An Integrative Approach To MPNs

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Co-Director, Integrative Medicine in Hematology Oncology
"CHAOS"  
Integrative Oncology  
THE DRIVERS SEAT  
"Empowerment"
Integrative Oncology

“is a patient-centered, evidence-informed field of cancer care that utilizes mind and body practices, natural products, and/or lifestyle modifications from different traditions alongside conventional cancer treatments.

Integrative oncology aims to optimize health, quality of life, and clinical outcomes across the cancer care continuum and to empower people to prevent cancer and become active participants before, during, and beyond cancer treatment.”

Claudia M. Witt, et al.  
*JNCI Monographs*, Volume 2017, Issue 52, 1 November 2017
The Four Pillars of Wellness

- **Body**: Lifestyle Medicine
- **MIND**: Stress Reduction
- **Meaning**: Connection
- **Joy**: Promoting Happiness and Gratitude

You Have the Power to Promote Your Own Wellness
## Why Is Integrative Oncology Important?

<table>
<thead>
<tr>
<th>Decrease Inflammation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease MPN Symptom Burden</td>
</tr>
<tr>
<td>Decrease Cardiovascular Risk Factors</td>
</tr>
<tr>
<td>Desire for and current use of complementary approaches</td>
</tr>
<tr>
<td>Potential to impact outcomes and treatment toxicity</td>
</tr>
<tr>
<td>Potential to decrease cost of care</td>
</tr>
</tbody>
</table>
YOUR TREATMENT GOALS

- MPN DISEASE
- MPN SYMPTOMS
- CANCER PREVENTION
- CARDIOVASCULAR RISK

Long Survival WITH HIGH QUALITY OF LIFE

DECREASE INFLAMMATION
Tumor Promoting inflammation

- Chronic infections, obesity, smoking, alcohol consumption, environmental pollutants and high fat diets are now recognized as major risk factors for most common types of cancer; and, importantly, all these risk factors are linked to cancer through inflammation.

**MPN Inflammation**

- Inflammation (hs CRP) correlates with MPN outcomes:
  - Increased risk of major thrombosis
  - Shortened leukemia free survival

Barbui 2011, 2013
Lussana 2017
How can you quiet inflammation?
LIFESTYLE

The Backbone of Integrative Health

Diet and Exercise are potent modulators of inflammation.

Furman, et al.  
Nature Medicine, 2019.
“LET FOOD BE THY MEDICINE AND MEDICINE BE THY FOOD”
-HIPPOCRATES
Benefits of Mediterranean Diet


Mediterranean diet associated with lower CRP.


Other dietary considerations:
Intermittent fasting, ketogenesis, microbiome

1. Use of olive oil as the main culinary fat
2. Consumption of ≥4 tablespoons/d of olive oil (including oil used for frying, salads, out-of-house meals, etc.)
3. Consumption of ≥2 servings/d of vegetables
4. Consumption of ≥3 servings/d of fruits
5. Consumption of ≥1 serving/d of red meat, hamburger or meat products (ham, sausage, etc.)
6. Consumption of <1 serving/d of butter, margarine, or cream
7. Consumption of <1 serving/d of sweetened and/or carbonated beverages
8. Consumption of ≥1 serving/d of wine
9. Consumption of ≥3 servings/week of legumes
10. Consumption of ≥3 servings/week of fish or shellfish
11. Consumption of <3 servings/week of commercial sweets or pastries (not homemade), such as cakes, cookies, biscuits or custard
12. Consumption of ≥5 servings/week of nuts (including peanuts)
13. Preferential consumption of chicken, turkey or rabbit meat instead of veal, pork, hamburger or sausage
14. Consumption of ≥2 servings/week of sofrito, a sauce made with tomato and onion, leek or garlic and simmered with olive oil.

AICR RECOMMENDATIONS FOR CANCER PREVENTION

To prevent cancer, people should aim to follow as many of the 10 Cancer Prevention Recommendations as possible. However, any change you make that works toward meeting the goals set out in the Recommendations will go some way to reducing your cancer risk.

BE A HEALTHY WEIGHT
Keep your weight within the healthy range and avoid weight gain in adult life.

BE PHYSICALLY ACTIVE
Be physically active as part of everyday life – walk more and sit less.

EAT A DIET RICH IN WHOLE GRAINS, VEGETABLES, FRUITS AND BEANS
Make whole grains, vegetables, fruits and pulses (legumes) such as beans and lentils a major part of your usual daily diet.

LIMIT CONSUMPTION OF RED AND PROCESSED MEAT
Eat no more than moderate amounts of red meat, such as beef, pork and lamb. Eat little, if any, processed meat.

LIMIT CONSUMPTION OF SUGAR-SWEETENED DRINKS
Drink mostly water and unsweetened drinks.

LIMIT CONSUMPTION OF “FAST FOODS” AND OTHER PROCESSED FOODS HIGH IN FAT, STARCHES OR SUGARS
Limiting these foods helps control calorie intake and maintain a healthy weight.

LIMIT ALCOHOL CONSUMPTION
For cancer prevention, it’s best not to drink alcohol.

FOR MOTHERS: BREASTFEED YOUR BABY, IF YOU CAN
Breastfeeding is good for both mother and baby.

AFTER A CANCER DIAGNOSIS: FOLLOW OUR RECOMMENDATIONS, IF YOU CAN
Check with your health professional about what is right for you.

DO NOT USE SUPPLEMENTS FOR CANCER PREVENTION
Aim to meet nutritional needs through diet alone.

American Institute for Cancer Research

Not smoking and avoiding other exposure to tobacco and excess sun are also important in reducing cancer risk.

Following these Recommendations is likely to reduce intakes of salt, saturated and trans fats, which together will help prevent other non-communicable diseases.
University of Arizona Anti-Inflammatory Food Pyramid

Green tea (EGCG)-inhibits DNA transferases, leading to demethylation (inhibition) of tumor promoter genes

Curcumin, cruciferous, soy, grapes, garlic effect the epigenome

**Avoid Processed Foods, Sugar Sweetened Drinks

**Asian Mushrooms: Contain Polysaccharides (B-D glucan) that are immunostimulants, Improved QOL

n-3/n-6 ratio

Sulphorophane: activator of antioxidant proteins
Physical Activity

- Decreased inflammation, obesity, and stress
  - Plaisance, Sports Med, 2006

- Physical activity associated with reduced risk and increased survival for several cancers.
  - PA and Cancer: A SR. 2018 PA guidelines advisor committee

- PA improved QOL
  - Kolen, 2020
MPN and Yoga

- 62 patients enrolled, 48 completed intervention
- Patients averaged 40 min per week yoga
- Significant decrease in TNF-a from baseline to week 12 (p=0.005)
- Small to moderate effect sizes for sleep disturbance, pain intensity, anxiety, and depression.
Tai Chi/Qigong

- Improved cancer related symptoms
- Improved Quality of Life


- Improved Immune Function

https://www.healerwithin.com
The Four Pillars of Wellness

Conventional Medicine

- Body
  - Lifestyle Medicine
- MIND
  - Stress Reduction

Meaning
- Connection

Joy
- Promoting Happiness and Gratitude

You Have the Power to Promote Your Own Wellness
WELLNESS of the MIND

- STRESS TRIGGERS INFLAMMATION
What if you could change your inflammatory profile ... in 5 Minutes per Day?
Mediation and Mindfulness

- Improvements in:
  - Pain
  - Depression
  - Cancer related symptoms
  - Weight control
  - Overall Quality of Life
  - Inflammatory Markers
  - Brain Anatomy

Functional MRI during meditation
MEDITATION APPS

https://www.headspace.com
https://www.calm.com
https://insighttimer.com/

Meditation modulates neuroplasticity, aging, and inflammatory gene expression in as little as 5 min per day!
Resources

https://vibe.emindful.com/programs/32
https://apps.apple.com/ca/app/am-mindfulness/id1300628961

https://www.mindfulcancerrecovery.com
https://www.facebook.com/MindfulnessBasedCancerRecovery
Finding Meaning and Connection

Improved QOL, Decreased Anxiety, Depression
Better cancer outcomes

SPIRITUALITY

NATURE

Post-Traumatic Growth

- How has your life perspective changed after your diagnosis?
  - relationships
  - new possibilities
  - personal strength
  - spiritual change
  - new appreciation for life

Joy is far less vulnerable than happiness. Joy seems to be a part of the unconditional wish to live, not holding back because our life may not meet our preferences and expectations. Joy seems to be a function of the willingness to accept the whole, and to show up to meet with whatever is there.

- Rachel Naomi Remen, *Kitchen Table Wisdom*

**Two Joyful Intentions**

**Daily Joy Intention**

Sit down and think of instances in your life that you felt the most joyful. Evaluate the circumstances around them. Did they occur during family time? During a favorite activity? Now think about the last week – can you identify a moment of happiness? An important aspect of joy is recognizing that joy can come in small moments. For example, enjoying your morning cup of coffee: Imagine the aromatic steam emerging from the freshly poured pot, the feeling of warmth in your hands from a favorite cup, the flavor of roasted beans... this can be a joyful experience!

Take at least 10 minute EVERY DAY to intentionally practice joy. First, name your joyful practice (whatever that means to you!) and then revel in each minute of your practice. When complete, take a moment to have gratitude for your joyful practice.

**Greeting the Day with Gratitude**

Before you get out of bed each morning, start your day by naming three things you are grateful for. Allow your mind to bring these things into clear focus and appreciate every aspect of them. How do they make you feel? See if you can turn up the volume on your gratitude and say a final “thanks” before your rise to greet your day.
The Four Pillars of Wellness

You Have the Power to Promote Your Own Wellness
Complementary Care Modalities

- Acupuncture
- Naturopathic care
- Chinese herbal medicine
- Meditation
- Ayurveda
- Hypnosis
- Native Healing, Prayer lodge, ceremony
- Biofeedback
- Essential Oils
- Homeopathy

- Meditation
- Prayer
- Pet Therapy
- Reiki
- Massage
- Cranial Sacral
- Laugh therapy
- Music Therapy
- ETC!

Data suggests 40-60% of cancer patients use complementary and alternative medicine
-NHS survey 2012
Acupuncture

▶ Effective and Safe
▶ Best data for pain and nausea.
▶ Can be effective for fatigue, sleep, smoking cessation, etc.

Garcia, et al.  
JCO. 2013.

**Acupuncture in Hematologic malignancies and transplant. Iskandarani and Deng. 2022. Blood Reviews.**

ARTICLE

The National Cancer Institute's Conference on Acupuncture for Symptom Management in Oncology: State of the Science, Evidence, and Research Gaps

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Study Type</th>
<th>No.</th>
<th>Pain Symptom Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult population</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acupuncture</td>
<td>SRs</td>
<td>17</td>
<td>AI-related joint pain&lt;sup&gt;27-30&lt;/sup&gt; CIPN&lt;sup&gt;31,32&lt;/sup&gt; Palliative and survivorship care&lt;sup&gt;33-43&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>RCTs</td>
<td>34</td>
<td>AI-related joint pain&lt;sup&gt;39,44-47&lt;/sup&gt; General cancer pain&lt;sup&gt;20,48-55&lt;/sup&gt; CIPN&lt;sup&gt;56-63&lt;/sup&gt; Procedural or surgical pain&lt;sup&gt;64-75&lt;/sup&gt;</td>
</tr>
<tr>
<td>Yoga</td>
<td>RCTs</td>
<td>4</td>
<td>General cancer pain&lt;sup&gt;76-79&lt;/sup&gt;</td>
</tr>
<tr>
<td>Guided imagery and PMR</td>
<td>RCTs</td>
<td>2</td>
<td>General cancer pain&lt;sup&gt;80,81&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hypnosis</td>
<td>SRs</td>
<td>2</td>
<td>Procedural pain&lt;sup&gt;82,83&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>RCTs</td>
<td>8</td>
<td>Procedural pain&lt;sup&gt;84-91&lt;/sup&gt;</td>
</tr>
<tr>
<td>Reflexology</td>
<td>RCTs</td>
<td>9</td>
<td>General cancer pain&lt;sup&gt;92-98&lt;/sup&gt;</td>
</tr>
<tr>
<td>Massage</td>
<td>SRs</td>
<td>5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>General cancer pain&lt;sup&gt;101,102&lt;/sup&gt; Pain during palliative care&lt;sup&gt;83,40,103&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>RCTs</td>
<td>9</td>
<td>General cancer pain&lt;sup&gt;104,105&lt;/sup&gt; Pain during palliative care&lt;sup&gt;81,106-111&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Abbreviations: AI, aromatase inhibitor; CIPN, chemotherapy-induced peripheral neuropathy; PMR, progressive muscle relaxation; RCT, randomized controlled trial; SR, systematic review.
Botanical Medicine

Resources:
• Natural Medicines Database
  https://naturalmedicines.therapeuticresearch.com
• Memorial Sloan Kettering Cancer Center: About Herbs
Issues with Botanicals

• Source and contamination
• Pharmacologic Interaction
• Safety
• Bioavailability
• Difficultly with Study: Source, Funding
• LOSS of Synergy and “plant medicine”

Finding Quality Dietary Supplements

When it comes to supplements, the quality of products may be quite variable. Look for products that have been evaluated by quality assurance companies. They will bear the label print of USP, NSF, or Consumer Labs to ensure the product has been tested, contains what the label indicates, and is free of toxic chemicals.
Natural Products that Inhibit JAK/STAT pathway


Ruxolitinib Chemical Structure
Curcumin and Cancer: An “old-age” disease with an “age-old” solution

Preetha Anand, Chitra Sundaram, Sonia Jhurani, Ajai Kumar B. Kunnunakkara, Bharat B. Aggarwal

Cytokine Research Laboratory, Department of Experimental Therapeutics, The University of Texas M.D. Anderson Cancer Center, Houston, TX, USA

Curcumin and cancer: An “old-age” disease with an “age-old” solution

Nutrition Reviews® Vol. 73(3):135–165
Curcumin and Pain

Many clinical trials have showed an analgesic effect of curcuminoids in various states including

- osteoarthritis
- chronic postsurgical pain
- active rheumatoid arthritis

Laboureyras et al., 2009; Sehgal et al., 2013; and (Chandran and Goel, 2012, Appelboom et al., 2014; Belcaro et al., 2010, 2014; Haroyan et al., 2018; Henrotin et al., 2014, Kuphniratsaikul et al., 2014, 2009; Madhu et al., 2013; Nakagawa et al., 2014; Panahi et al., 2014; Pinsornsak and Niempoog, 2012; Rahimnia et al., 2015; Sterzi et al., 2016
Omega-3 and Inflammation

**Some omega-6s Increase Inflammation**

- Linoleic acid (ARA)
  - Metabolized by COX-2 enzymes
  - Lipoxygenase enzymes
  - Produces Prostaglandins
  - Inflammation increases

**Omega-3s and Some Omega-6s, -9s Decrease Inflammation**

- ALA, EPA, DHA, oleic acid, GLA
  - Inhibits NF-KappaB and activates PPARα and PPARγ
  - Transcription and expression of COX and lipoxygenase genes are reduced
  - COX-2 and lipoxygenase enzyme concentrations decrease
  - Inflammation decreases
  - Prostaglandin concentrations decrease
Omega-3

• Influence in inflammatory response
• Randomized trial 97 patients with RA with Omega 3 supplementation reduced need for daily NSAID by 30% (p.002) \(^1\)
• Evidence to support supplementation with omega-3s for preventing or treating cancer NOT conclusive
• Potential for drug interaction with Warfarin, Increased INR

2. Deng, et al. ASCO Post Integrative Oncology Series
The SIMM study: Survey of integrative medicine in myeloproliferative neoplasms

Krisstina Gowin¹ | Blake T. Langlais² | Heidi E. Kosiorek² | Amylou Dueck² | Denise Millstine³ | Jennifer Huberty⁴ | Ryan Eckert⁵ | Ruben A. Mesa⁵
SIMM Study

- 858 Patients (338 ET, 188 PV, 315 MF)
- Patients used broad spectrum of integrative therapies (aerobic activity (51%), massage (28%), yoga (25%), nutrition (25%), strength training (23%), acupuncture (19%), mediation (19%), etc.
- Natural products used in prior 6 months by 48% ET, 42% MF, and 45% PV patients
- 20% reported NOT disclosing supplement use to physician
- Only 24% received nutrition advice
- 80% “felt integrative needs were NOT heard by provider”
“Nurture Your Garden”
Set 3 Wellness Goals For Yourself

• 1)
• 2)
• 3)

• How will you hold yourself accountable?
HOW DOES IT WORK?
• SCORE how satisfied you are in the 7 Core Areas of Health
• EXPLORE your health by answering simple questions.
• MAKE A GOAL in any Core Area of Health
• TAKE ACTION—step-by-step to reach your goal in 1–3 months.
Take Home Points

- DISCUSS YOUR TREATMENT PLAN WITH PROVIDERS
- Eat Intentionally
- Move often
- Breathe
- Manage Stress
- Cultivate Joy
Our research focuses on...

- Mindfulness & Meditation
- Physical Activity
- Diet & Supplements
- Support from Loved Ones
- Managing Symptoms

Myeloproliferative Neoplasms

- MPN Burden/Symptom/QoL Assessment
- Interventions/Therapeutics & Outcomes
- Novel MPN Drug/Genetic Therapies
- Physical Activity/Behavioral Therapies

MPN Quality of Life Study Group

Thank you!
THANK YOU!

Questions?
gowink@email.arizona.edu
Benefits / Neuroscience findings

• Research has found that meditators appear to lose less gray matter and that meditating reduced the cognitive decline associated with normal aging.

• More gyrification, or “folding,” of the cortex, which is associated with faster mental processing.

• Increased thickness in the prefrontal cortex and right anterior insula, areas of the brain associated with attention and awareness of sensations and emotions in oneself and others.

• “Significantly larger volumes” of gray matter in the hippocampus, an area crucial to memory and learning.

• Much, much more... help with pain, addiction, depression and anxiety, quality of life, fatigue, etc.
Table 1
Acute phase inflammatory proteins and outcomes of MPN.

<table>
<thead>
<tr>
<th>Author</th>
<th>Setting</th>
<th>Total patients</th>
<th>Biomarkers</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbui 2011 [56]</td>
<td>ET (n = 173) and PV (n = 71) patients</td>
<td>244</td>
<td>hs CRP and PTX-3</td>
<td>PTX-3 and hs-CRP values were significant correlated with JAK2V617F allele burden greater than 50%. Patients with increased levels of hs-CRP (&gt;3 mg/L) had an increased risk of major thrombosis. Conversely, high PTX-3 levels (&gt;4.5ng/ml) decreased the rate of thrombosis.</td>
</tr>
<tr>
<td>Barbui 2013 [57]</td>
<td>PMF (n = 167) and post PV or ET MF (n = 17) patients</td>
<td>184</td>
<td>hs CRP</td>
<td>Higher hs-CRP levels (≥7mg/dl) were independently associated with shortened leukemia free survival. Also, the annual incidence rate of death was increased in patients with higher levels of hs-CRP.</td>
</tr>
<tr>
<td>Lussana 2017 [58]</td>
<td>ET (n = 305) and PV (n = 172) patients</td>
<td>477</td>
<td>hs CRP and PTX-3</td>
<td>Circulating levels of PTX-3 were significantly increased in homozygous JAK2V617F mutation carriers compared to all the other genotypes. The risk of hematological evolution and death from any cause was significantly increased in individuals with high PTX-3 levels, while high levels of PTX3 were associated with a trend to a lower risk of thrombosis. Patients with high hs-CRP levels exhibited an increased risk of hematological evolution and death and to a lower extent also of thrombotic events. Subjects with JAK2V617F mutation and an allele burden ≥ 50% had an age-independent higher incidence of elevated hs-CRP level. ASXL1, EZH2 sub-clonal mutations, JAK2 46/1 haplotype and the A3669G polymorphism of glucocorticoid receptor were not significantly associated with increased hs-CRP levels.</td>
</tr>
<tr>
<td>Barosi 2017 [59]</td>
<td>PMF</td>
<td>526</td>
<td>hs-CRP</td>
<td></td>
</tr>
</tbody>
</table>

PMF = primary myelofibrosis; ET = essential thrombocytemia; PV = polycythemia vera; PTX-3 = pentraxin 3; hs-CRP = high sensitivity C-reactive protein.
Fatigue

Table 1: Complementary and integrative interventions for cancer-related fatigue

<table>
<thead>
<tr>
<th>Modality</th>
<th>Main mechanisms of CRF reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity</td>
<td>↑ cardiorespiratory fitness</td>
</tr>
<tr>
<td>- Avoid inactivity</td>
<td>↓ muscle mass &amp; strength</td>
</tr>
<tr>
<td>- Consider needs for energy conservation</td>
<td>↑ inflammation</td>
</tr>
<tr>
<td>- Combine aerobic and strength training</td>
<td>↓ distress, anxiety, fear</td>
</tr>
<tr>
<td>- Utilize early morning exercise to balance melatonin levels</td>
<td>↑ muscle and fascia tension</td>
</tr>
<tr>
<td>- The exercise program should be monitored by a specialist</td>
<td>↑ deep sleep</td>
</tr>
<tr>
<td>- Length of sessions: 20–45 min</td>
<td>↑ physio-psychological symptoms</td>
</tr>
<tr>
<td>- Frequency: 1–3 times per week</td>
<td>↑ stress hormones</td>
</tr>
<tr>
<td>Touch therapies</td>
<td>↑ pain resolution</td>
</tr>
<tr>
<td>- Acupuncture/pressure</td>
<td>↑ contrast levels</td>
</tr>
<tr>
<td>- Length of sessions: 20–45 min</td>
<td>↑ feeling of loneliness</td>
</tr>
<tr>
<td>- Frequency: 1–3 times per week</td>
<td>↓ CRF</td>
</tr>
<tr>
<td>Mind-body therapies</td>
<td>↓ relaxation</td>
</tr>
<tr>
<td>- Yoga, Tai-chi, Qigong</td>
<td>↓ post-surgery stress</td>
</tr>
<tr>
<td>- Hypnosis, guided imagery</td>
<td>↓ pain</td>
</tr>
<tr>
<td>- Length of sessions &amp; frequency: according to therapist discretion</td>
<td>↓ nausea &amp; vomiting</td>
</tr>
<tr>
<td>- Mindfulness</td>
<td>↓ anxiety</td>
</tr>
<tr>
<td>- Nutrition</td>
<td>↓ CRF</td>
</tr>
<tr>
<td>- Maintain an optimal nutritional status to avoid deficiencies</td>
<td>↑ sleep quality</td>
</tr>
<tr>
<td>- Base meals on a variety of vegetables, fruits, whole grains, and legumes</td>
<td>↓ oxidative stress</td>
</tr>
<tr>
<td>- Consume omega-3-rich foods</td>
<td>↓ inflammation</td>
</tr>
<tr>
<td>- Reduce consumption of animal-based products</td>
<td>↓ cardiac-artrial protection</td>
</tr>
<tr>
<td>- Avoid sugary drinks</td>
<td>↓ immune system</td>
</tr>
<tr>
<td>- Limit consumption of processed foods</td>
<td>↓ immune system</td>
</tr>
<tr>
<td>Nutritional supplementation</td>
<td>↑ sleep quality</td>
</tr>
<tr>
<td>- Micronutrients</td>
<td>↓ CRF</td>
</tr>
<tr>
<td>- Monitor potential micronutrient deficiencies, especially vitamin D, calcium, B12, folate, iron, selenium, and magnesium</td>
<td>↓ oxidative stress</td>
</tr>
<tr>
<td>- Melatonin</td>
<td>↓ inflammation</td>
</tr>
<tr>
<td>- Maintain sleep hygiene: sleeping in complete darkness along with early morning sun exposure</td>
<td>↓ cardiac-artrial protection</td>
</tr>
<tr>
<td>- Homeopathy</td>
<td>↓ oxidative stress</td>
</tr>
<tr>
<td>Astragalus membranaceus (AM), Huang Qi</td>
<td>↓ inflammation</td>
</tr>
<tr>
<td>- Ginseng (Panax ginseng, American ginseng, Siberian ginseng)</td>
<td>↓ oxidative stress</td>
</tr>
<tr>
<td>- Withania somnifera—Ashwagandha (W3)</td>
<td>↓ inflammatory</td>
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