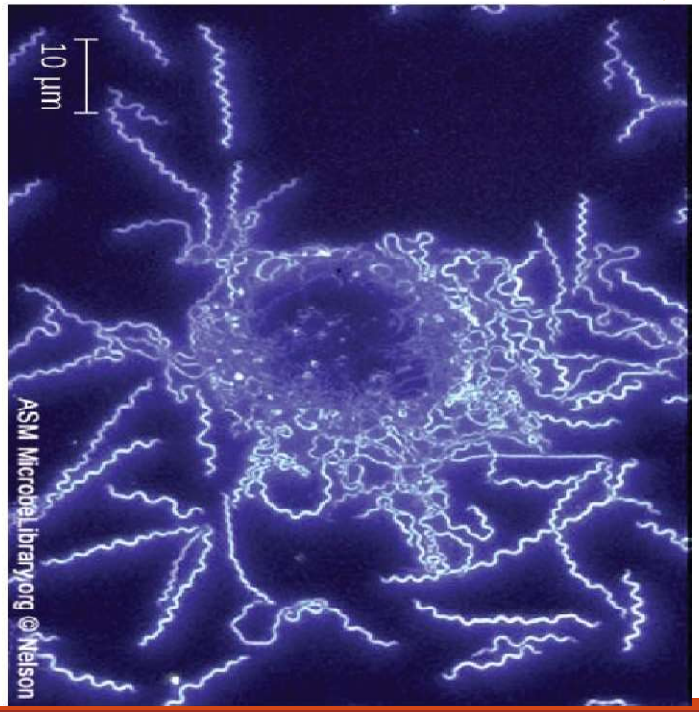
- Not addressing the ROOT causes that are:
  - ✓ making the patient hospitable to the infection
  - ✓ keeping the patient from healing
  - ✓ eliminating the infection(s)

- *No combination or amount of antibiotics will COMPLETELY eradicate the infection; it's the body's immune system that must eliminate it from the body or put it into remission (Bernard 2018)*

- We need to FOCUS on
  - ✓ normalizing the immune system
  - ✓ making the body inhospitable to the infection
  - ✓ HEALING the body
  - ✓ ...while killing the infectious organisms

(a)

(b)



No combination or amount of antibiotics will *COMPLETELY* eradicate the infection; it's the body's immune system that must eliminate it from the body or put it into remission (Bernard 2018)

- Antibiotics (prescription or herbal) only shrink an infection to an amount that is manageable by the **immune system (Bernard 2018)**

Excessive Antibiotics Can Further Cause Immune Dysfunction By:

1. Disrupting the microbiome
2. Increasing gut permeability
3. Increasing toxic load
4. Impairing organs of detoxification and elimination
5. Altering nutrient intake
6. Triggering formation of persister cells

How Do We Treat an Infection that Needs to be ***ELIMINATED***

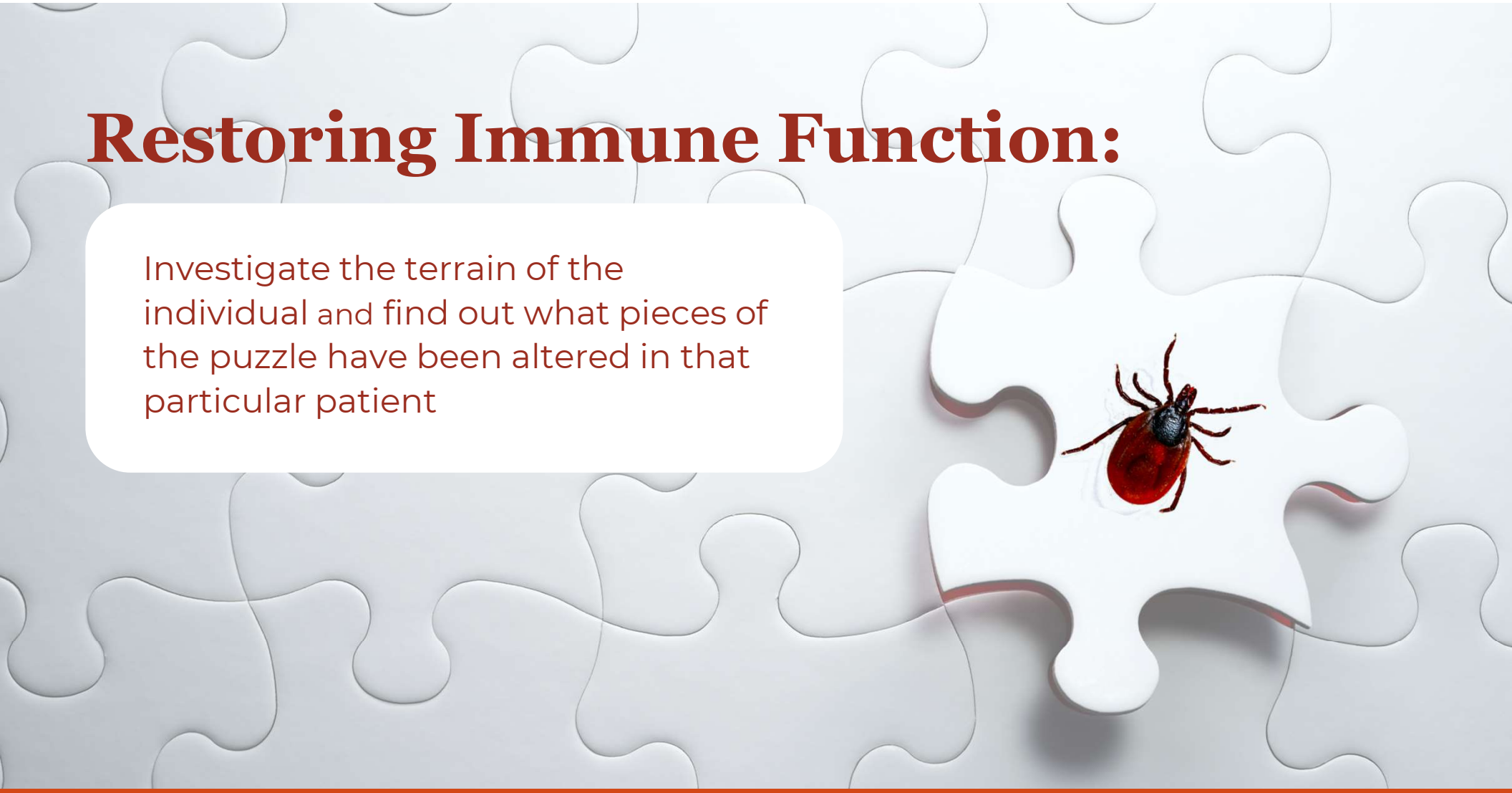
While

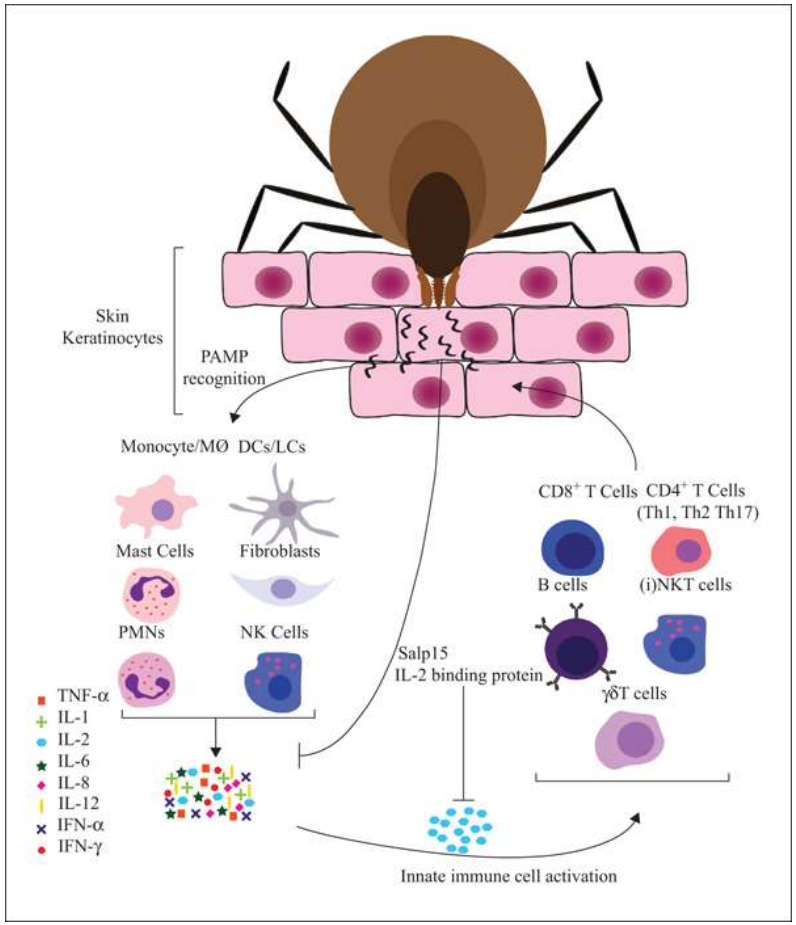
RESTORING

Proper Immune Function…

Restoring Immune Function:

Investigate the terrain of the individual and find out what pieces of the puzzle have been altered in that particular patient





A Perfect Storm

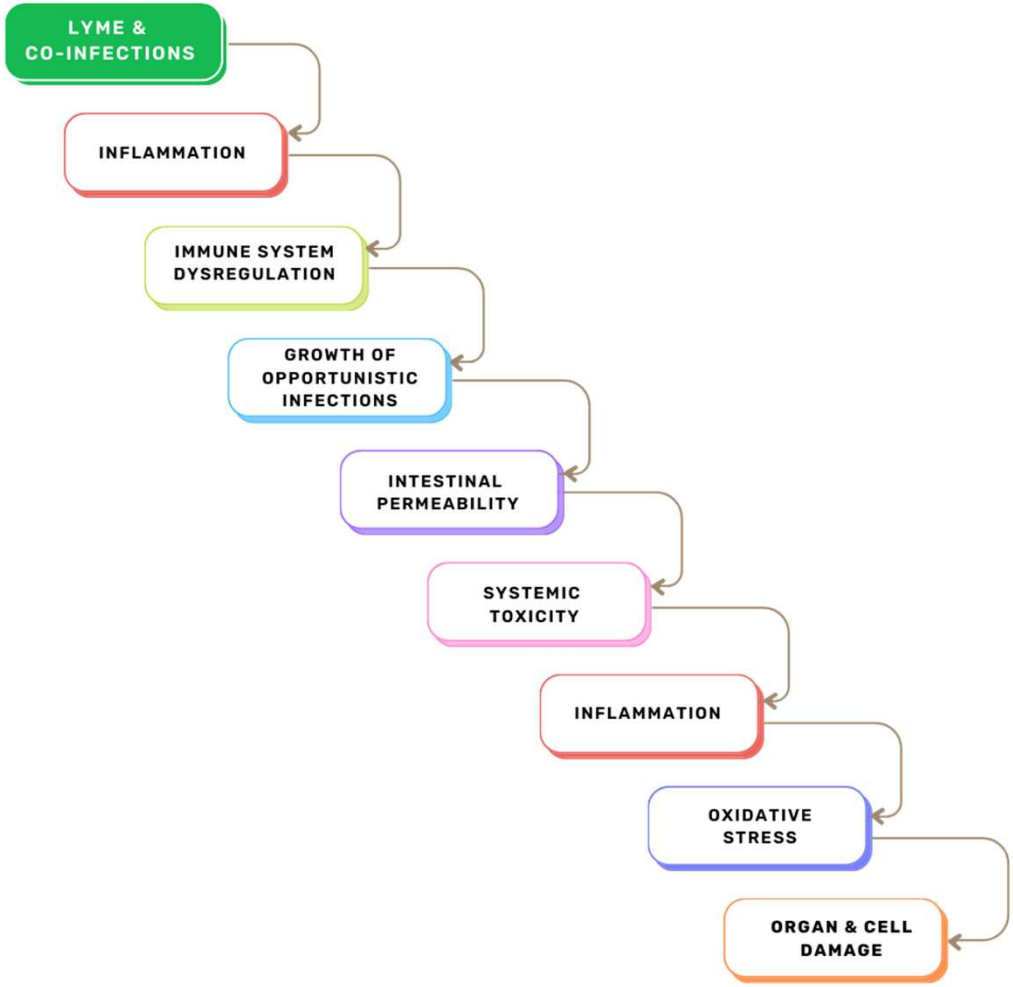
- Inflammatory cytokine cascade
- Immune dysregulation
- Enzymes that breakdown collagen and ECM
- Elevated Galactin-3 levels
- Damage to endothelial cells
- Increased intestinal permeability
- Increased toxicity
- Eventual impairment of organs and organ systems
- Alters ANS – Dysautonomia
- Biofilm formation and Persister cell formation

John Libbey Eurotext - European Cytokine Network - The role of host immune cells and Borrelia burgdorferi antigens in the etiology of Lyme disease (jle.com)

Cascade of Events

What we wish it were…

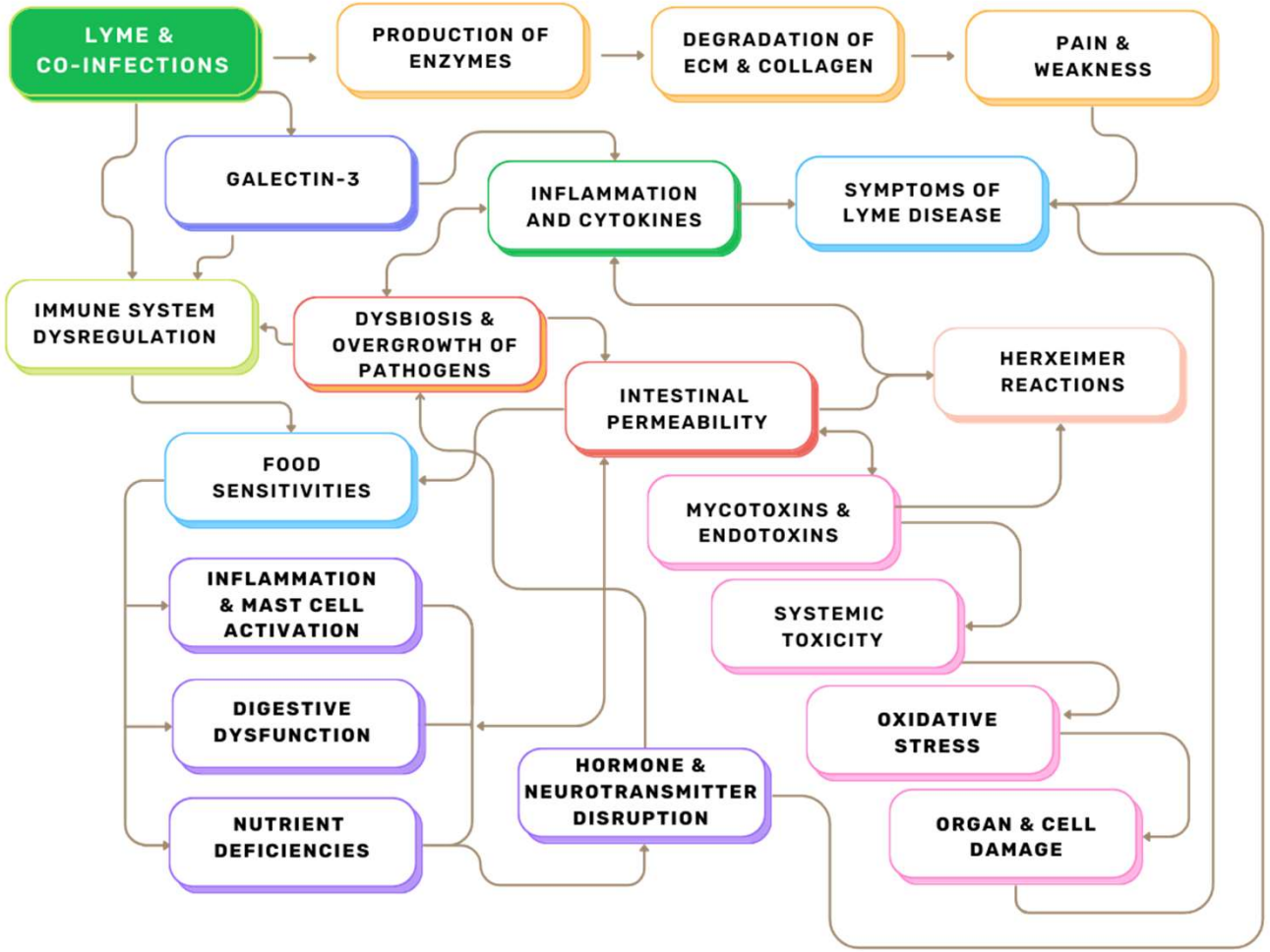
- A Linear Model of Events



Cascade of Events

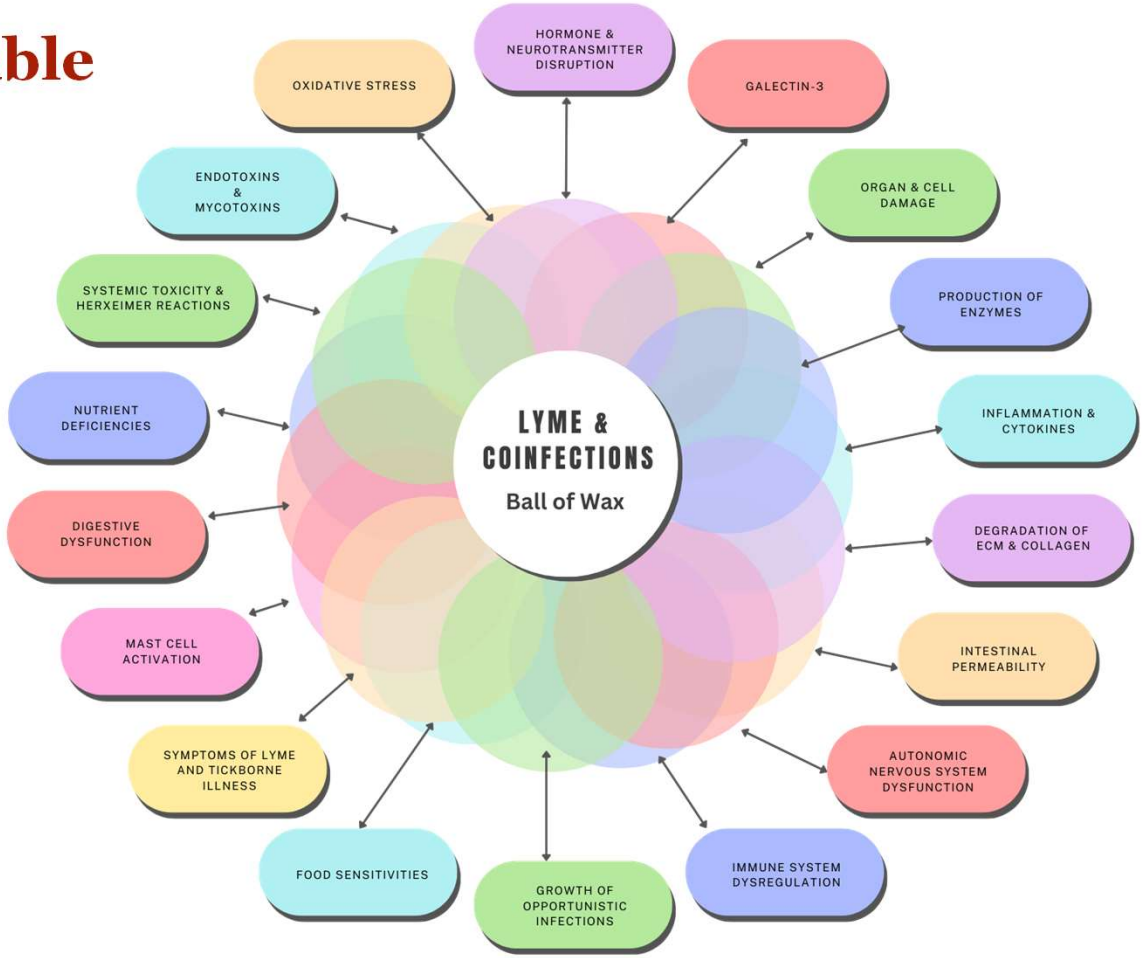
The Reality...

- A Hornet's Nest of Events
- Complex Pathophysiological Interactions



Making the Body Hospitable

TBD infections alter the terrain of the body to allow them not only to evade the immune system and survive but THRIVE!

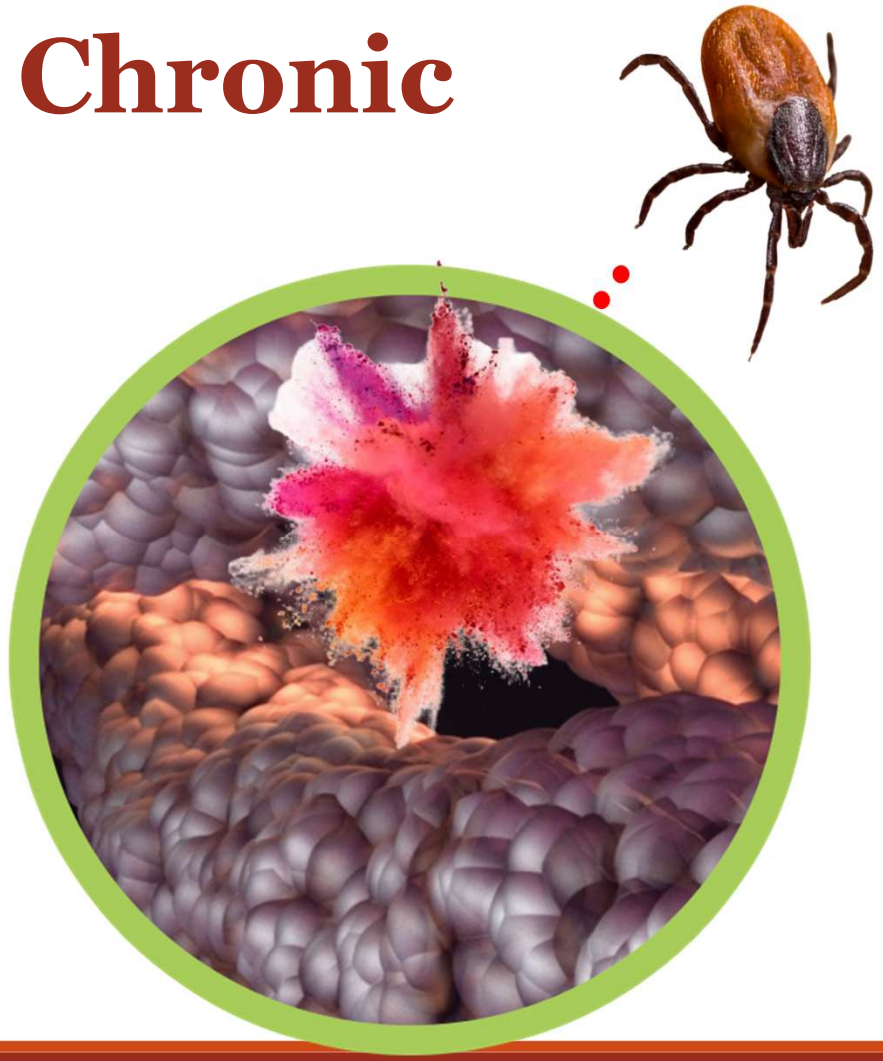


These dysfunctions are intermingled and need to be dealt with simultaneously.

They cannot be resolved one at a time in a linear fashion because each issue causes several issues downstream

How TBDs Become Chronic

- TBDs hijack the immune system and get it to work for them instead of their new host (Anderson, 2021)
- TBDs release chemicals that work synergistically with the chemokines released into the host's body from tick saliva at the time of initial infection (Cotté, 2014)
- Together they manipulate the biochemistry of the body using various enzymes to 1. degrade the ECM to feed themselves and 2. alter the immune system making the body hospitable to the infection (Cotté, 2014)



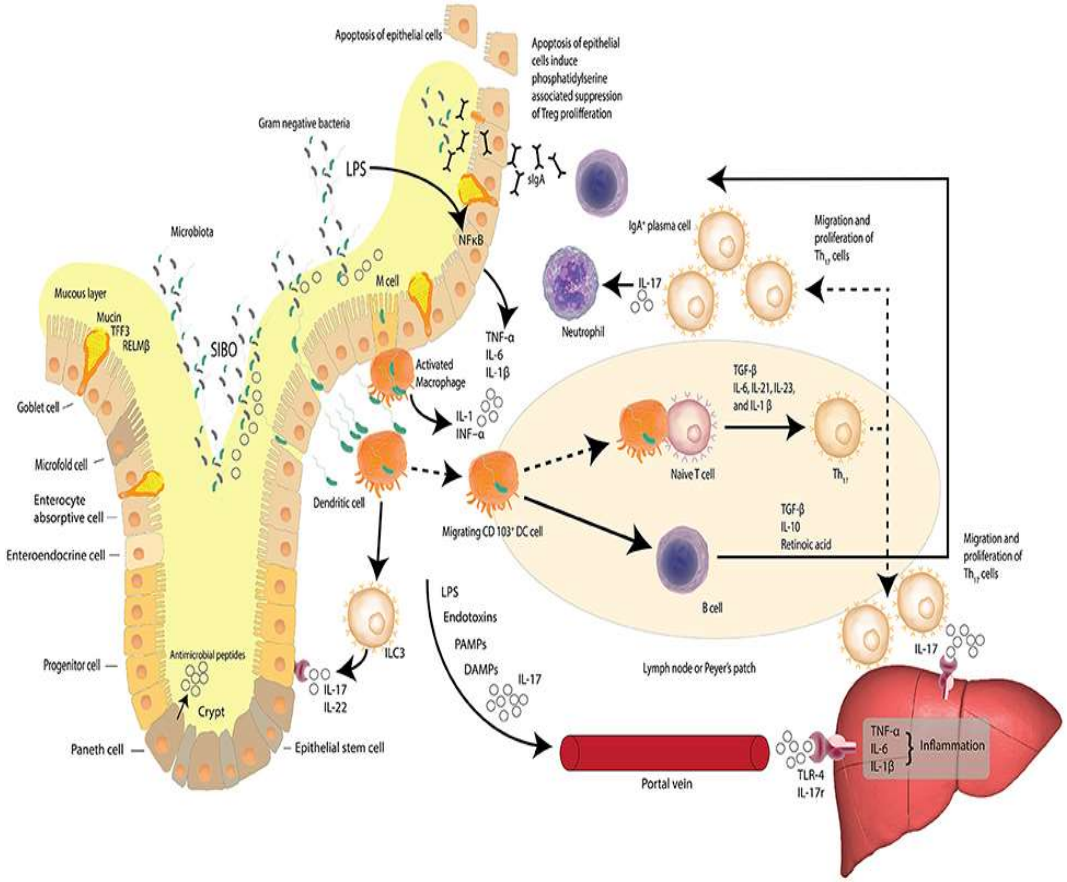
Inflammation: the Driving Force

- Feeds spirochetes
- Causes a majority of symptoms
- Causes an imbalance in the immune system
- Stresses organs
- Imbalances hormones
- Imbalances neurotransmitters and lead to emotional/ cognitive issues
- Causes breakdown of the Gut and increases permeability

Restoring GI integrity is Key!

Compromised tight junctions allow for translocation of pathogens, immunogenic food particles, and endotoxins.

- Immune distraction/dysregulation
- Systemic inflammation
- Endotoxin reabsorption
- Increased severity of Herxeimer
- Overburdens liver detox systems
- CNS Inflammation/Sx



Understanding the Pathophysiology of *Borrelia spp.* infection

Initial Stages of *Borrelia spp.* Infection

- Adhesion of spirochete to endothelial cells on blood vessel wall via adhesins on spirochete body (Antonara, 2011)

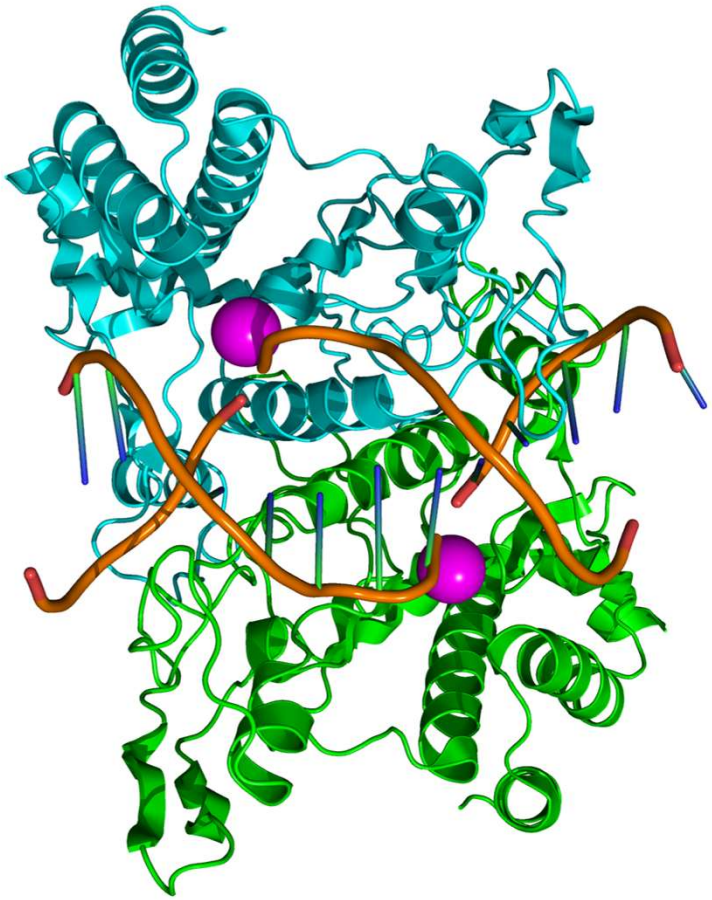
- Spirochetes release cytokines to loosen the Endothelial Cell (EC) junctions— to allow entry to the ECM (Grab, 2005)

Role of Tick Saliva in Initial Infection (and New Tick Bites)

Chemicals in tick saliva:

- inhibit IL-8 (Hajnická, 2001)
- inhibit IL-12 (Anguita, 1996)
- inhibit IFN-gamma (Dame, 2007)
- *causing a shift of Th1 to Th2 and inhibiting Nitric Oxide production

The longer the tick feeds, the more saliva enters the bloodstream and the worse the immune status becomes!



Enzymes that Breakdown ECM and Collagen

Hyaluronidase (HYL)

- Hyaluronic Acid (HA) is GAG widely distributed throughout the connective, epithelial and neural tissue
- Major component of Synovial fluid and ECM
- Hyaluronidase (HYL): allows for degradation of Hyaluronic Acid --loosens the CT matrix and EC junctions
- Stopping HYL stops bacteria movement in body (Kolar, 2015)

HYL inhibitors:

- ***Echinacea angustifolia***, which strengthens mucous membranes and skin (Yotsawimonwat, 2010)
- ***Withania somnifera*** (Machiah, 2006)

Aggrecanase

- Aggrecan is a proteoglycan found in ECM and cartilage (Watanabe, 1998) found most abundantly in cartilage of joints
- Spirochetes release aggrecanase to break down aggrecan, releasing nutrients to feed (Russell, 2013)

Aggrecanase Inhibitor:

- ***Polygonum cuspidatum* root** (Bushra, 2021)

Matrix Metalloproteinases (MMPs)

- aka Collagenases
- Degrade the ECM by breakdown of collagen in the body, GAG release (Van Doren, 2015)
- Wide range of pathologies but are extremely damaging to the brain and CNS

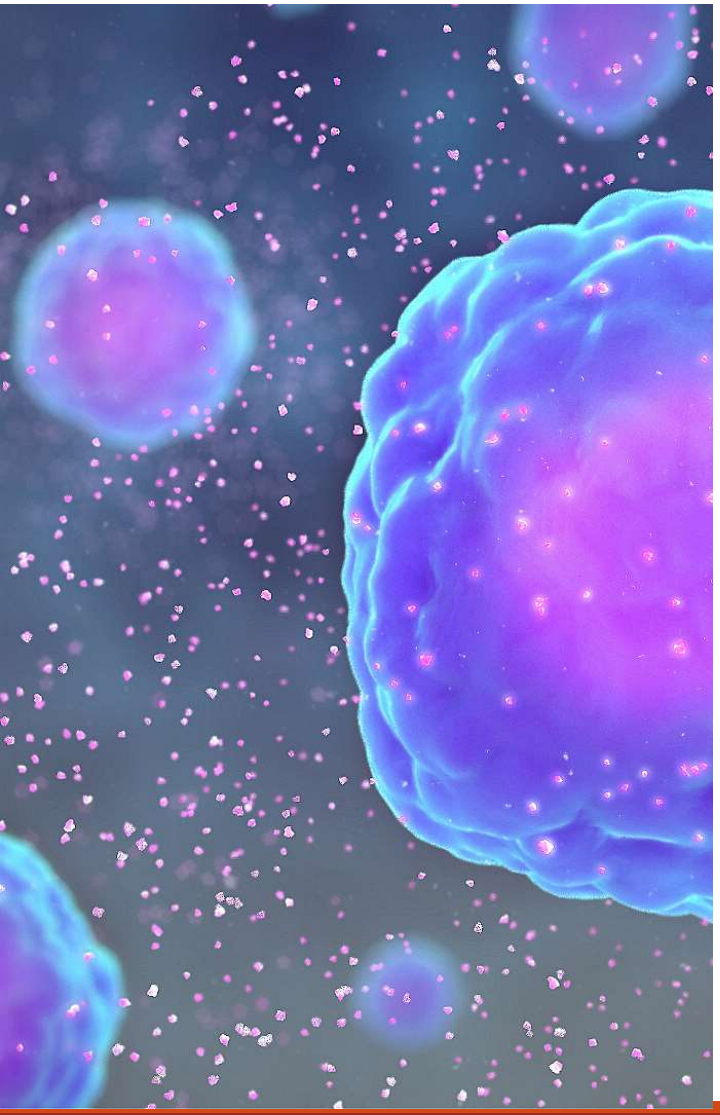
MMPs -1 & 3 Inhibitor:

- ***Polygonum cuspidatum* root** (Kang, 2018)

MMP-9 Inhibitors:

- **Cordyceps** (Cai, 2018), **NAC** (Liu, 2017)
- ***Salvia miltiorrhiza*** (Kim, 2017)
- ***Scutellaria baicalensis*** (Chen, 2014)

Note: Inhibitors halt infection. If spirochetes cannot break down collagen, they cannot feed, reproduce, or spread



Specific Cytokines Affected by TBDs

Flagellin

- Inflammatory protein on flagella that **activates NF-kB** from endothelial cells (Benedikz, 2019)

NF-kB

- Causes immune and inflammatory responses
- Borrelia uses **NF-kB** to further enhance inflammation and immune cell proliferation to break down tissues they need to feed from (Parthasarathy, 2014)

NF-kB inhibitors:

- ***Astragalus*** *(Dong, 2020)*
- **Cordyceps** *(Park, 2018)*
- ***Eupatorium perfoliatum*** *(Shin, 2018)*
- ***Houttuynia cordata*** *(Lee, 2013)*
- ***Polygonum cuspidatum*** *(Park 2017)*
- ***Pueraria lobate*** *(Bulugonda, 2017)*
- ***Salvia miltiorrhiza*** *(Cheung, 2013)*
- ***Scutellaria baicalensis*** *(Li, 2016)*
- ***Withania somnifera*** *(Singh, 2007)*
- **Curcumin** *(Edwards et al., 2020; Shrestha et al., 2017; Xu & Liu, 2017)*

Mitogen-Activated Protein Kinases (MAPKs)

- **Released by stimulation of bacteria (Sahay, 2018)**
- **Primary pathways used to enter a new host - stimulate the cytokine cascade**
  - ERKs: cause issues with: integrity of endothelial barriers, cardiac function, and neural structures in brain (Collins, 2005)
  - JNKs (Johnson, 2002)
  - p38 kinases
- **Upregulation activates proinflammatory cytokines IL-6, TNF-alpha, IL-1B (Johnson, 2023)**

ERK inhibitors: ***Cordyceps sinensis*** (Han, 2010), (Xie, 2014), ***Pueraria lobate*** (Kim, 2017)

JNK inhibitors: ***Cordyceps sinensis*** (Han, 2010), ***Scutellaria baicalensis*** (Huang, 2014)

P38 MAPK inhibitors: ***Cordyceps sinensis*** (Das, 2021), ***Polygonum cuspidatum*** (Kim, 2013), ***Scutellaria baicalensis*** (Zhang, 2017)

IL-6

- Drives fever and multi organ injury
- Multifunctional cytokine that regulates immune system inflammatory response (acute and chronic), and hematopoiesis and cancer growth
- Promotes increase in CD4, IL21, CD8, activation of B cells, VEGF, fibrinogen
- Inhibits T reg cell production (Potere, 2021)
- Crosses BBB stimulates PGE2 in hypothalamus altering body's temp regulation process (Egecioglu, 2018)
- Affects HTH/PIT/AD axis (Späth-Schwalbe, 1994)
- Degeneration of neurons in peripheral and CNS, common in MS, Alzheimer's, depression, etc. (Kimura, 2010)

IL-6 Inhibitors:

Andrographis paniculata (Li, 2021), ***Pueraria lobata*** (Shukla, 2018), ***Salvia miltiorrhiza*** (Jang, 2003), ***Scutellaria baicalensis*** (Liu, 2019)

IL-8

- Primary cause of inflammation and cellular damage resulting from it in *Borrelia spp.* infection (Grygorczuk, 2004)

IL-8 Inhibitors:

- ***Cordyceps sinensis*** (Das, 2021)
- **NAC** (Zhou, 2021)
- ***Polygonum cuspidatum root*** (Quagliariello, 2021)
- **Curcumin** (Allijn et al., 2016)
- **Quercetin** (Wu et al., 2015)

IL-1B

- Primary cytokine expressed in *Borrelia spp.* infection (Miller, 1992)
- Stimulates cell proliferation and increases COX2 in CNS (Molina-Holgado, 2000)
- Increased sensitivity to pain (Simon, 1999)
- Plays a multifaceted role in acute & chronic conditions

ACUTE

- Is a potent pro-inflammatory cytokine crucial for host-defense response to injury and infection
- Plays a beneficial role in resolving ACUTE inflammation

CHRONIC

- Is an immune amplifier of immune reactions and leads to autoimmune and autoinflammatory diseases
- Supports tumor development, growth and metastasis. (Mardi, 2021)

IL-1B Inhibitors:

Cordyceps sinensis (Hu, 2014), ***Eupatorium perfoliatum*** (Chen, 2018), ***Polygonum cuspidatum*** (Liu, 2018), ***Pueraria lobata*** (Zhu, 2014), ***Salvia miltiorrhiza*** (Ma, 2016), ***Scutellaria baicalensis*** (Hsieh, 2007)

TNF-alpha

- Pro-inflammatory cytokine produced by many cell types in response to inflammation, infection, and environmental stress
- Signals cell proliferation, apoptosis, modulation of immune response, and induction of inflammation (Karki, 2021)
- Elevated in many chronic inflammatory conditions
- Affects HTH/PIT/AD axis (Dunn, 2000)
- Causes issues with appetite, body temperature, liver function, insulin resistance (Knobler, 2005)
- Causes severe brain and CNS damage (Raffaele, 2020)

TNF-a Inhibitors:

Cordyceps sinensis (Zhu, 2012), ***Eupatorium perfoliatum*** (Chakravarti, 2011),

Houttuynia cordata (Park, 2005), ***Scutellaria baicalensis*** (Wu, 2020), ***Salvia miltiorrhiza*** (Peng, 2007)

INF-alpha

- Causes tissue inflammation, organ damage, autoimmune conditions, fever, fatigue, and leukopenia, and depression (by stimulating IDO or indoleamine 2,3 dioxygenase) (Wicher, 2005)

IFN-a Inhibitors:

- ***Polygonum cuspidatum*** (Lin, 2015)
- ***Salvia miltiorrhiza*** (Zhang, 2012)
- ***Scutellaria baicalensis*** (Błach-Olszewska, 2008)

Indoleamine 2,3 dioxygenase (IDO)

- Enzyme that breaks apart L-tryptophan into:
  - 3- HK (3-hydroxykynurenine)
  - QUIN (quinolinic acid)
  - KYNA (kynurenic acid)
- Decreases T cells
- Severely decreases melatonin and serotonin

IDO inhibitors:

- ***Scutellaria baicalensis*** (Chen, 2012)
- ***Crinum latifolium*** (Jenny, 2011)

QUIN

- Causes overstimulation of the neurons in brain, excitotoxicity lesions, degradation of brain tissue, ROS and sometimes seizures (Heyes, 1992)
- The number and seriousness of seizures people experience is directly related to levels of QUIN and 3-HK (Basile, 1995)

QUIN Inhibitors:

- ***Uncaria rhynchophylla*** (Buhner, 2015)
- ***Scutellaria baicalensis*** (Buhner, 2015)
- **Melatonin** (Vega-Naredo, 2005)
- **Selenium** (Santamaria, 2003)

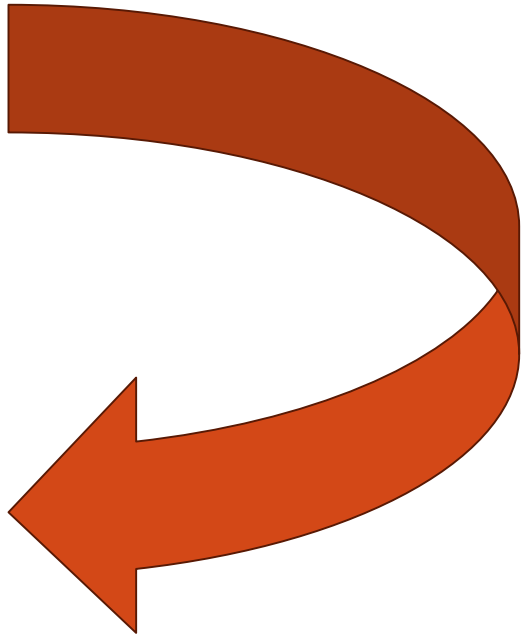
NOTE: **Scutellaria** *contains high levels of melatonin, which decreases brain's vulnerability to Lyme infection, is protective of brain structures, and increases sleep.*

This ongoing inflammatory cytokine cascade leads to an imbalance in the immune system

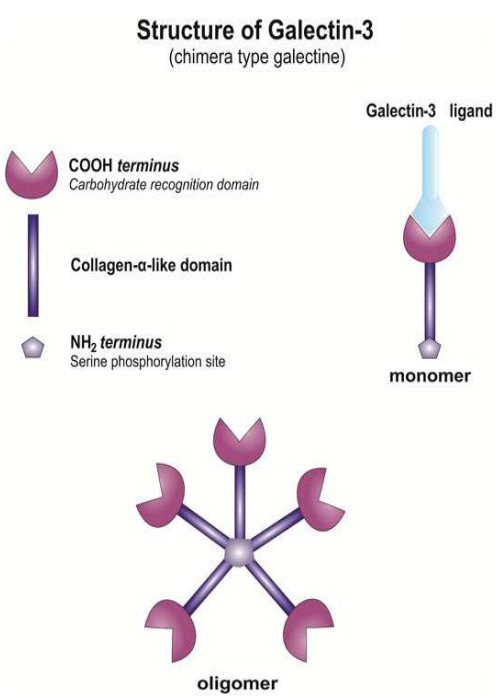
3 Herbs that do the following:

- ✓ Inhibit enzymes that breakdown ECM
- ✓ Inhibit inflammatory cytokine cascade
- ✓ Balance the immune system

1. ***Polygonum cuspidatum (Japanese knotweed)***
2. ***Scutellaria baicalensis (Chinese skullcap)***
3. ***Withania somnifera (Ashwagandha)***



Galectin-3: an Additional Upstream Driver of Inflammation



- **Galectin-3 (gal-3)** is a β-galactoside-binding protein which regulates cell–cell and cell–extracellular matrix interactions affecting cell proliferation, migration, adhesion, differentiation and apoptosis
- Produced by macrophages, monocytes, dendritic cells (DCs), eosinophils, mast cells, NK cells, and activated T and B cells

Kavanaugh D, et al. *Appl Environ Microbiol*. 2013 Jun;79(11):3507-10.

Gal-3 in Acute vs. Chronic Infection

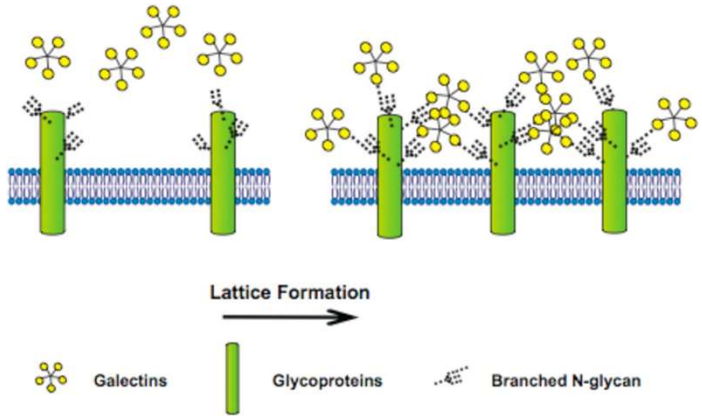
- **Acute Infection:** Gal-3 plays an important role as an “alarmin”, immediately activating an initial immune response by mobilizing recruitment and infiltration of immune cells to sites of infection and stimulating immune cell production of inflammatory cytokines to combat infections
- **Chronic Infection:** Gal-3 is like an alarm that never turns off, continuing to drive inflammatory, adhesive, profibrotic and proliferative pathways that promote systemic inflammation and immune suppression. Gal-3 prevents immune surveillance by crosslinking T-cell receptors and CD45 by binding glycans. It suppresses adequate immune responses by blocking T-cell receptor activity, downregulating T-cell signaling and inhibiting dendritic, T-cell and Natural Killer (NK) cell function

Kavanaugh D, et al. *Appl Environ Microbiol*. 2013 Jun;79(11):3507-10.

Chronically Elevated Galactin-3

When the galectin-3 alarm doesn't turn off, inflammation becomes chronic and immune dysregulation occurs, resulting in:

- Suppressed immunity
- Cytokine storms
- Mast cell activation
- Formation of fibrosis
- Promotion of pathogen adhesion and evasion
- Formation of biofilms
- Autoimmunity



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Gao P, Simpson JL, Zhang J, Gibson PG. Galectin-3: its role in asthma and potential as an anti-inflammatory target. Respir Res. 2013 Dec 9;14(1):136. doi: 10.1186/1465-9921-14-136. PMID: 24313993; PMCID: PMC3878924.
Garcia-Revilla J, Deierborg T, Venero JL, Boza-Serrano A. Hyperinflammation and Fibrosis in Severe COVID-19 Patients: Galectin-3, a Target Molecule to Consider. Front Immunol. 2020 Aug 18;11:2069. doi: 10.3389/fimmu.2020.02069. PMID: 32973815; PMCID: PMC7461806.

Dr. Hinchey's 10B Approach:

Core Principles for Healing TBD

10 Goals for Successful Resolution of Lyme

A Comprehensive Approach to Treat TBD:

I. Background Check
II. Bandaids
III. Block Inflammation – (3 part)
IV. Buffer ANS
V. Balance Immune system
VI. Build Gut
VII. Break Down Biofilms
VIII. Bolster Detoxification
IX. Bind Toxins (Herx)
X. Blast Bugs

BACKGROUND CHECK

Investigate all of the things that fill the patient's "bucket", causing them to become hospitable to the infection(s):

- Micronutrient deficiencies (Calder, 2020)
- Dysfunctional digestion / malabsorption (Mullin et al., 2014)
- Food sensitivities and inflammatory and toxic food intake (gluten, dairy, sugar, processed foods etc.) (Fasano, 2012)
- Rx intake affecting nutrient status and burdening detoxification pathways (Liska et al., 2006)
- Hormone dysregulation (Aranow, 2011)
- Mindset and perceptions (Dhabhar, 2014)
- Mental, emotional, and physical stressors, and HPA axis dysregulation (McEwen, 2006)
- Sleep and circadian rhythm dysregulation (Besedovsky et al., 2019)
- Sedentary lifestyle, inactivity (Nieman, 2019)
- Poor social network, lack of community and healthy interpersonal relationships (Uchino, 2004)
- Biotoxins (mold), environmental chemicals, toxins in food, air, water (Shoemaker & House, 2006)

BANDAIDS

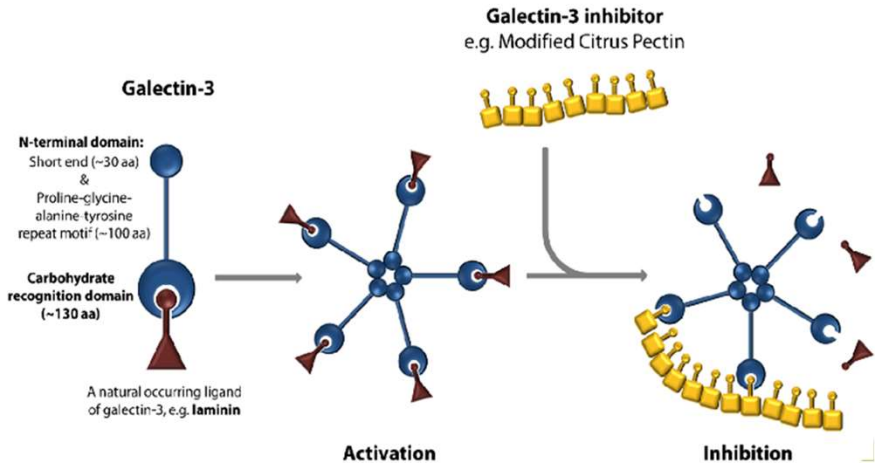
Enlisting a variety of therapeutic interventions to minimize symptoms and alleviate ongoing stress response to promote PNS function and healing, while simultaneously uncovering and treating the underlying root causes:

- **Adaptogenic Herbs:** Rhodiola rosea, Ashwagandha, Holy Basil, and Eleuthero (Panossian & Wikman, 2010)
- **Anti-inflammatories:** Both pharmaceutical and natural agents (Serhan & Savill, 2005)
  - LDN (Low-Dose Naltrexone): Modulates the immune system and reduces inflammation (Younger et al., 2018)
  - Phosphatidylserine: Helpful in lowering elevated cortisol levels (Benton et al., 2001)
  - Magnesium: the "relaxation mineral", supports nervous system function (Sartori et al., 2012)
  - Vitamin C: Required for cortisol production (Patak et al., 2004)
  - B Vitamins: Essential for energy production and neurotransmitter synthesis (Kennedy, 2016)
  - Omega-3 Fatty Acids: anti-inflammatory and support brain function (Bradbury, 2011)
  - L-Theanine: Promotes a calm, relaxed state (Nobre et al., 2008)
  - Curcumin: Has potent anti-inflammatory and antioxidant properties (Hewlings & Kalman, 2017)
- **Repleting Nutrients:** Ensuring optimal levels for physiological function through food and nutraceuticals
- **Adequate Sleep and sleep aids:** proper sleep hygiene, essential for detoxification & repair (Riemann & Baglioni, 2012)
- **Limiting Stimulants:** Such as caffeine and nicotine (Rogers et al., 2013)
- **Therapeutic Technologies:** Such as HBOT and PEMF (Thom, 2009; Markov, 2007)
- **Bodywork:** Including cranial sacral therapy and massage (Upledger, 1983; Field et al., 2010)
- **Professional Counseling/Therapy: Psychotherapy** (Otte et al., 2016): Cognitive Behavioral Therapy (Hofmann et al., 2012), Biofeedback (Lehrer et al., 2003), EMDR (Shapiro, 2001)

BLOCK Galactin-3

Gal-3 Natural Inhibitor: Modified Citrus Pectin (Xu, 2020)

- Polysaccharide soluble fiber derived from the pith of citrus peels
- Modified to lower molecular weight and esterification for enhanced GI absorption
- Molecular weight <15kDa (unmodified 50-300kDa)
- Esterification <10% (unmodified ~70%)



BLOCK Inflammatory Cytokines

Polygonum cuspidatum and ***Scutellaria baicalensis*** together inhibit <u>all</u> of the inflammatory cytokines involved in LD

NF-KB	IDO
IL-6	IFN-a
IL-8	MAPKs
IL-1B	TNF-a

BLOCK Inflammatory enzymes

that degrade Collagen, ECM, and Endothelial Cells

- **Inhibit Aggrecan**
  - ***Polygonum cuspidatum*** root (Bushra, 2021)
- **Inhibit Hyaluronidase (HYL)**
  - ***Echinacea angustifolia***, which strengthens mucous membranes and skin (Yotsawimonwat, 2010), ***Withania somnifera*** (Machiah, 2006)
- **Inhibit MMPs (collagenases)**
  - ***Polygonum cuspidatum*** (Kang, 2018), **Curcumin** (Zeng et al., 2019; Mun et al., 2009; Zhu et al., 2020; Cao et al., 2015), ***Salvia miltiorrhiza*** (Kim, 2017), ***Scutellaria baicalensis*** (Chen, 2014)
- **Protect endothelial cells** **Polygonum cuspidatum**

Buffer ANS

- **Lyme has been documented to cause autonomic dysfunction (Carod-Artal, 2018)**
  - Urinary retention and intestinal pseudo-obstruction

- **Improving symptoms of dysautonomia with nutrition and supplementation (Do, 2021)**
  - ✓ Vitamins B1, B12, C, D
  - ✓ MSM + silica
  - ✓ Salt
  - ✓ Pre- and probiotics
  - ✓ IV hydration

Buffer ANS, con't.

- **Dietary interventions:** anti-inflammatory foods that support the microbiome (Aggarwal & Sung, 2009); Quigley, 2013), control blood sugar and reduce inflammation with omega-3 fatty acids (Wall et al., 2010) and probiotics (Cryan & Dinan, 2012), avoid caffeine (Wikoff, et al., 2017), mindful eating (Albers, 2008)
- **Physical activity: Exercise,** Yoga and Tai Chi (Jahnke et al., 2010)
- **Stress Management:** breathing techniques (6), mindfulness meditation (Kabat-Zinn, 2003), biofeedback and HRV (Zucker et al., 2009), creative/art therapy (Stuckey & Nobel, 2010)
- **Sleep Hygiene** (Hirshkowitz et al., 2015)
- **Circadian rhythm balance** (Walker, 2017): getting AM sunlight and avoid PM blue light (Cho et al., 2015)
- **Bodywork:** acupuncture (Lee & Choi, 2013), craniosacral therapy, massage (Upledger, 2002)
- **Grounding or earthing** (Chevalier et al., 2012)
- **Digital detox** and avoidance of EMFs (Twenge & Campbell, 2018)
- **Trauma Therapies:** EMDR, ART, etc. (Shapiro, 2001); (Kip et al., 2012)
- **Community & supportive relationships:** foster connection (Holt-Lunstad et al., 2017); (Uchino, 2006)

BALANCE Immune system

- Balance Th1 and Th2:
  - ***Withania somnifera***
    - Counteracts the exact modulation of the immune system that tick saliva and protozoa initiate and maintain to keep infection going (Bani, 2006)
    - Balances Th1 and Th2
  - ***Astragalus spp***
    - modulating the imbalanced relationship between Th1 and Th2 cytokines (Chen, 2014)
- Increase NK cells (if low)
  - ***Uncaria tomentosa***
- Increase lymphocytes (if low)
  - ***Echinacea angustifolia***

BUILD Gut

- Eliminate food sensitivities and food allergies
- Eliminate pathogenic bacteria and yeast/mold
- Balance opportunistic bacteria, replenish probiotics
- Heal the gut lining; Glutamine, demulcent herbs, zinc
- Replace deficient micronutrients
- Digestive Enzymes
- Modified Citrus Pectin (MCP)
- Serum Derived Bovine Immunoglobulin (SBI)
- Eliminate gluten, dairy, and sugar
- Anti-inflammatory and phytonutrient-rich diet
- Intermittent fasting
- Adequate sleep
- Stress management

BREAK DOWN Biofilms

- **MCP**
- **Serrapeptase & Nattokinase**: proteolytic enzymes (Tiwari, 2015)
- **Many botanicals:**
  - Berberine (Sun et al., 2015)
  - Curcumin (Rudrappa & Bais, 2008)
  - GSE (Heggers et al., 2002)
  - Oregano oil (Nostro et al., 2007)
  - Garlic (Allicin) (Naganawa et al., 1996)
  - Olive Leaf Extract (Sudjana et al., 2009)
  - Monolaurin (Preuss et al., 2005)

VII

BOLSTER Detoxification

1. Fix tight junctions**: G3M, glutamine, butyrate, glutamine, tryptophane, zinc, A/D/C, polyphenols**
2. Correct dysbiosis: **probiotics, berberine, GFSE**
3. **Glycine**
4. GSH conjugation: **NAC, selenium, alpha lipoic acid, cruciferous veggies, curcumin, sulforaphane**
5. Nrf2 induction: **sulforaphane**
6. Methylation: **Methyl folate, Methyl B12, B6, choline**
7. Sulfation: **cysteine, methionine, molybdenum**
8. Acetylation: **B1, B5, Vit C**
9. Glucuronidation**: EPA/DHA, limonene** from citrus peels
10. Decrease B-glucuronidase: **calcium-d-glucarate, pre and probiotics, EGCG, Liver-milk thistle, artichoke, bupleurum root**
11. Binders of endotoxins: **chlorella, G3M, bentonite clay**, etc.
12. Don't forget routes of elimination and self care!

BIND Endotoxins to inhibit Jarish-Herxheimer Reaction

- Transient clinical phenomenon that occurs in patients infected by spirochetes who undergo antibiotic tx
- Caused by the release of cytokines and lipoproteins enter the bloodstream that cause acute inflammatory changes (dilation of small BVs, dermal edema, perivascular and interstitial polymorphonuclear round cell, leucocytic infiltration)
- Fevers, chills, nausea, vomiting, headaches, tachycardia, hypotension, hyperventilation, flushing, myalgia, exacerbation of all symptoms due to heightened inflammation

Treatment Goals: Products

1. Bind LPS: MCP, SBI, Chlorella
2. Detox: Tight junctions; Coordination of Ph1 and Ph2 liver (NAC), micronutrients for detox, elimination, self-care (sauna, epsom salt baths)
3. Alkalinization: Alkaseltzer Gold, chlorella, minerals, salts
4. Anti-inflammatories: NAC, JKW, Chinese Skullcap

BLAST the Bugs: *Borrelia spp.*

- ***Artemesia spp* / Sweet Annie** (Feng, 2020)
- ***Andrographis paniculata*** (Feng, 2020)
- **Teasel** (Goc, 2016)
- ***Houttuynia cordata*** (Hayashi, 1995)
- **Garlic** (Kolb, 2020)
- **Olive leaf extract** (Borjan, 2020)
- ***Uncaria tomentosa* / Cat's claw** (Weiss, 2018)
- ***Scutellaria baicalensis* / Chinese Skullcap** (Feng, 2020)
- ***Juglans nigra* / Black walnut** (Feng, 2020)
- **Grapefruit Seed Extract** – Cyst and Round Bodies (Brorson, 2007)
- ***Cryptolepis sanguinolenta*** (Feng, 2020)
- ***Polygonum cuspidatum*** (Feng, 2020)

In vitro and *in vivo* growth inhibitory activitie
cryptolepine hydrate against several *Babesi*
Theileria equi

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Herb–Drug Interaction Potential of Anti-Borreliae Effective Extracts from *Uncaria tomentosa* (Samento) and *Otoba parvifolia* (Banderol) Assessed In Vitro

Johanna Weiss

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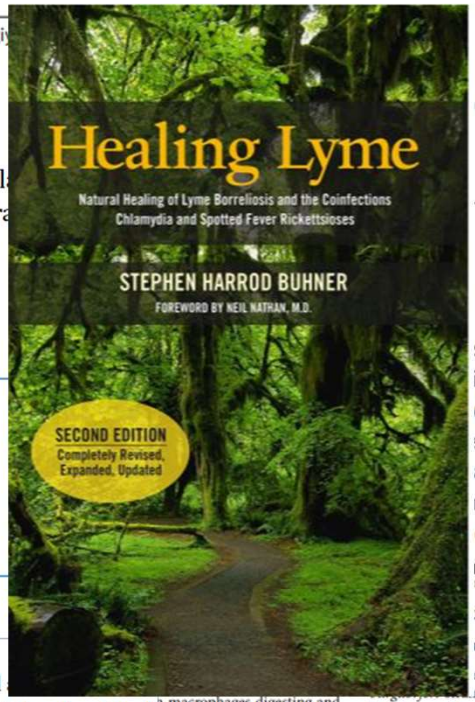

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Metrics

Abstract

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was inhibited about 40%
expression of *CYP2J2*, *UG*

Botanical Medicines Cryptolepis sanguinolenta, Artemisia annua, Scutell
baicalensis, Polygonum cuspidatum, and Alchornea cordifolia Demonstra
Activity Against Babesia duncani

Yumin Zhang, [1] Hector Alvarez-Manzo, [1] Jacob Leone, [2] Sunjya Schweig, [3] and Ying Zhang [4,*]

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Associated Data

▸ **Supplementary Materials**

▸ **Data Availability Statement**

Abstract

Human babesiosis is a CDC reportable disease in the United States and is recognized
health risk in multiple parts of the world. The current treatment for human babesiosis is suboptimal
due to treatment failures and unwanted side effects. Although *Babesia duncani* was first described

Borrelia infected patients report signs and symptoms ranging from

activity
current treatments for Lyme disease, and offering new options to already existing therapeutic regiments.

Keywords: biofilm, *Borrelia sp.*, cysts, micronutrients, phytochemicals, spirochetes

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n, culturing conditions and test compounds
ents were conducted with infectious, fluorescent *B.*
n GCB726 with GFP, which was graciously provided by Georges Chaconas, University of Calgary, Canada [11]. Barbour-Stoenner-Kelly medium (BSK II) [12], without gelatin and supplemented with 6% heat inactivated rabbit serum (Sigma-Aldrich, St. Louis, USA) was used in the culturing of cells at +37 °C. Low-passage number cells

My 7 Most Used Antimicrobials for *Borrelia spp.*

- Japanese knotweed
  - *Polygonum Cuspidatum*
- Cats claw
  - *Uncaria tomentosa*
- Chinese Skullcap
  - *Scutellaria baicalensis*
- Sweet Annie
  - *Artemisia annua*
- *Cryptolepis sanguinolenta*
- *Houttuynia cordata*
- Black walnut
  - *Juglans nigra*

Polygonum cuspidatum Japanese Knotweed

Anti-inflammatory

- Inhibition of the cellular immune system and inhibition of the formation of proinflammatory cytokines by emodin, resveratrol, citreorosein etc. (Buhner, 2005; Patocka, 2017; Guo, 2018)
- Inhibition of MMP-1, MMP -3 and MMP-9 expression by resveratrol and rhein (Buhner, 2005; Kang, 2018)
- Suppression of serotonin-induced swelling (Zhang, 2013)
- Inhibition of CRP and rheumatoid factor positive responses (Zhang, 2013)

Polygonum cuspidatum Japanese Knotweed

Immunomodulant/Immunostimulant

- Normalizes immune response, ex. response to antigen signal, proliferative capacity, IL-2 production, lymphocyte antibody production and regulatory T cell expansion, in inflammatory and autoimmune conditions (Patocka, 2017; Espinoza, 2017)
- Enhances phagocytosis of macrophage and natural killer cell activities in leukemic mice (Chueh, 2015)

Neuroprotective

- Active on CNS due to ability to cross blood/brain barrier (Buhner, 2005)
- Protects against hypoxic-ischemic brain injury via upregulation of brain-derived neurotrophic factor (BDN) and inhibition of cell adhesion molecules by polydatin (Patocka, 2017; Zhang, 2013)
- Protects against beta-amyloid-induced neurotoxicity and ischemic injury by emodin (Zhang, 2013)

Contraindications: pregnancy (Buhner, 2015)

Side Effects: abdominal pain, diarrhea, dry mouth, nausea, vomiting (Buhner, 2015)

Herb/Drug Interactions: blood-thinners (Buhner, 2015)

Uncaria tomentosa
Cat's Claw

Anti-inflammatory
-Inhibition of NF-kappaB (Batiha, 2020)

Antioxidant
-Inhibition of lipopolysaccharide-induced inducible nitric oxide synthase (iNOS) gene expression, nitrite formation, cell death and the activation of NF-kappaB (Batiha, 2020; Sandoval-Chacón, 1998)

Anti Spirochetal
-Effective against all morphological forms of *Borrelia burgdorferi*-spirochetes, round bodies, and biofilm-like colonies (Weiss, 2018)

Uncaria tomentosa
Cat's Claw

Cardioprotective

-Antiarrhythmic and negative chronotropic activity via direct effects on the action potential of cardiac muscle through inhibition of multiple ion channels by hirsutine and dihydrocorynantheine (Masumiya, 1999)
-Hypotensive effect on both systolic and diastolic blood pressures by gambirine (Mok, 1992)

Immunostimulant

-Stimulates proliferation of myeloid progenitors and normal resting B and T cell lymphocytes (Farias, 2011)
-Enhances IL-1 and IL-6 in lipopolysaccharide-stimulated macrophages (Lemaire, 1999)
-Increases natural killer cell CD57+ expression (Buhner, 2005)

Contraindications: immunosuppressive therapy, pregnancy or woman attempting to get pregnant (Buhner, 2005; Kuhn, 2008)
Side effects: constipation, diarrhea, digestive upset, mild lymphocytosis (Kuhn, 2008)
Herb/Drug Interactions: antihypertensives, blood thinners, immunosuppressants (Kuhn, 2008)

Scutellaria baicalensis Chinese Skullcap

Antibacterial/Anti Spirochetal

-Via destruction of bacterial nucleic acid formation, altering bacterial energy metabolism and inhibiting the formation of bacterial biofilms via baicalin and baicalein (Sloan Kettering, 2023)

-*In vitro* activity against log phase spirochetes, latent round bodies, and biofilm formations of *B. burgdorferi* and *B. garinii* via baicalein (Zhao, 2016; Liao, 2021)

-Baicalein also exhibits synergistic activity when paired with various antibiotics (Zhao, 2016; Yin, 2021; Feng, 2020; Goc, 2015)

Anti-inflammatory

-Inhibition of the production of inflammatory factors TNF-α, IL-1β, Interleukin-6 (IL-6), Interleukin-17 (IL-17), matrix metalloprotein-9 (MMP-9), and regulation of NF-κB signaling pathway via baicalin (Sloan Kettering, 2023; Fujita, 2005)

-Inhibition of interleukin-8 release and COX-2 synthesis and upregulation of the formation of heat shock protein 70 via baicalein (Sloan Kettering, 2023; Cai, 2016)

Neuroprotective

-Baicalin exhibits a variety of beneficial effects in the central nervous system (CNS) by promoting neural differentiation and inhibiting neuronal apoptosis (Wang, 2019; Dinda, 2017)

-In rat model of collagenase-induced intracerebral hemorrhage baicalin administration reduced brain edema, inhibited NF-κB activation, suppressed MMP-9 expression and reduced the production of IL-1β and IL-6, as well as BBB permeability (Wang, 2019; Tian, 2015)

Artemisia annua
Sweet Annie

Antibabesial/Antiplasmodial

- Inhibition of *in vitro* or *in vivo* growth of *B. gibsoni*, *B. equi*, *B. bigemina*, *B. bovis*, and *B. microti* by artemisinin and its derivatives most likely due to its ability to generate free radicals which can damage pathogen DNA and proteins (Zhang, 2021)
- Artemisinin based compounds can reduce malarial parasitemia more rapidly than other known antimalarial drugs and are effective against all stages of *Plasmodium* spp (Zhang, 2021)
- ****Effective in 95-100% of mice infected with malaria** (Septembre-Malaterre, 2020)

Antibacterial/Anti Spirochetal

- Inhibition of a number of both gram positive and gram negative bacteria (Septembre-Malaterre, 2020; Kim, 2015)
- Directly effective against the stationary phase of *B. burgdorferi* and more effective than the control antibiotics cefuroxime and doxycycline. (Buhner, 2005; Kim, 2015)
- Artemisia ketone is the oil component that has the greatest antimicrobial activity (Septembre-Malaterre, 2020)

Artemisia annua Sweet Annie

Anti-inflammatory

-Suppression of pro-inflammatory cytokine production, including IL-1β, IL-6, IL-10, and TNF-α (Kim, 2015)

-Suppression of NF-κB, toll-like receptors (TLRs), signal transducer and activator of transcription (STAT) activity PI3K/protein kinase B (AKT) activity (Xia, 2020)

Antioxidant

-Mostly by hydrogen atom transfer rather than single-electron transfer (Septembre-Malaterre, 2020)

- -Chrysoprenol D, a flavonoid, has been identified as the main constituent contributing to antioxidant activity
- (Septembre-Malaterre, 2020; Messaili, 2020)

-Diet containing the extract of *Artemisia annua* reduced serum levels of biomarkers for lipid peroxidation and DNA damage (Septembre-Malaterre, 2020; Kim, 2014)

Contraindications: pregnant and breastfeeding women (Kuhn, 2008; Buhner, 2005)
Side Effects: gastric upset, nausea, diarrhea, vomiting, dizziness and headache (Kuhn, 2008; Buhner, 2005)
Herb/Drug Interactions: azole antifungal agents and calcium channel blockers can negatively affect artemisinin absorption (Kuhn, 2008)

Cryptolepis sanguinolenta

Antibacterial/Anti Spirochetal
-DNA intercalation and topoisomerase II inhibition (Tempesta, 2010; Paulo, 1994; Cimanga, 1991)
-Activity against both Gram-positive and Gram-negative bacteria via cryptolepine (Tempesta, 2010; Paulo, 1994; Ansah, 2005)
-Directly effective against the stationary phase of *B. burgdorferi* and more effective than the control antibiotics cefuroxime and doxycycline (Feng, 2020)

Antimalarial/Antibabesial
-Inhibition of hemozoin polymerization (Tempesta, 2010; Onyeibor, 2005)
-Oral administration of water extract of *C. sanguinolenta* containing the cryptolepis alkaloids indicated efficacy comparable to chloroquine (Coronado, 2014)
-*B. duncani* treated with cryptolepine and quinine or *C. sanguinolenta* 90% ethanol extract could not regrow in subculture (Tempesta, 2010)

Anti-inflammatory
-Inhibition of nitric oxide production and DNA binding of NF-κB following inflammatory stimuli via cryptolepine (Tempesta, 2010; Zhang, 2021)

Contraindications: pregnant women and women of reproductive age who want to conceive (Tempesta, 2010)

Side Effects: generally well tolerated, few side effects have been documented in humans (Feng, 2020)

Houttuynia cordata

Antibacterial

-Myrcene, an essential oil, has an antimicrobial activity and moreover enhances the activity of antibiotics (National Parks, 2023)

-Profound inhibition of bacterial biofilm formation (Yang, 2009; Řebíčková, 2020)

-Houttuynin (decanoyl acetaldehyde), a β-dicarbonyl compound, is reported as a major anti-bacterial constituent (Sekita, 2016; Sekita, 2016)

Anti-inflammatory

-Downregulation of TNF-α and IL-6 and inhibition of NF-κB activation (Kumar, 2014; Duan, 2008)

Antioxidant

-Free radical scavenging activity of methanolic extract mainly due to catechin, procyanidin B (Sekita, 2016; Kim, 2007; Lee, 2013)

Juglans nigra Black walnut

Antibacterial/Anti Spirochetal

-*In vitro* testing exhibited bacteriostatic activity against log phase spirochetes of *B. burgdorferi* and *B. garinii* and bactericidal activity against *Borrelia* round bodies (wildflower.org, 2017; Paudela, 2013)

-Activity against Staphylococcus, Klebsiella pneumoniae, Pseudomonas aeruginosa, Escherichia coli, Bacillus subtilis and Proteus vulgaris (Ho, 2018)

-Majority of antibacterial activity via juglone, Glansreginin A, azelaic acid, quercetin, and eriodictyol-7-*O*-glucoside (Feng, 2020; Goc, 2016)

Anti-inflammatory

-Via inhibition of proinflammatory cytokines, including TNF-α, IL-1β, IL-6, IL-8, IL-10 and MCP-1 (Rathi, 2014)

Side effects: uncommon, nut allergies
Contraindications: Hashimotos

A Holistic Plan of Care

- Naturopathic whole-body approach

- Healing the patient by correcting immune system dysfunction, decreasing inflammation, and ultimately making them inhospitable to the infections

- Making the body inhospitable to the infection while shrinking the bacterial/ parasitic load will give the best chance for eradicating the infections, healing the body, and restoring proper function

Dr Hinchey's 10B Approach:

Core Principles for Healing TBD

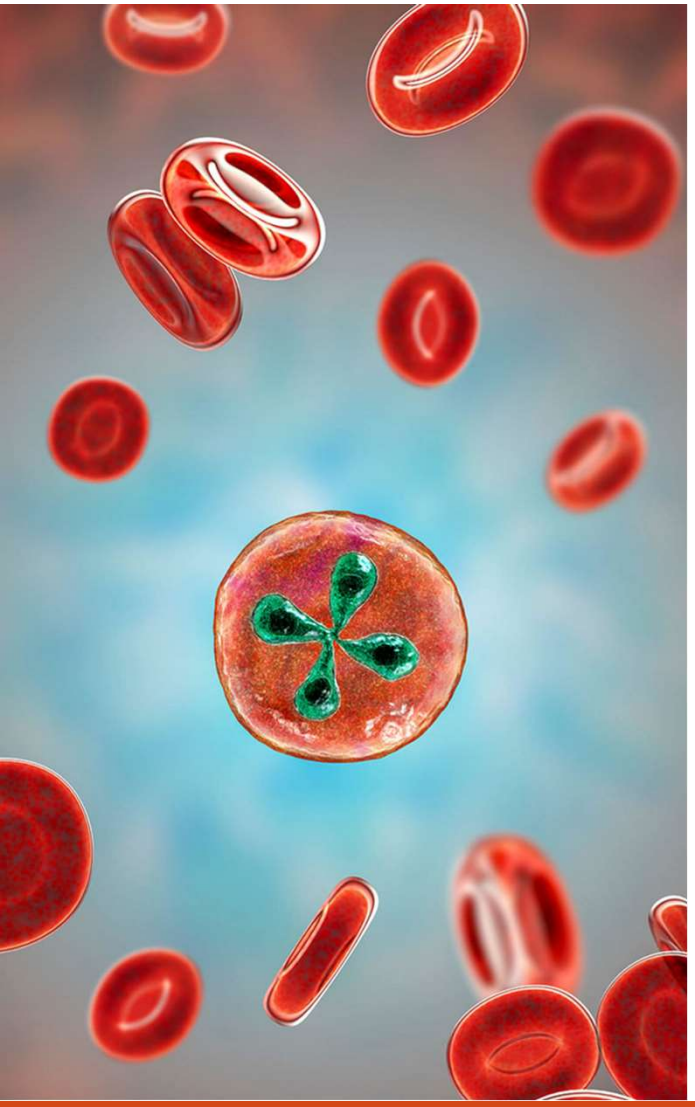
1. ***Background*** *check:* investigate what has happened in your patient's body to make them hospitable (all the things that fill their bucket)?
2. ***BandAid****:* temporarily use interventions focused on ameliorating the worst symptoms to improve quality of life while healing underlying causes
3. ***Block Inflammation:***
   a) Gal-3: **MCP**
   b) Inflammatory cytokine cascade: **JKW, Chinese skullcap**
   c) Enzymes that degrade ECM & collagen: **JKW, Chinese skullcap, Ashwagandha**
4. ***Buffer effects of stress on autonomic nervous system:*** **Ashwagandha, constitutional hydrotherapy, meditation, breathwork, light therapy**
5. ***Balance*** the immune system: **Ashwagandha, Red sage**
6. ***Build*** gut lining / collagen, endothelial cells: **SBI, MCP, Collagen Peptides, JKW**
7. ***Break down*** biofilms: **MCP, enzymes**
8. ***Bolster*** detoxification pathways: **NAC, micronutrients, elimination support**
9. ***Bind*** toxins (herx, endotoxins, mycotoxins, biotoxins, heavy metals): **MCP, SBI, chlorella, etc**
10. ***Blast*** *bugs*: **Cryptolepis, JKW, Cat's Claw, Sweet Annie, Houttyunia**

Lyme Disease Sample Herbal Protocol

In addition to Background work (lifestyle/ nutritional interventions, micronutrient repletion, and individualized puzzle pieces addressed)

- **MCP**: 1 tsp TID
- ***Withania somnifera***: ½ tsp TID
- ***Polygonum cuspidatum* root**: ¼ tsp TID
- ***Scutellaria baicalensis*** ¼-½ tsp TID
- ***Uncaria tomentosa***: ¼ tsp TID
- ***Cryptolepis sanguinolenta***: ½ tsp TID
- ***Artemisia annua***: ¼ tsp TID
- ***Juglans nigra***: ¼ tsp TID
- **GFSE**: 600-1200 mg BID

Consider others depending on individual symptoms



Understanding the Pathophysiology of Babesia

Persistence of Babesia

In the blood vessels of (blood smear is clear), the disease can recur, usually within 2 weeks to a month (Ho, 2021) many organs (esp. spleen and liver), babesia sequesters many forms of itself:

- Merozoites, gametocytes, ookinetes, sporozoites (Chauvin, 2009)
- Even after successful antibiotic therapy

From these sequestered locations, new sporozoites are released that infect new RBCs and the cycle starts all over again

New cycle:

- Offspring has resistance to pharmaceuticals, as it has learned the mechanism that had previously killed them through pleomorphism, or altered genetic structure and body shape (Chauvin, 2009)
- Can be asymptomatic for a while and then turn relapsing

Nitric Oxide (NO)

- Under normal circumstances, RBC releases NO when a parasite attaches to RBC
- NO surrounds the cell and upon release, forms a toxic gas cloud that lasts for seconds to kill many bacteria and parasites
- Babesia releases a compound very similar to arginase – the enzyme that down regulates the production of NO by RBC (by breaking down arginine)
- This takes away the main RBC defense of babesia infection (Aguilar-Delfin, 2003)

Increasing NO production:

- **L-arginine** (Boger, 2014)

Cyclin-dependent kinases (CDK)

Once merozoite gets inside the RBC, it replicates by:

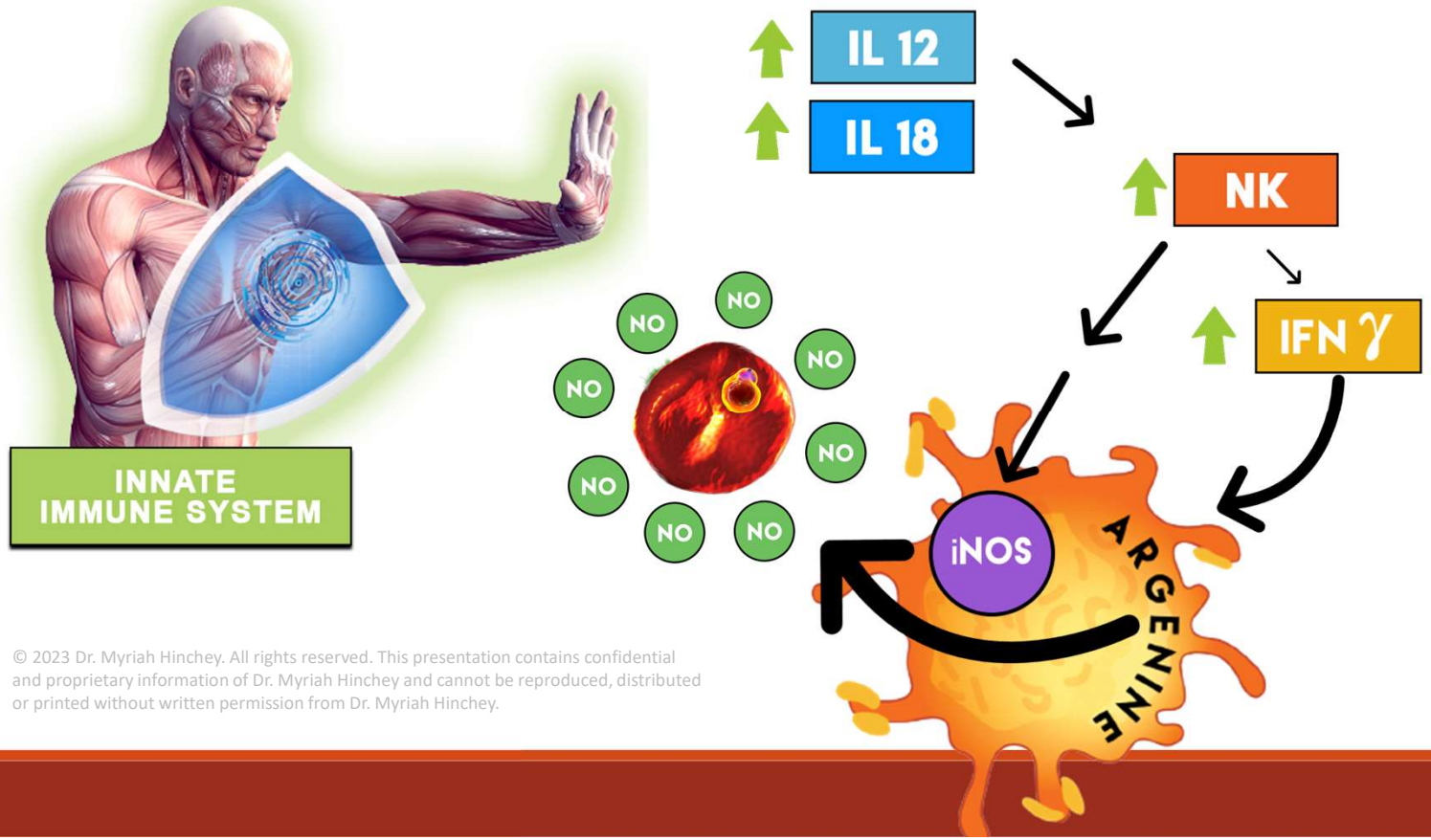
- creating a parasitophorous vacuole (PV) made from lipids
- PV is broken down in 10 mins, releasing the envacuoled merozoite into the interior of the RBC
- creates new nuclei divides via fission, 2-4 new babesia cells are created

Process is regulated by cyclin-dependent kinases (CDKs). Replication cannot occur without them.

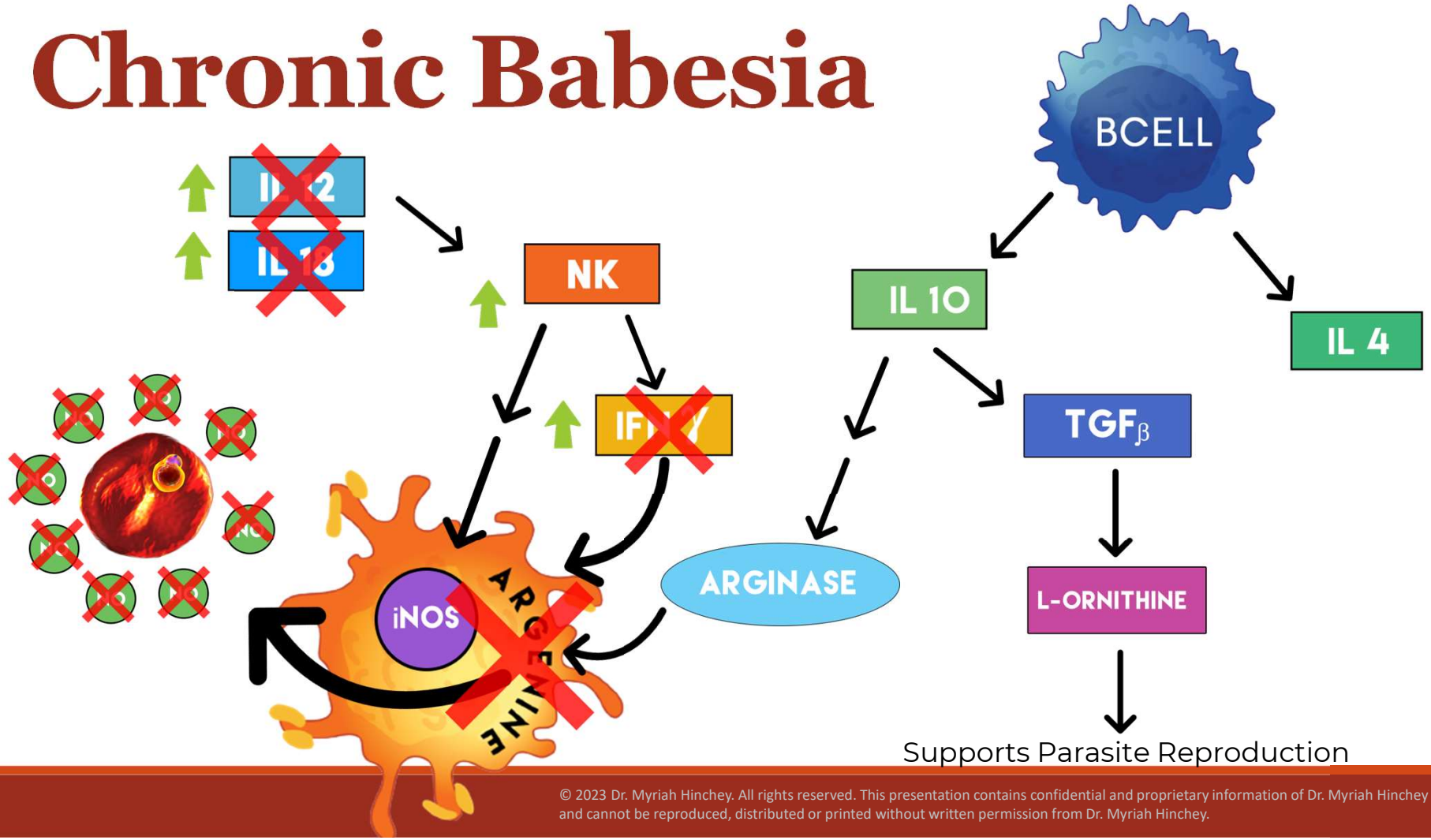
CDK inhibitors:

Licorice (Lee, 2013), ***Artemisinin/Sweet Annie*** (Gray, 2016), ***Chinese skullcap*** (Hsu, 2001), **Ginger** (Lin, 2012), ***Peganum harmala*** (Li, 2007), ***Eurycoma longifolia*** (Li, 2007), ***Magnolia officinalis*** (Lee, 2006), ***Dunaliella salina*** (Sheu, 2008)

Acute Babesia Cytokine Cascade



Chronic Babesia



SUMMARY: Successful Resolution of Babesia

1. Spleen's IFN gamma production (Aguilar-Delfin, 2003)
2. Body's NO production, generated by L-arginine and IFN gamma (Stich, 1998 - although this was on *Babesia bovis*)
3. Increasing IL-12 (Aguilar-Delfin, 2003)
4. Regulation of IL-10 (Khan, 2019)
   - decrease in IL-10 stops the suppression of INF gamma and TNF alpha

     increases production of NO from the macrophage and increases IL-12

Goals for Successful Resolution of Babesia

I. Immune system/cytokine modulation

II. Organ support and protection

III. Anti-Babesial herbs

Immune Modulation: Th1 & Th2

***Withania somnifera*/Ashwagandha**

- Counteracts the exact modulation of the immune system that **tick saliva** and **protozoa** initiate and maintain to keep infection going (Bani, 2006)

Astragalus membranaceus

- Inhibits several of the cytokines that cause Th2 dominence and contribute to inhibition of NO production (chen, 2014)

Immune Modulation: Decrease IL-10, IL-4 and TGF-beta

- IL-10 suppressors
  - ***Glycyrrhiza glabra* - licorice** (Luo, 2015)
  - ***Silybum* - milk thistle** (Wilasrusmee, 2002)
  - ***Cannabis sativa*** (Al-Ghezi, 2019)
  - ***Scutellaria baicalensis* - Chinese skullcap** (Bao, 2019)
  - ***Artemisia spp*** (Kim, 2021)
  - ***Withania somnifera* - Ashwagandha** (Saggam, 2021)
- IL-4 suppressors
  - ***Astragalus*** (Cui, 2018)
  - ***Glycyrrhiza*** (Richard, 2021)
- TGF-beta inhibitors
  - ***Artemisia spp*** (Jung, 2023)
  - ***Astragalus spp*** (Wei, 2020)
  - ***Schisandra chinensis*** (Chen, 2017)
  - ***Salvia miltiorrhiza*** (Wu, 2018)
  - ***Scutellaria spp*** (Bokhari, 2015)

Immune Modulation, continued

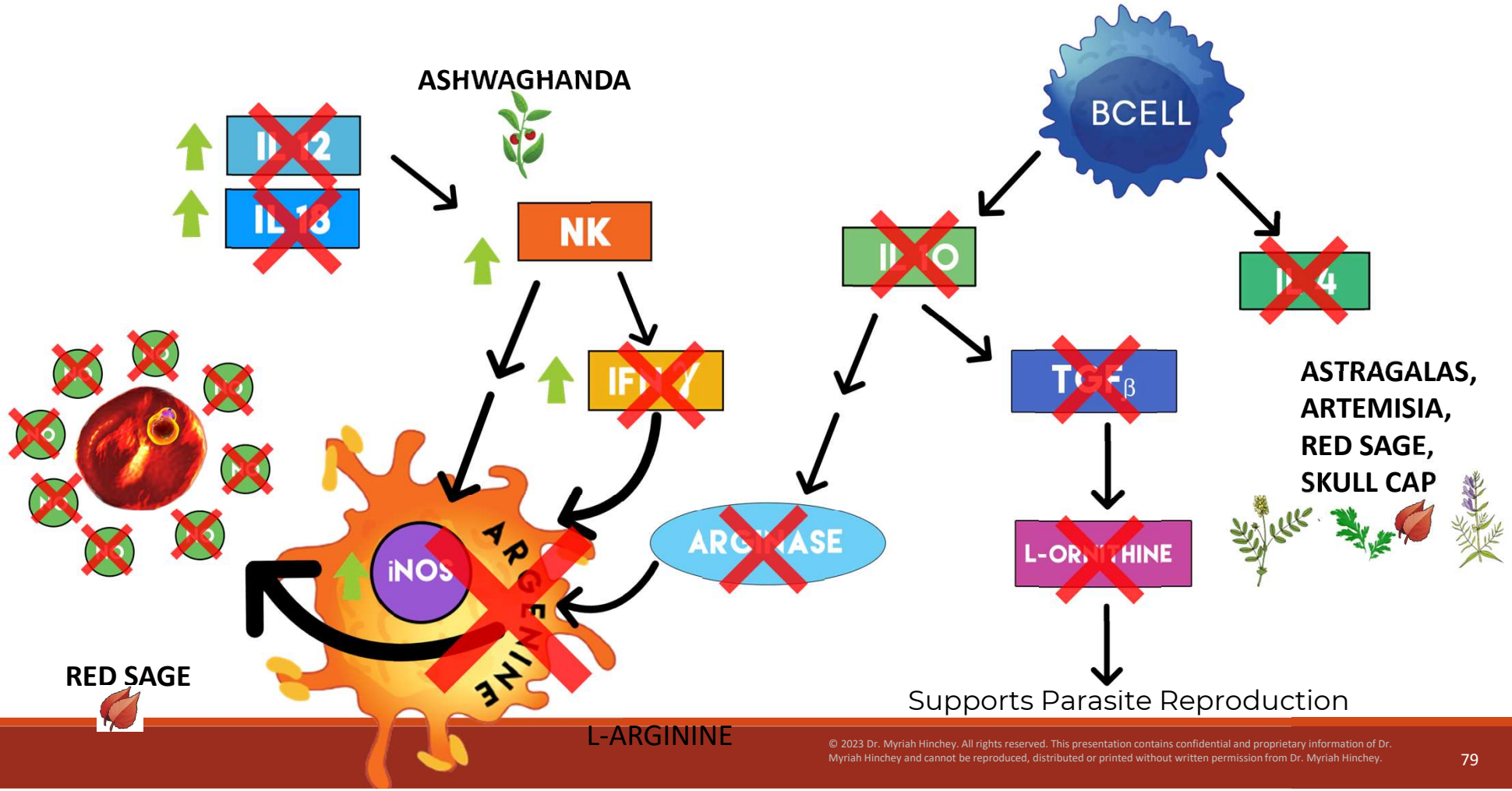
Inhibit generation of arginase to increase NO

- Arginase inhibitors
  - ***Panax ginseng*** (Shin, 2013)
  - ***Scutellaria baicalensis*** (Kim, 2013)
  - ***EGCG*** (dos Reis, 2013)

Increase IL-12, IL-18, INF- gamma, NO

- Inhibition of IL-10 (above)
- IL-12 stimulators
  - ***Eleutherococcus*** *senticosus* (Shin, 2013)
  - ***Astragalus spp*** (Lu, 2013)
- INF-gamma stimulators
  - ***Astragalus*** (Lu, 2013)
  - ***Grapefruit seed extract*** (Abdelkawy, 2017)

Herbal Interventions for Babesia



L-ARGININE

Organ Support: RBCs

- Inhibit CDK and block RBC invasion
  - **Ginger** (Elkady, 2012)
  - ***Skullcap*** *(Guo, 2015)*
  - ***Artemisinin*** (Goda, 2021)
  - **Magnolia** (Lee, 2004)
  - **Licorice** (Lee, 2009)
- Protect RBC and relive anemia by increasing RBC numbers
  - ***Sida acuta*** (Ugwuezumba, 2018)
- Protect and increase NO levels for healthy vascular function
  - **L-arginine** (Boger, 2014)
    - most abundant in grass fed red meat (1/5th oz steak = 6 grams L-arginine!), spinach, walnuts, almonds
- Upregulate NOS and NO
  - **Red sage** (Jang, 2003)

Organ Support, continued

Endothelial cells

Normalize endothelial function and activates CDK inhibitors

- ***Bidens pilosa*** (Wu, 2007)

Spleen

Upregulate CDK inhibition

- **Red sage - *Salvia miltiorrhiza*** (Jung, 2020)

Liver

Upregulate CDK inhibitors

- **Milk thistle - *Silybum marianum*** (Hogan, 2007)

Kill the Microbes: *Babesia spp.*

- ***Cryptolepis sanguinolenta*** (Zhang, 2021)
- ***Alchornia cordifolia*** (Zhang, 2021)
- ***Sida acuta*** (Chumpol, 2018)
- ***Bidens pilosa*** (Geissburger, 1991)
- ***Artemisia spp*** (Zhang, 2021)

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Botanical Medicines Cryptolepis sanguinolenta, Artemisia annua, Scutellaria baicalensis, Polygonum cuspidatum, and Alchornea cordifolia Demonstrate Inhibitory Activity Against Babesia duncani

Yumin Zhang, [1] Hector Alvarez-Manzo, [1] Jacob Leone, [2] Sunjya Schweig, [3] and Ying Zhang [4,*]

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Table 1

Evaluation of a panel of 46 herbal medicines at 0.01% (v/v) for inhibitory activity against *B. duncani* after 3 days of incubation.

Product Names	***Plants***	**Inhibition (%)**
Chinese Skullcap (90% EE)	*Scutellaria baicalensis*	84
Cryptolepis (90% EE)	*Cryptolepis sanguinolenta*	80
Cryptolepis (60% EE)	*Cryptolepis sanguinolenta*	70
Chinese Skullcap (60% EE)	*Scutellaria baicalensis*	68
Japanese knotweed (60% EE)	*Polygonum cuspidatum*	59
Sweet wormwood (30% EE)	*Artemisia annua*	58
Alchornea	*Alchornea cordifolia*	54
Japanese knotweed (90% EE)	*Polygonum cuspidatum*	42
Andrographis (90% EE)	*Andrographis paniculata*	37
Andrographis (60% EE)	*Andrographis paniculata*	36
Sweet wormwood (60% EE)	*Artemisia annua*	35
Andrographis (30% EE)	*Andrographis paniculata*	34
Cistus	*Cistus incanus*	34

Babesia Sample Herbal Protocol

In addition to Background work (lifestyle/ nutritional interventions, micronutrient repletion, and individualized puzzle pieces addressed)

- ***Cryptolepis sanguinolenta***: ¼-½ tsp tid
- ***Alchornea cordifolia***: ¼ tsp tid
- ***Sida acuta***: ¼ tsp tid
- ***Artemisia annua***: ¼ tsp tid (or 200mg tid)
- ***Withania somnifera:*** *¼- ½ tsp tid*
- ***Salvia miltiorrhiza***: ½ tsp tid
- **L-arginine**: 2000 mg tid
- ***Astragalus membranaceus*:** ¼- ½ tsp tid
- ***Silybum marianum***: 200 mg tid

Putting It All Together

Knowledge is Power!

The Infection

Understand how the infectious organism thrives in the body

The Terrain

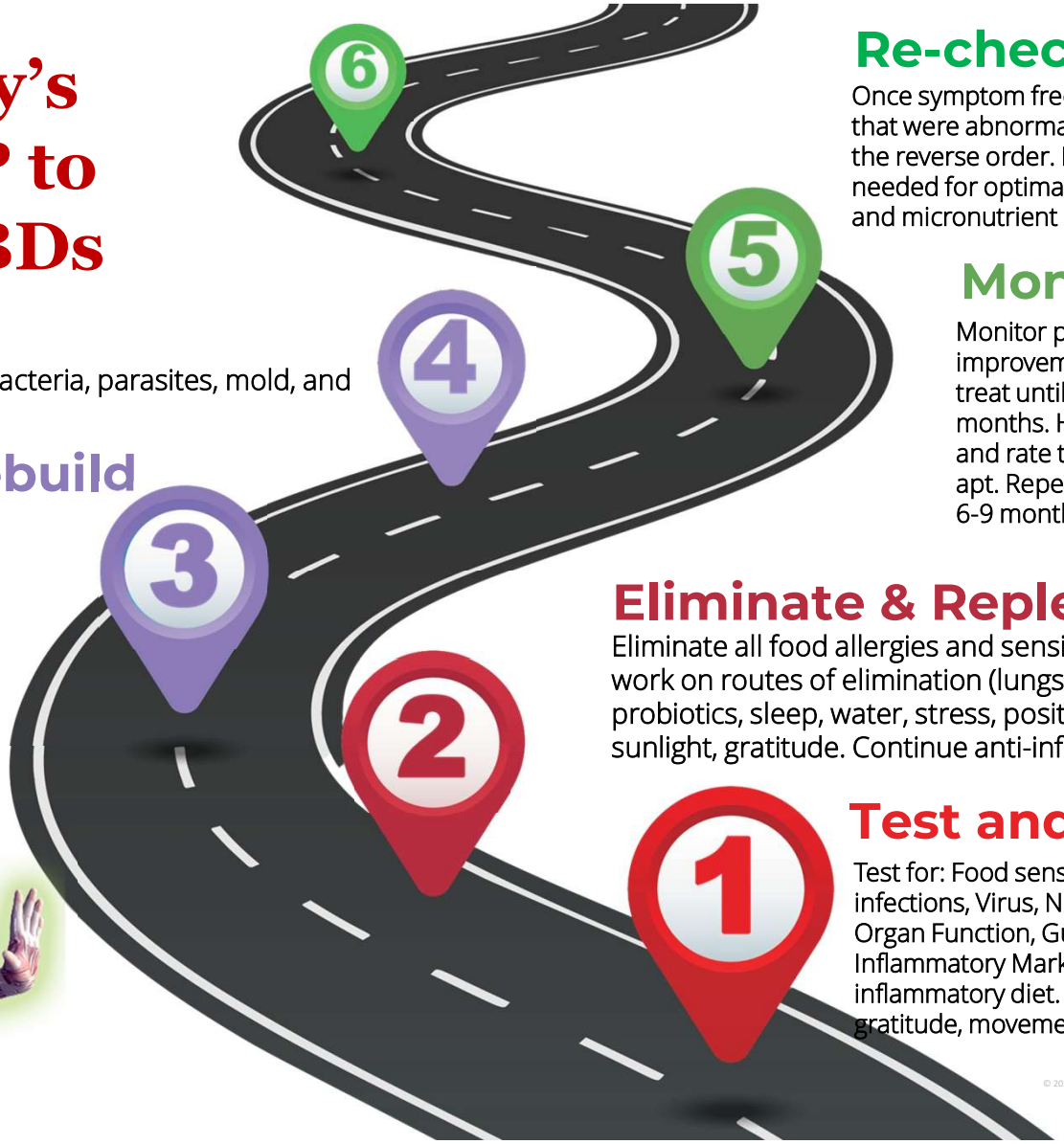
Understand how the patient's circumstances are making the body hospitable to infection

The Treatment

Understand the MOAs of the medications, herbs, and nutraceuticals available to you

...then you can create an intelligent, effective treatment plan!

Dr Hinchey's ROADMAP to Healing TBDs



Re-check, Wean, Remain

Once symptom free for 2 months, Re-check all labs that were abnormal. If normal – wean off protocol in the reverse order. Remain on the basic nutrients still needed for optimal health; retest food sensitivities and micronutrient levels.

Monitor Progress

Monitor progress every 8 weeks – looking for 25% improvement by 90 days on full treatment protocol – treat until patient has been sx free for 2 solid months. Have patient fill out check list at every apt and rate the severity and frequency of sx at each apt. Repeat abnormal labs as medically necessary or 6-9 months for objective progress.

Add Killers

Add in proven killers of virus, bacteria, parasites, mold, and fungus. Continue steps 1-3.

Balance and Rebuild

Add in herbs to shift cytokine cascade – balance Th1- Th2; increase NK cells; stop migration through CT, add binders & continue with steps 1-2.
Reminder of lifestyle (diet, sleep, stress, gratitude, movement)

Eliminate & Replenish

Eliminate all food allergies and sensitivities, replace def nutrients, work on routes of elimination (lungs, skin, colon, kidneys), gut healing, probiotics, sleep, water, stress, positive thinking, gentle movement, sunlight, gratitude. Continue anti-inflammatory diet.

Test and Address Lifestyle

Test for: Food sensitivities, Mold, Fungal, Lyme co-infections, Virus, Nutrient Deficiencies, MTHFR, Hormones, Organ Function, Gut Function, Dysbiosis, Histamine, Inflammatory Markers, and Immune Markers. Start anti-inflammatory diet. Address Nutrition, sleep, stress, gratitude, movement.


Thank
You

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