Why Wellness Matters: Science & Practice!

Learning Objectives

- Assess the connection between stressors, inflammation, and wellness
- Discuss the impact of wellness practices on inflammation in rheumatic diseases
- Explore the implementation of wellness practices in patients with rheumatological disease in support of holistic patient management

Defining Wellness

Oxford Dictionary. 2019 Oxford University Press

Defining Wellness

- Wellness is an active desire to increase well-being and enhance quality of life while living with a chronic disabling disease[1]
- Wellness is multidimensional and holistic, encompassing lifestyle, mental and spiritual well-being, and the environment[2]

What does **WELLNESS** mean to you and your patients?

1. Stuifbergen AK, et al. *Disabil Health J*. 2010:3(3):133–145; 2. National Wellness Institute, accessed Feb 2019. https://www.nationalwellness.org/page/Six_Dimensions.

Wellness Facilitates Coping with Chronic Disease

Wellness can be strengthened by strong social support, motivation, constructive coping strategies, and cognitive reframing.[1,2]

>170 studies (literature reviews) have been published demonstrating the positive impact of wellness interventions (functioning, health, QoL) on people with chronic disease*[3]

Most studies reported significant effects, incorporated multiple measures, and did not rely solely on self-reported measures.[3]

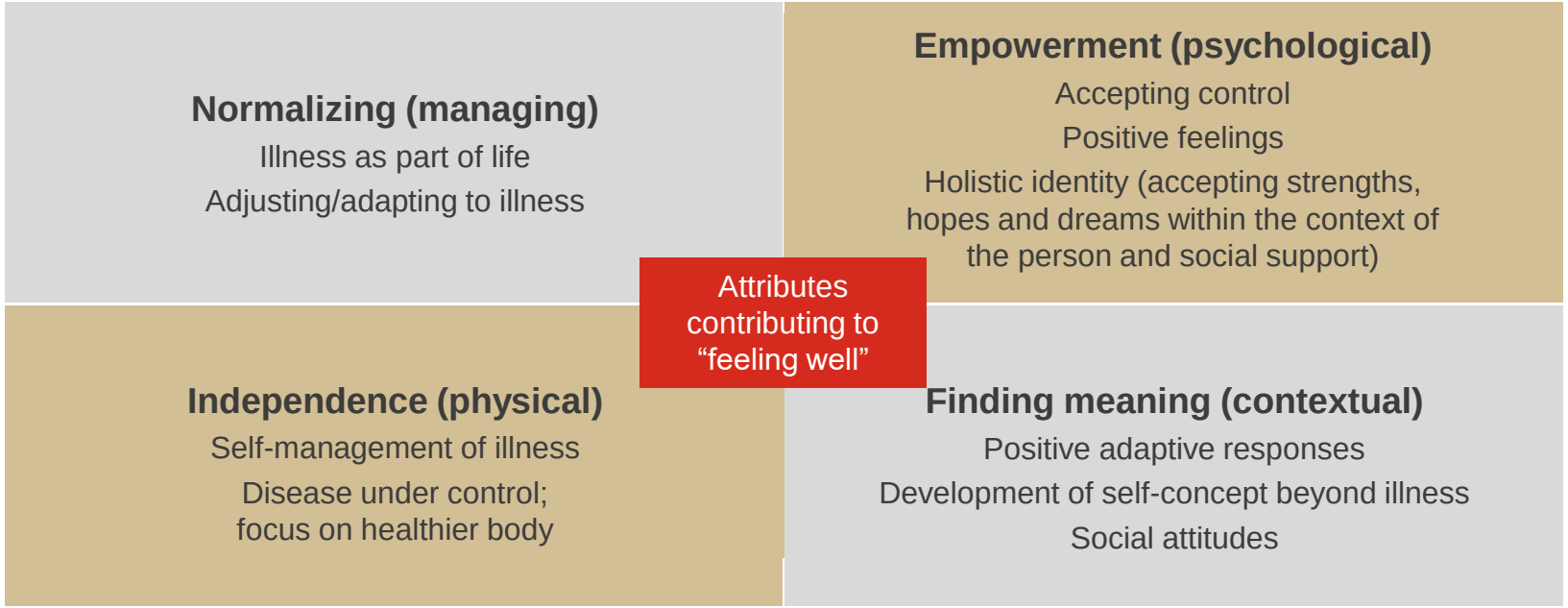
- **82.2%** of studies showed a large impact of the wellness practice immediately post-intervention

*studies of varying patient numbers and length

1. Lacalle-Moreno RC. *PJN* 2015;85(2):45-75. 2. Sanderson T, et al. *Chronic Illn*. 2010;6(3):228-40; 3. Stuifbergen AK, et al. *Disabil Health J*. 2010;3(3):133–145.

Wellness Within Illness: Adaptation and Coping

Attributes contributing to 'feeling well' and which can be modified by wellness practices



*studies of varying patient numbers and length

1. Moreno-Lacalle, RC. *PJN* 2015;85(2):45-4.

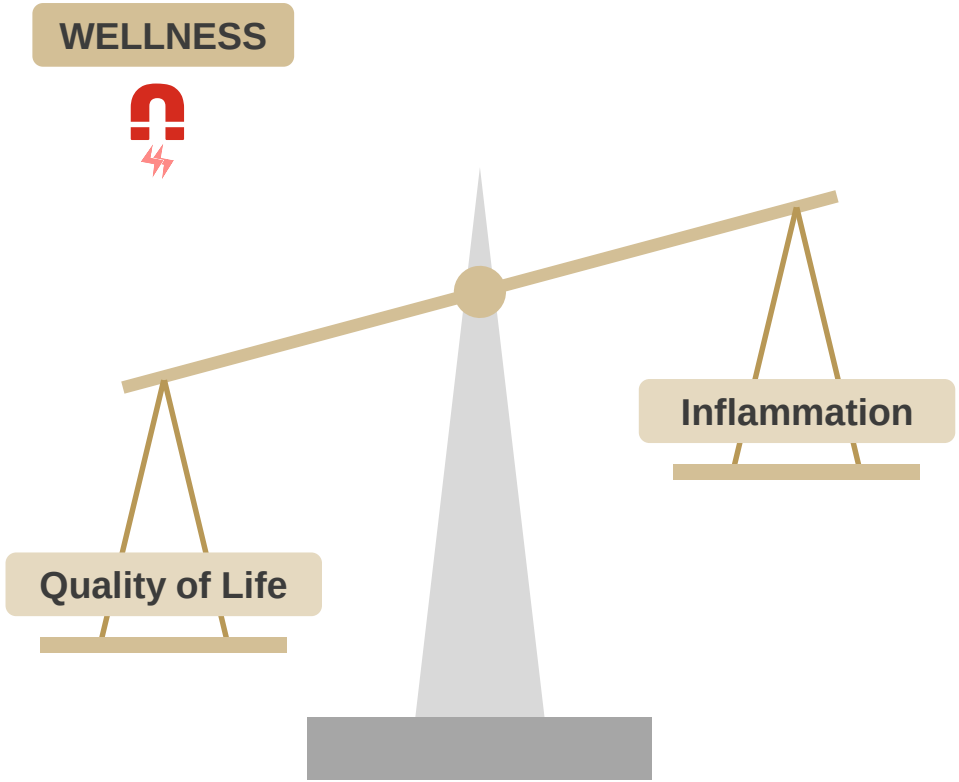
Wellness Intertwined with Inflammation and QoL

Quality of Life

- Activities of daily living
- Mobility
- Life enjoyment
- Independence
- Value activities

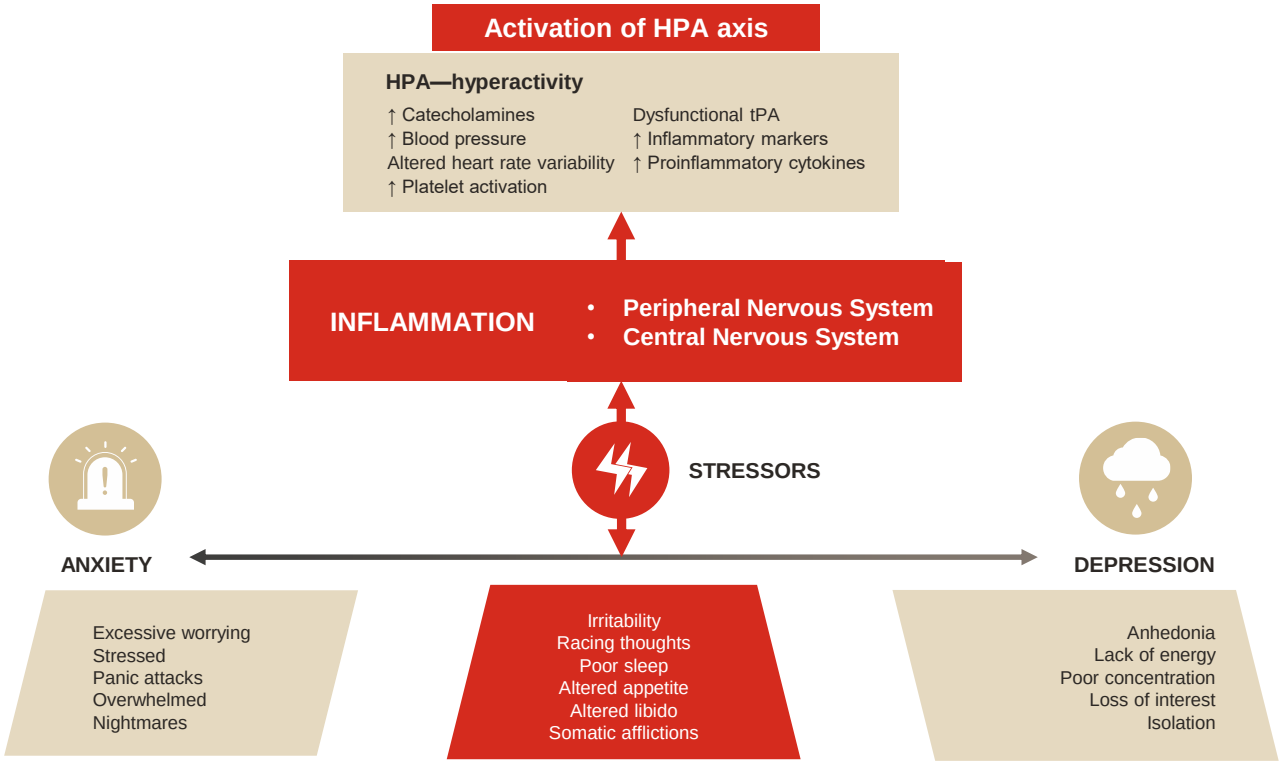
Inflammation

- Severity of symptom/impairment
- Pain
- Ability to manage outcomes
- Fatigue
- Joint damage



Graphic adapted from Sanderson T, et al. *Arthritis Care Res (Hoboken).* 2010;62(5):647–656; Dantzer R, et al. *Nat Rev Neurosci.* 2008;9(1):46–56.

Stressors Activate Inflammatory Response in Brain and Periphery

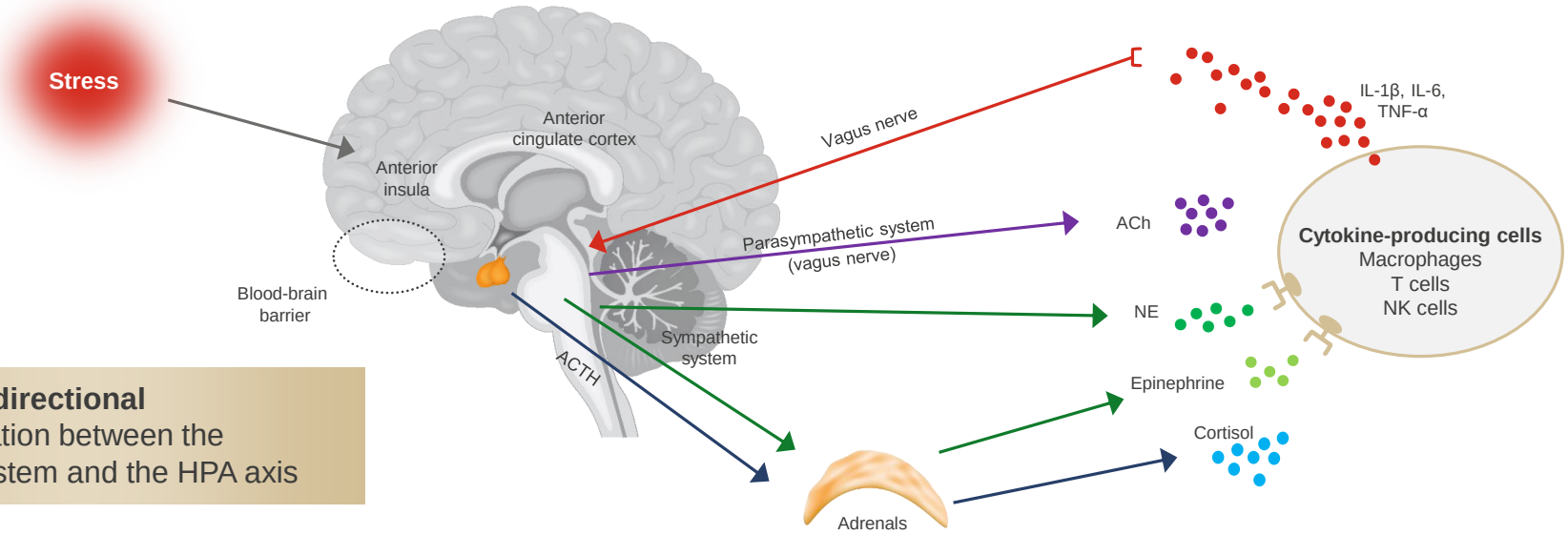


tPA = tissue plasminogen activator.

Calcia MA, et al. *Psychopharmacology* (Berl). 2016;233;1637–1650; Rohleder N. *Psychosom Med*. 2014;76;81–189; Liu Y, et al. *Frontiers in Human Neuroscience* 2017;11:316; *Camacho A. Med Hypotheses.* 2013;81(4): 577-581 .

Multiple Brain-Body Pathways Connect Stress to Inflammation

- Proinflammatory cytokines, such as TNF, IL-1, and IL-6, stimulate cortisol release by **acting at all 3 levels of the HPA axis**
- In turn, **cortisol** has a negative feedback effect on the immune system to **suppress the further synthesis and release of proinflammatory cytokines**



There is **bidirectional** communication between the immune system and the HPA axis

ACh = acetylcholine; ACTH = adrenocorticotropic hormone; HPA = hypothalmus-pituitary adrenal; IL = interleukin; NE = norepinephrine; NK = natural killer; TNF = tumor necrosis factor.

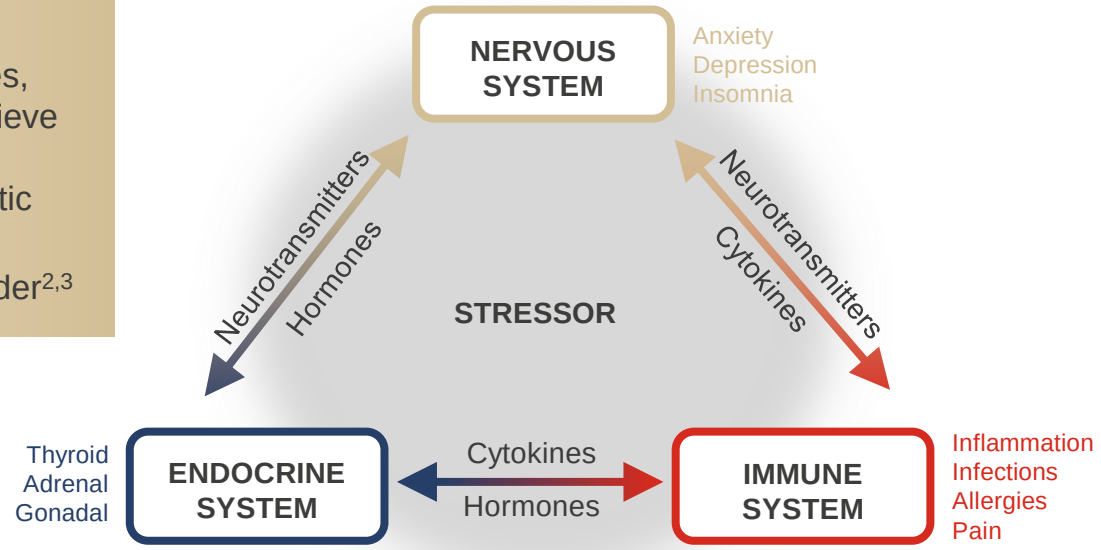
Silverman MN, Sternberg EM. *Ann N Y Acad Sci.* 2012;1261:55-63.

Psychoneuroimmunology (PNI) Provides a Model for the Brain-Body Link[1]

"**PNI is a convergence of disciplines**—namely the behavioral sciences, the neurosciences, endocrinology, and immunology—intended to achieve a more complete understanding of the way the interaction among these systems serve homeostatic ends and influence health and disease."

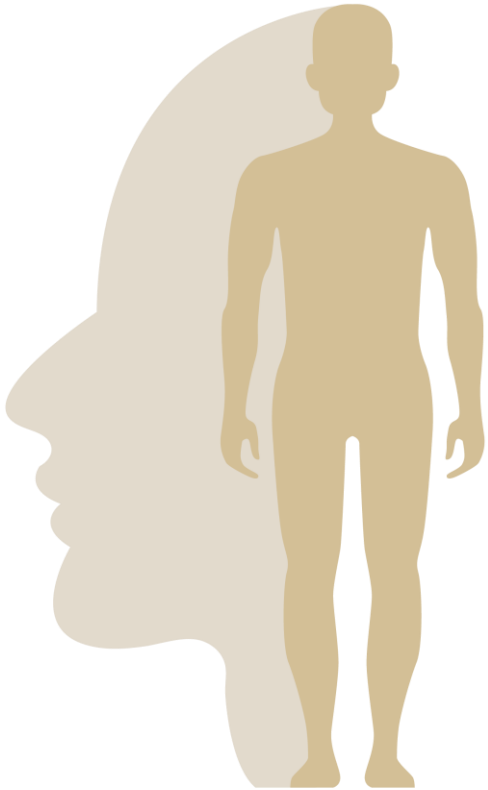
– Robert Ader[2,3]

The Integrated Bidirectional View of PNI[4]



1. Mission statement. Psychoneuroimmunology Research Society website. https://www.pnirs.org/society/index.cfm. Accessed March 2018. 2. Ader R. Psychoneuroimmunology. 4th ed. Amsterdam: Elsevier Academic Press, 2007; 3. Ader R, et al. *Psychosom Med*. 1975;37(4):333-340. 3. Miller AH, et al. *Biol Psychiatry*. 2009;65(9):732-741.

Inflammatory Disorders Connect Mind and Body Into One Unitary System



COGNITIVE DYSFUNCTION

DEPRESSION

STIFFNESS

FATIGUE

WEIGHT CHANGE (gain or loss)

DISEASE ACTIVITY

INSOMNIA

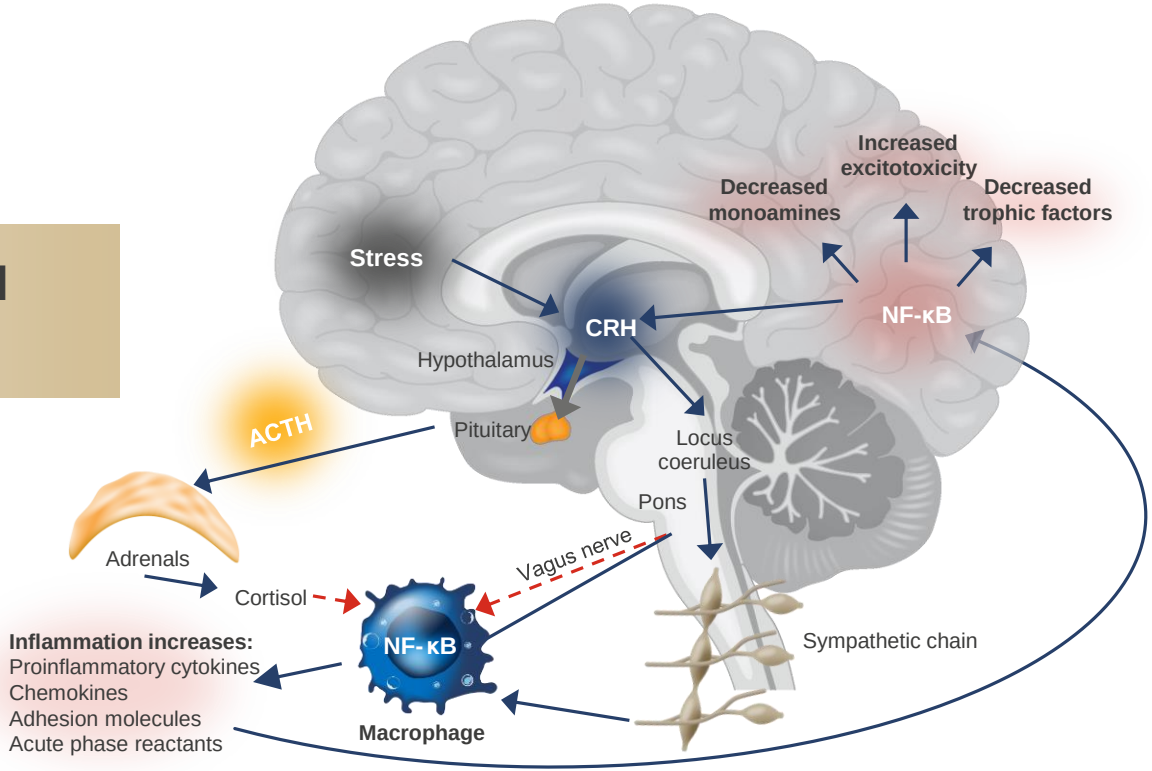
PAIN

ANXIETY

Hider SL, et al. *Rheumatology (Oxford)*. 2009;48(9):1152-1154.

The HPA Axis, Autonomic Nervous System, and Immune System are Interrelated

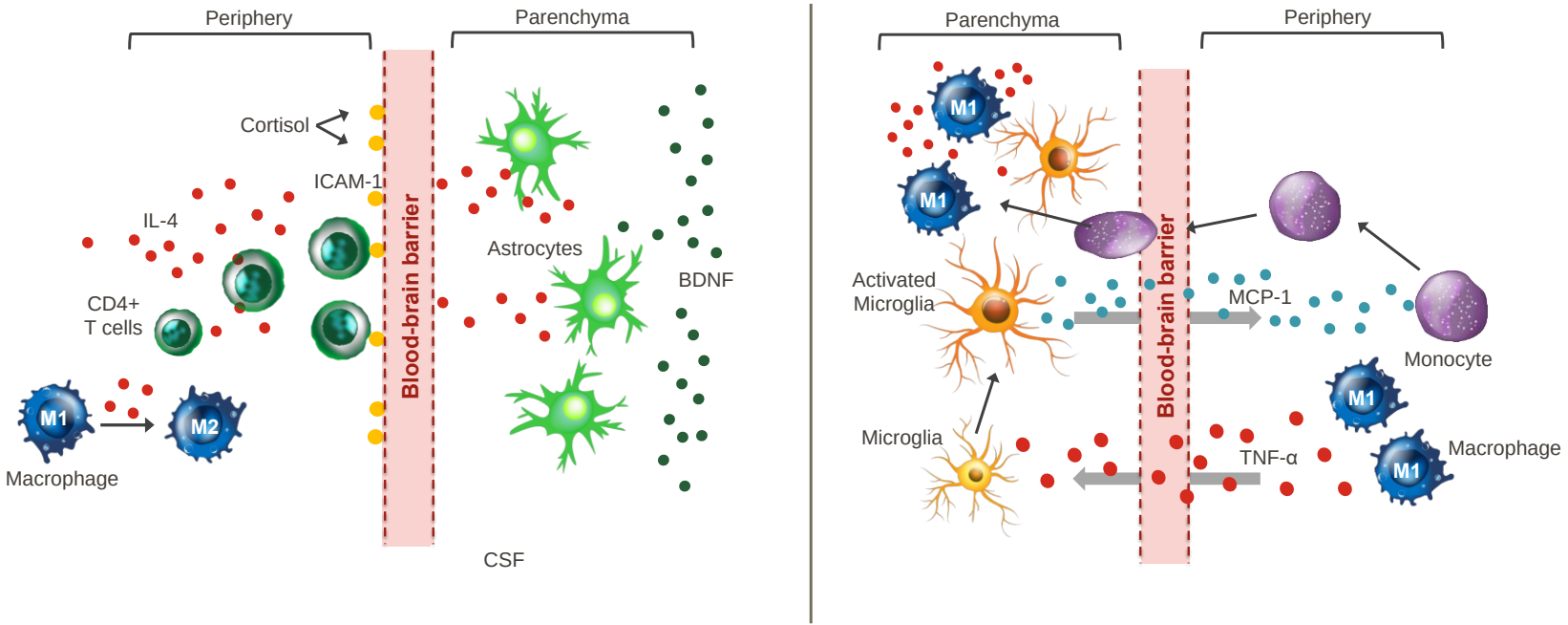
PNI involves a **bidirectional** relationship between the 3.



ACTH = adrenocorticotropic hormone; CRH = corticotropin-releasing hormone; HPA = hypothalamic-pituitary-adrenal; NF-κB = nuclear factor-kappa-B.

Miller AH, et al. *Biol Psychiatry*. 2009;65(9):732-741.

Stress State Enables Inflammatory Cytokines to Enter the Brain

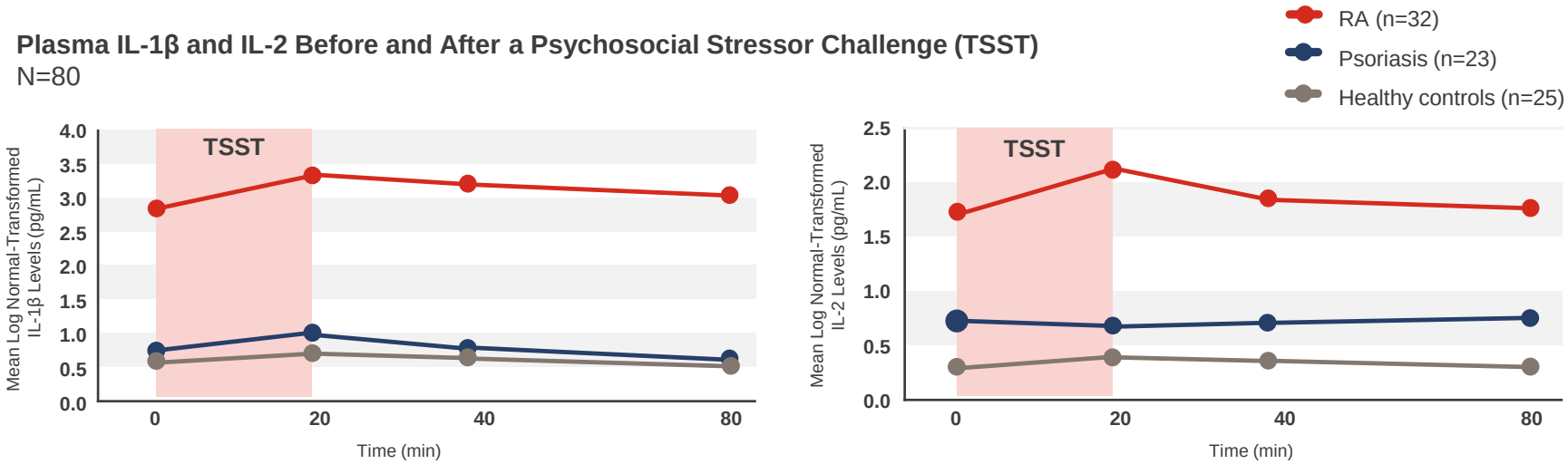


BDNF = brain-derived neurotrophic factor; CSF = cerebral spinal fluid; ICAM = intercellular adhesion molecule; IL = interleukin; MCP = monocyte chemotactic protein; TNF = tumor necrosis factor.

Haroon E. et al. *Neuropsychopharmacol*. 2012;37(1):137-162.

Immune Response to Stress in RA and Psoriasis

Plasma IL-1β and IL-2 Before and After a Psychosocial Stressor Challenge (TSST)
N=80



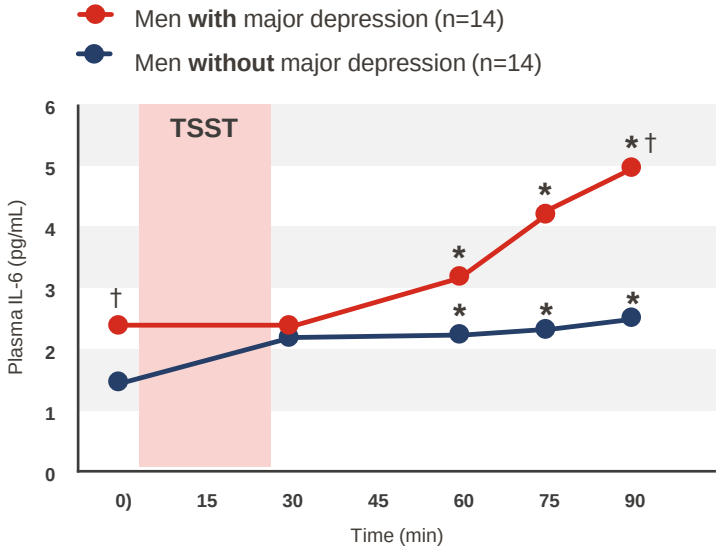
Patients with RA had significantly higher baseline and stress-induced* levels of IL-1β and IL-2 compared to patients with psoriasis and healthy controls.

Not only are levels of inflammation higher at baseline for patients with RA, inflammation further increases with stress.

*After correction for baseline.
TSST = Trier Social Stress Test.
De Brouwer SJ, et al. *Rheumatology (Oxford).* 2014;53(10):1844-1848.

Psychosocial Stress Can Induce an Inflammatory Response in Major Depression

Plasma IL-6 Levels Before and After a Psychosocial Stressor Challenge (TSST)



Participants with major depression had **increased early-life stress**‡

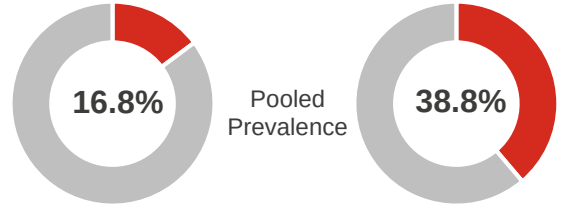
Participants with major depression had **significantly higher IL-6 levels** at baseline and 90 minutes after the stressor, as well as a greater IL-6 response to the stressor.

*P<0.05 vs baseline; †P<0.05 between groups; ‡On Childhood Trauma Questionnaire.
TSST = trier social stress test.
Pace TWW, et al. *Am J Psychiatry*. 2006;163(9):1630-1633.

Prevalence of Mental Health Disorders in Rheumatology Practices

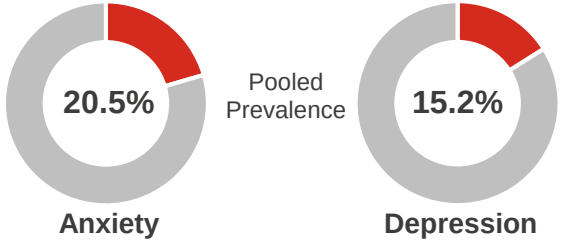
Rheumatoid Arthritis[1]

N=13,189



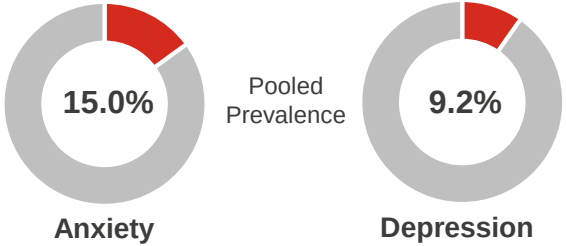
Inflammatory Bowel Disease[3]

N=158,371



Psoriatic Arthritis[2]

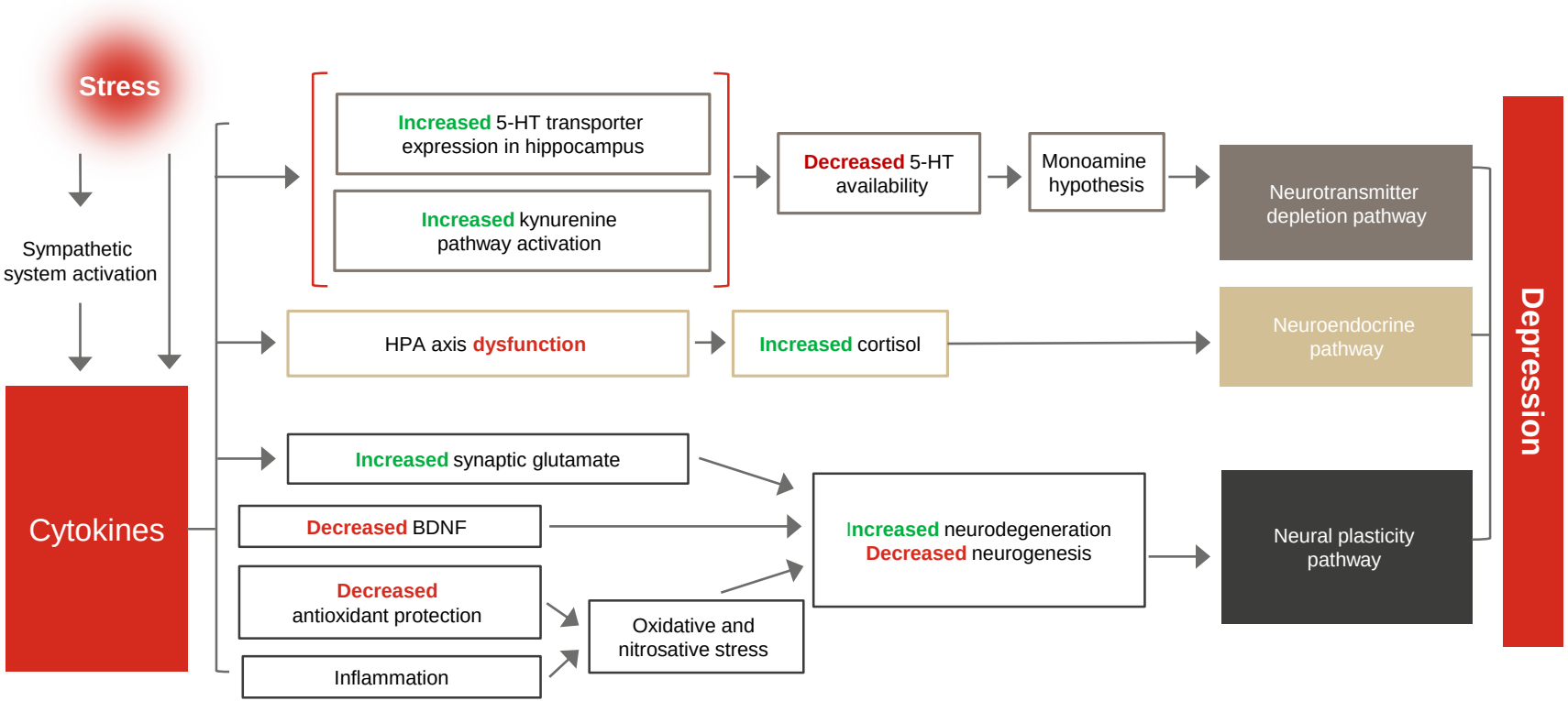
N=306



*Moderate or severe.

1. Matcham F, et al. *Rheumatology (Oxford)*. 2013;52(12):2136-2148.; 2. McDonough E, et al. *J Rheumatol*. 2014;41(5):887-896. 3.. Neuendorf R, et al. *J Psychosom Res*. 2016;87:70-80.

Bidirectional Relationship Exists Between Inflammatory Cytokine Levels and Depression

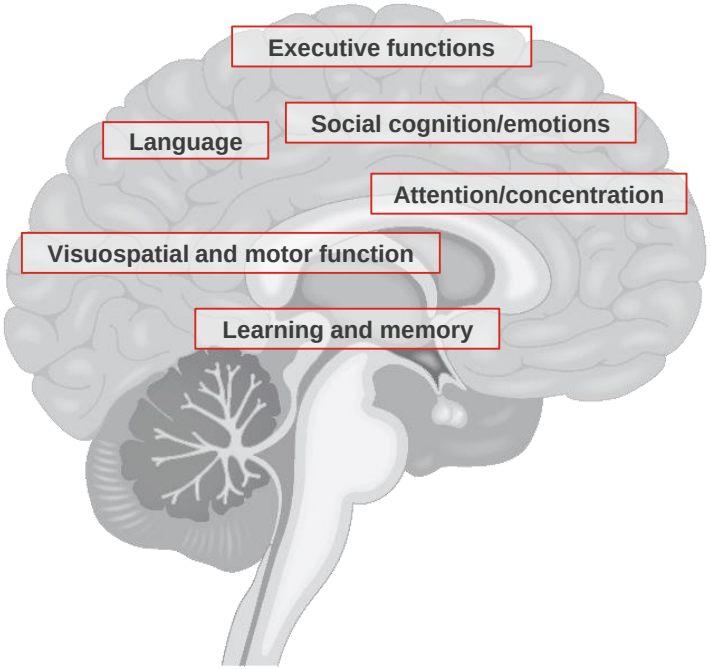


BDNF = brain-derived neurotrophic factor; HPA = hypothalmus-pituitary-adrenal; HT = hydroxytryptamine.

Jeon SW, Kim YK. *World J Psychiatry.* 2016;6(3):283-293.

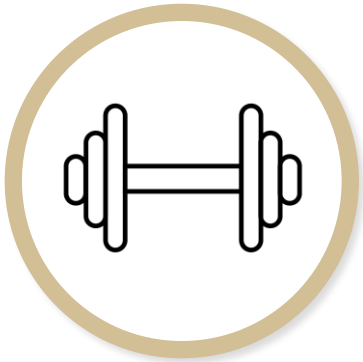
High Disease Activity is also Associated with Cognitive Impairment

- Independent association between high disease activity and cognitive impairment*[1]
  - Cognitive impairment affected all domains: visuospatial/executive, language, and abstraction
    RR 2.2, 95% CI: 1.07-4.7, P=0.033
    RA registry data, N=464. Disease activity measurement DAS28; functional impairment HAQ.
- Systematic review concluded that individuals with RA significantly underperform on cognitive function tests particularly in verbal function, memory and attention[2]
  Systematic review 15 studies, 10 with control groups.



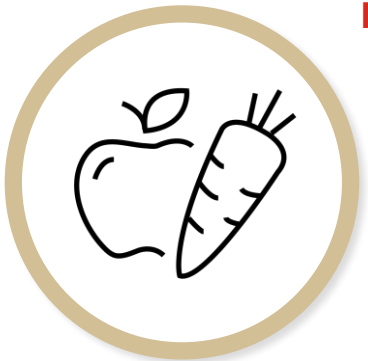
*Assessed using Thai version of Montreal Cognitive Assessment
DAS = disease activity score; HAQ = health assessment questionnaire; RR = relative risk
1. Katchamart W, et al. *Clin Rheumatol*. 2019. https://doi.org/10.1007/s10067-019-04488-3; 2. Meade T, et al. *Arthritis Care Res (Hoboken).* 2018;70(1):39-52.

Wellness Behaviors With Evidence Based Anti-Inflammatory Activity



Exercise

Sleep

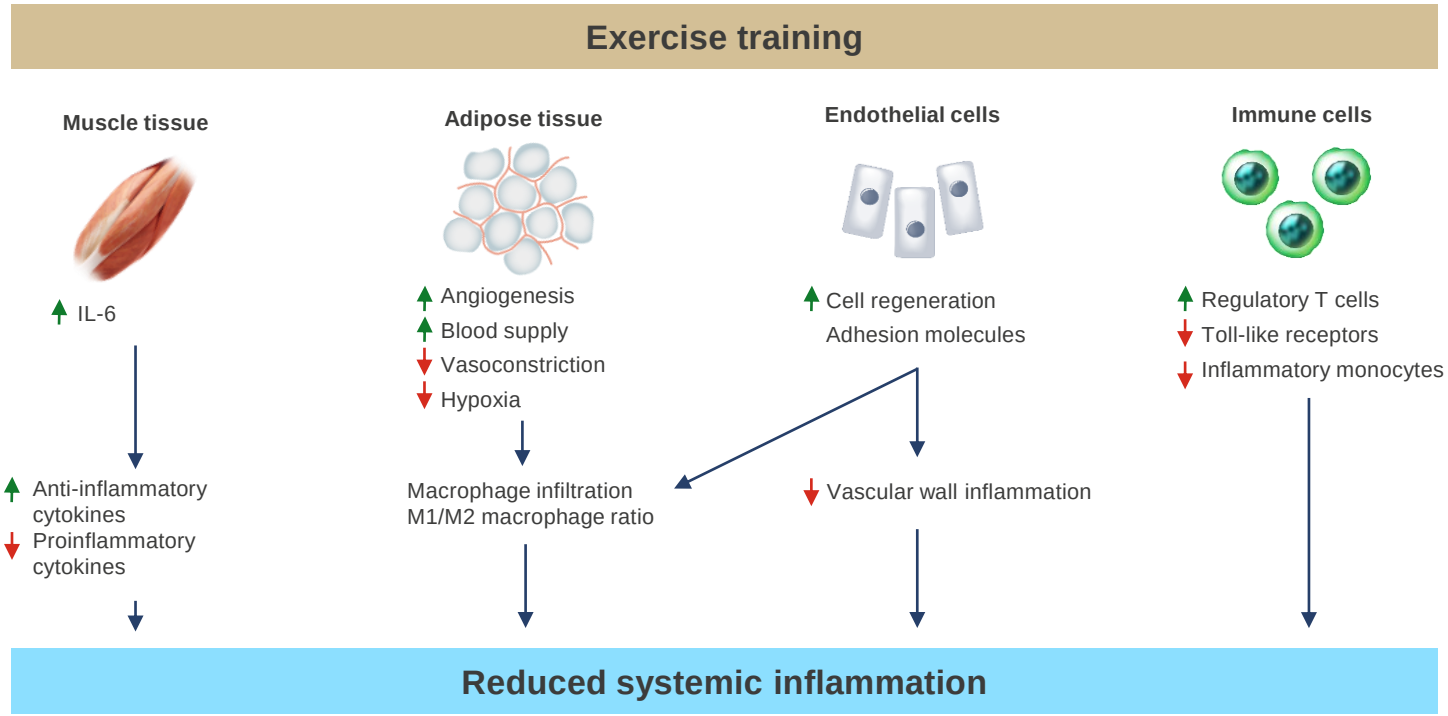


Nutrition

Mindfulness

Social Connectedness

Exercise Inhibits Proinflammatory Cytokines and Increases Anti-Inflammatory Cytokines



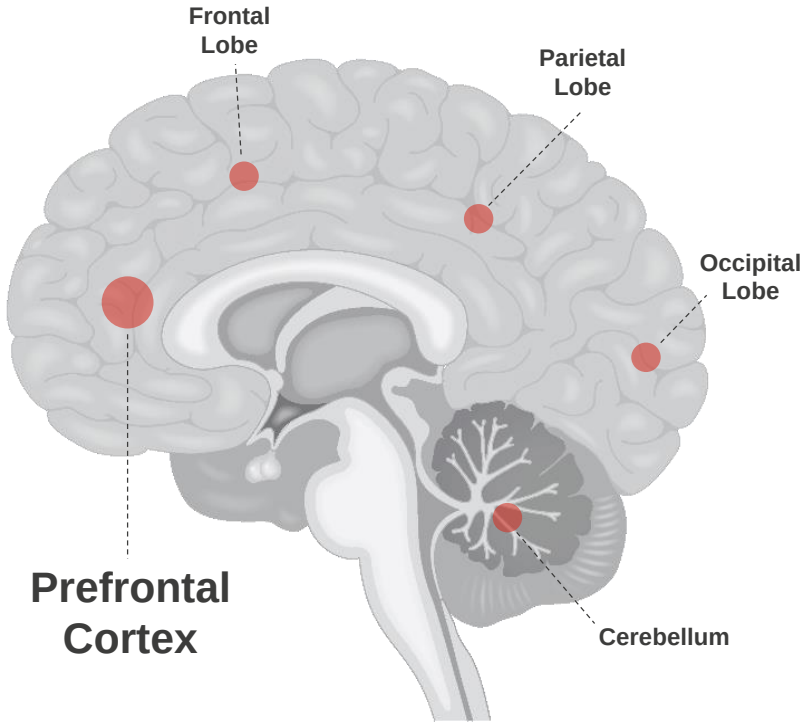
M1/M2 = proinflammatory/anti-inflammatory macrophage ratio.

You T, et al. *Sports Med*. 2013;43(4):243-256.

Exercise Increases Gray-Matter Volume and Brain Connectivity

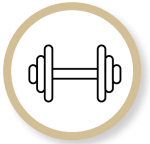
Physical activity increases gray and white matter volumes, particularly in t prefrontal and temporal regions.

- May activate frontal structures related to cognitive function and executive control processes
- Animal models show relationship to:
  - Enhanced neuroplasticity
  - ↑ of growth factors; with ↑ BDNF levels in the serum, plasma and CNS leading to changes in metabolic and neurotrophic function



BDNF = brain-derived neurotrophic factor; CNS = central nervous system..
Chieffi S, et al. *Front Neurol*. 2017;8:188.

Benefits of Exercise in RA



>10 randomized, controlled trials have demonstrated the benefits of exercise in RA patients.

The benefits of a general exercise program include:

- Improved cardiorespiratory fitness/ cardiovascular health
- Increased muscle mass
- Reduced adiposity (including attenuated trunk fat)
- Improved strength
- Physical functioning

This can be achieved without exacerbation of disease activity or joint damage.

Best Exercise Types for Joint Health

- Resistance training increases tendon stiffness and strengthens connective tissue
- Cyclic loading (e.g., walking, cycling, strength endurance exercises) enhances cartilage integrity and joint lubrication
- Mobility exercises increase range of motion

Cooney JK, et al. *J Aging Res*. 2011;2011:681640

Best Exercises for RA

Stretching.

- Reaching for the sky or toes – reduces stiffness and maintains range of motion
- Stretch and hold different muscles and joints for 10 to 20 seconds before releasing
- 10-15 mins, 2 days/week

Helps with:
flexibility, range of motion

Flowing movements.

- Tai chi and yoga combine deep breathing with gentle, flowing movements
- 10-15 mins, 2 days/week

Helps with:
flexibility, range of motion, balance, stress

Walking.

- Low-impact exercise helps joints, heart and mood
- Start off slow and increase the pace and distance safely over time
- 30-60 mins, 3-5 days/week

Helps with:
aerobic conditioning and mood

Work out in water.

- Reduces joint stress, provides natural resistance to increase aerobic capacity and strengthening
- 30-60 mins, 3-5 days/week

Helps with:
flexibility, range of motion, aerobic conditioning, strength

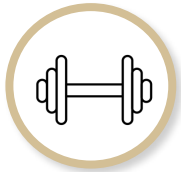
Cooney JK, et al. *J Aging Res*. 2011;2011:681640;

Best Exercises for RA

Cycling.

- Helps get the heart and joints moving and relieves stiffness
- 30-60 mins, 3-5 days/week

Helps with:
range of motion, aerobic conditioning, endurance, leg strength



Strength Training.

- Weight or strength training helps take stress off weakened joints by strengthening the muscles
- Use a resistance band to challenge the body and build muscles
- 8-12 reps/exercise, 2-3 sets, 2-3 days/week

Helps with:
strength, aerobic conditioning

Hand exercises.

- Bend the wrists up and down, slowly curling the fingers
- Spread fingers wide on a table or squeeze a stress ball
- Increases strength and flexibility in the hands

Helps with:
range of motion, flexibility

Cooney JK, et al. *J Aging Res*. 2011;2011:681640;

Sleep Disruption Impacts Clearance of Metabolites and Toxins

Normal Sleep

Increased intracellular ATP → Enhanced cellular repair mechanisms → **Decreased** inflammatory response → **Enhanced tau clearance**

Sleep Deprivation

Decreased intracellular ATP → Inhibited cellular repair mechanisms → Increased inflammatory response → **Cell Death and Increased tau accumulation**

Alters the dynamics within the brain:

- Altered neuronal function
- Neuronal cell death
- Tau accumulation → neurodegenerative disease

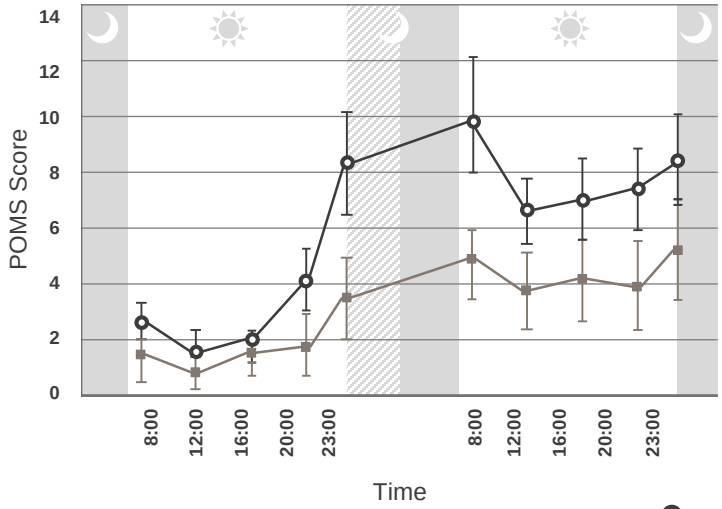
ATP = adenosine triphosphate.

Lucke-Wold BP, et al. *Neurosci Biobehav Rev*. 2015;55:68-77.

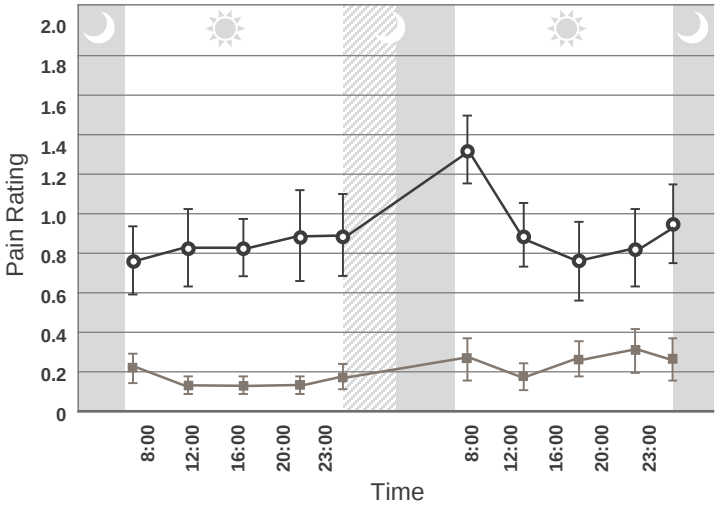
Sleep Deprivation Impacts RA-Related Symptoms

Effects of Partial Night Sleep Deprivation on Self-Reported Fatigue and Pain in Patients With RA

POMS Fatigue



McGill Pain Index (rates pain level)



Patients with RA (n=27)

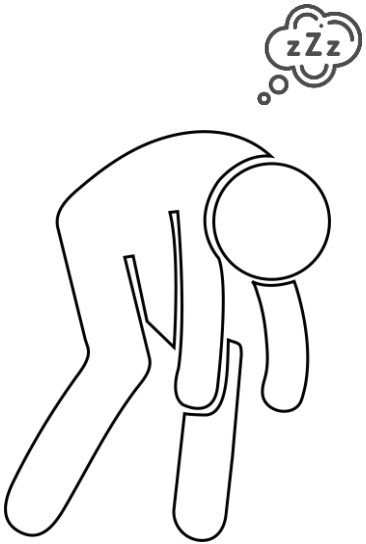
Controls (n=27)

Sleep deprivation interval

POMS = profile of mood states.

Irwin MR, et al. *Sleep*. 2012;35(4):537-543.

Sleep Hygiene Impacts Sleep Quality[1]



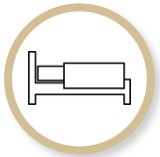
- Poor sleep is increasingly recognized as contributing to decreased quality of life, increased morbidity/mortality and heightened pain perception
- A subjective sleep assessment study identified the following in an RA patient population:[2]
  - sleep latency
  - sleep duration
  - sleep efficiency
  - daytime dysfunction
  - increased sleep-aid medication use

1. Sangani S, Baker JF. *Arthritis Rheumatol.* 2016;68 (suppl 10); 2. Taylor-Gjevre RM, et al. *Musculoskeletal Care*. 2011;9(3):152-9.

Sleep Hygiene Practices for Chronic Pain Sufferers

Have a regular schedule.

- As much as you can, go to sleep and get up at the same time every day, even on days off



Sleep when sleepy.

- Go to sleep when getting sleepy not when exhausted
- Getting into bed takes time and energy – it is harder to sleep when exhausted

Bed is for sleeping and relaxing.

- Avoid using phone, computer, tablet – read and relax

Nap.

- Lie down in the afternoon when possible; relax, listen to meditation music and rest the body/mind
- Over fatigue impacts sleep

Use sleep rituals that encourage sleep.

- These may include a heating pad, sleep herbs/aromatherapy, reading, relaxing music

Avoid caffeine, alcohol and nicotine

https://rheumatoidarthritis.net/living/the-magic-of-of-sleep-hygiene-and-where-it-fails/. Accessed Feb 15, 2019.

Implement Sleep Hygiene Practices – Different Experiences for Chronic Pain Sufferers

Warm bath or shower.

- Helps relax; one to two hours before bed

Don’t watch the clock.

- Watching the clock causes stress

Use a sleep diary.

- Helpful to track sleep habits and understand what may be impeding sleep

Exercise regularly.

- Not close to bed time, but it is important to move every day

Eat right.

- Don’t go to bed hungry
- Don’t have a heavy meal close to bedtime

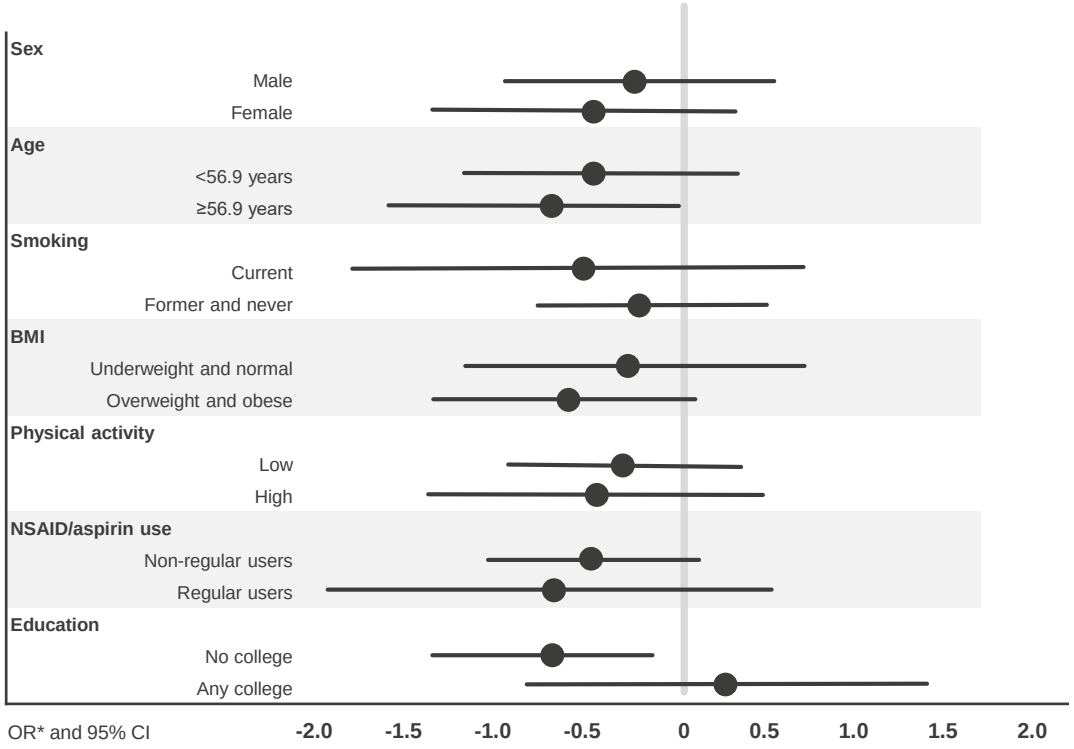
Keep bedroom cool, and dark.

- Helps circadian rhythm to encourage sleep

https://rheumatoidarthritis.net/living/the-magic-of-of-sleep-hygiene-and-where-it-fails/. Accessed Feb 15, 2019.

Mediterranean Diet and Inflammation

Associations of the Mediterranean Diet Scores With Plasma hsCRP Concentration



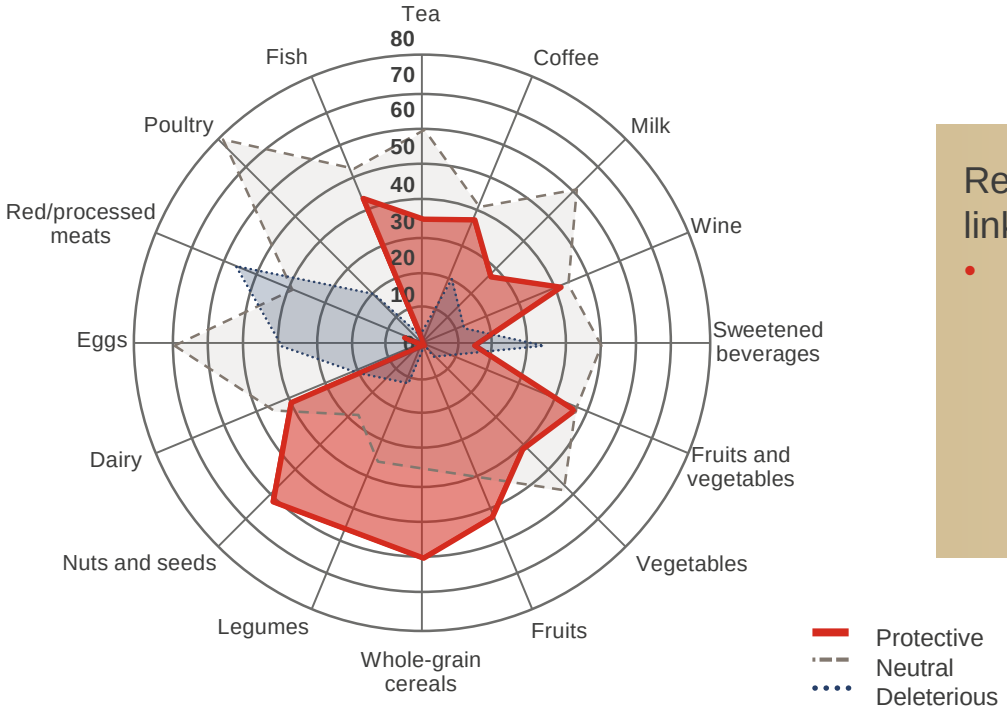
Diets that are Mediterranean-like may be associated with lower levels of systemic inflammation.

Pooled cross-sectional study of an elective outpatient colonoscopy population (N=646)

*Transformed by natural logarithm.
CI = confidence interval; hsCRP = high-sensitivity C-reactive protein; NSAID = nonsteroidal anti-inflammatory drug; OR = odds ratio.
Whalen KA, et al. *J Nutr*. 2016;146(6):1217-1226.

Are We What We Eat?

Radar Plots for Food Groups and Beverages vs Number of References
(percentages from 0-100% are shown on concentric circles)



Review of 304 studies examining the link between nutrition and **chronic disease.**

- **Plant food groups are more protective** than animal food groups against diet-related chronic diseases (obesity, type 2 diabetes, mental health disorders, skeletal disorders, cardiovascular diseases, and cancers)

Fardet A, Boirie Y. *Nutr Rev*. 2014;72(12):741-762.

Anti-Inflammatory Diet Plays an Important Role in RA management

- Benefits of omega-3 fatty acids and monounsaturated fatty acids (components of Mediterranean diet) in controlling disease activity have been shown in multiple clinical trials.[1]
- Mediterranean diet shows anti-inflammatory effects due to protective properties of omega-3 polyunsaturated fatty acids, monounsaturated fatty acids, and vitamins, but also by influencing the gut microbiome.[2]

Mediterranean diet

- Daily monounsaturated fatty acid intake was an independent predictor of remission in RA
- Related to decreases in disease activity scores (DAS28-ESR).[3]
  - **OR 1.97; 95% CI, 0.98-3.98; P=0.057**

    Prospective TOMORROW cohort study: 208 patients with RA and 205 matched healthy controls; food intake assessed using self-administered diet history questionnaire

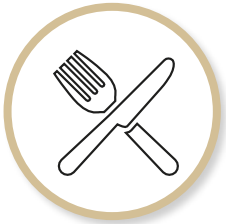
CI = confidence interval; DAS28-ESR = disease activity scores in 28 joints and erythrocyte sedimentation rates; OR = odds ratio.

1. Cutolo M, Nikiphorou E. *RMD Open* 2018;4:e000591; 2. Badsha H. *Open Rheumatol J.* 2018;12:19-28.; 3. Matsumoto Y, et al. *Clin Nutr.* 2018;37(2):675-680.

Information for Patients Regarding Diet

Recommended anti-inflammatory food chart

Fruits	Dried plums, grapefruits, grapes, blueberries, pomegranate, mango (seasonal fruit), bananas, peaches, apples
Cereals	Whole oatmeal, whole wheat bread, whole flattened rice
Legumes	Black soybean, black gram
Whole Grains	Wheat, rice, oats, corn, rye, barley, millets, sorghum, canary seed
Spices	Ginger, turmeric
Herbs	Sallaki, ashwagandha
Oils	Olive oil, fish oil, borage seed oil (in encapsulated form)
Miscellaneous	Yogurt (curd), green tea, basil (tulsi) tea



Eat a balanced diet –

- Plenty of fruit, vegetables and whole grains
- Get enough protein from lean meat, do not go overboard – aim for fish more often than other kinds of protein
- Include almonds and other nuts, which provide healthy fats

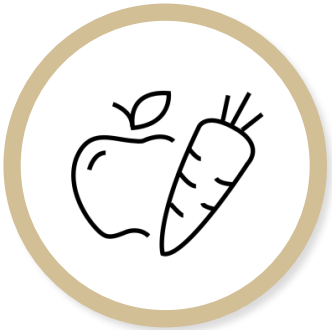
These foods will help provide patients with vitamins A, C and E, which can be important in targeting systemic inflammation.

Khanna S, et al. *Front. Nutr.* 2017;4:52.

Information for Patients Regarding Diet

Fish Oils and Omega-3 fatty acids

- Have shown modest benefit on joint swelling and pain, duration of morning stiffness, global assessment of pain and disease activity
- Natural sources are oily fish: mackerel, sardines, herring, salmon, trout and fresh tuna (not tinned tuna)



Fruits, Vegetables and Antioxidants

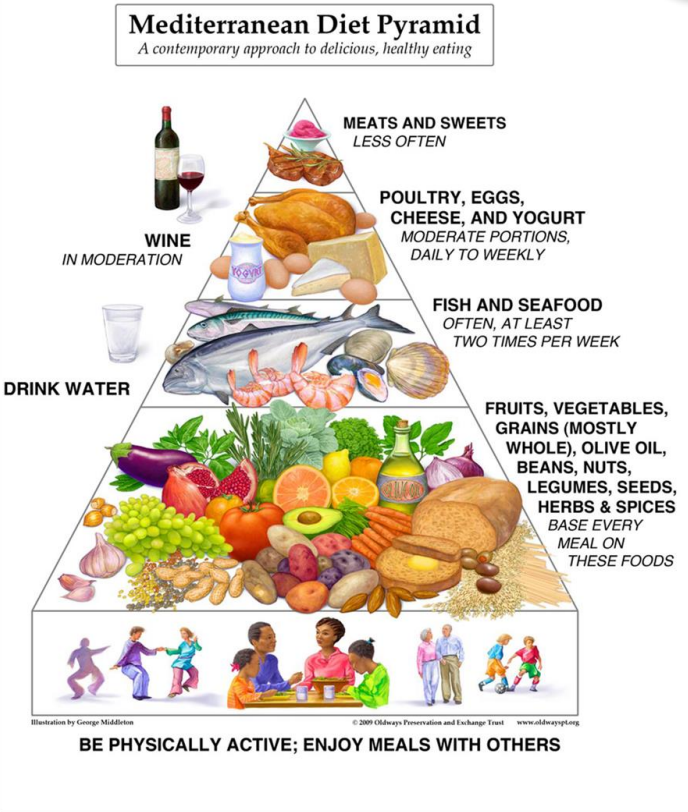
- Antioxidants are found extensively in fruits and vegetables, particularly brightly coloured varieties such as oranges, apricots, mangos, carrots, peppers/capsicums, and tomatoes

Mediterranean Diet

- Includes daily intake of fresh fruits and vegetables, nuts, beans/pulses/grains, olive oil, wholegrain cereals and regular oily fish and poultry consumption
- Contains omega-3 fats, olive oil, antioxidants, dairy products and unrefined carbohydrates

Statistically significant clinical benefits in reduced disease activity and RA symptoms (improved SF-36 health survey) in patients who followed a Mediterranean diet (n=26) for 3 months compared with those who followed their usual diet (n=25).[2]

- **↓DAS28 0.56 (P<0.001), ↓ HAQ 0.15 (P=0.020)**

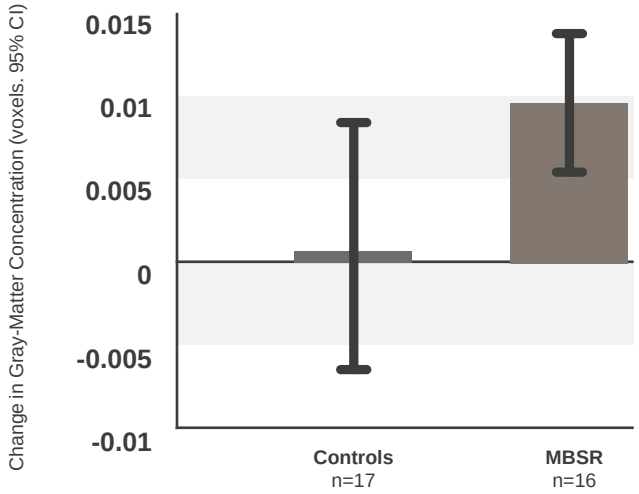


DAS = disease activity score; HAQ = health assessment questionnaire; SF-36 = short-form-36 health survey.

1. Cutolo M, Nikiphorou E. *RMD Open.* 2018;4:e000591; 2. Skölldsam L, et al. *Ann Rheum Dis.* 2003;62(3):208–14.

Volumetric Changes in the Hippocampus With 8 Weeks of Mindfulness-Based Therapy

Change in Gray-Matter Concentration in the Left Hippocampus



- **Mindfulness-based stress reduction (MBSR) associated with changes in gray-matter concentration**
- Observed in brain regions involved in learning and memory processes, emotion regulation, self-referential processing, and perspective taking

CI = confidence interval.
Hölzel BK, et al. *Psychiatry Res*. 2011;191(1):36-43.

Meditative Practice and Therapeutic Benefits in Chronic Inflammatory Conditions

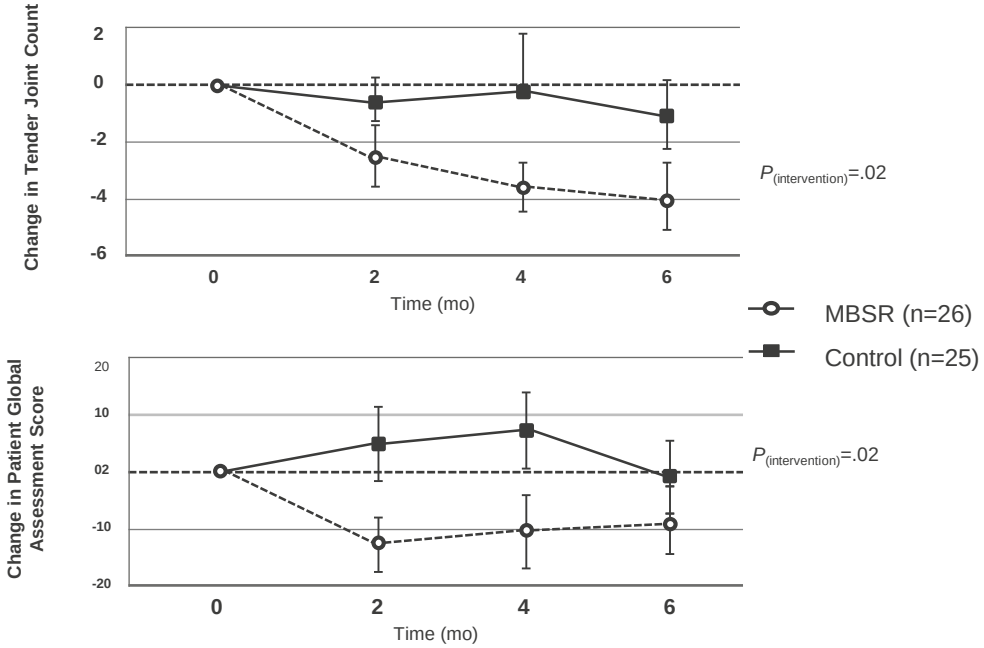
- Compared to meditation-naïve participants (n=37), long-term meditators (n=31) had:
  - **Significantly lower** stress-evoked cortisol ($P<0.05$), perceived stress ($P<0.01$), and smaller neurogenic inflammatory response ($P<0.05$)
- Long-term meditators also reported higher levels of psychological factors associated with well-being and resilience

Long-term meditation practice may reduce stress reactivity and have therapeutic benefit in chronic inflammatory conditions characterized by neurogenic inflammation.

Rosenkranz MA, et al. *Psychoneuroendocrinol*. 2016;68:117-125.

Mindfulness Can Positively Impact Disease Activity Measures in RA

Effect of Mindfulness-Based Stress Reduction (MBSR) on Disease Activity in Patients With RA



These results may offer clinicians preliminary evidence for the utility of mindfulness-based interventions to help reduce disease activity (tender joints and patient global assessment).*

*Results were not statistically significant for swollen joint count and CRP.
CRP = C-reactive protein.
Fogarty FA, et al. *Ann Rheum Dis.* 2015;74(2):472-474.

Mindfulness Meditation: Primer for Rheumatologists

Mindfulness encompasses

1. holding one's attention in the present moment
2. maintaining an attitude of acceptance, openness, and non-judgment

Reperceiving– mindfulness facilitates a fundamental shift in perspective

- After 8 weeks of training, self-reported pain significantly improved regardless of intervention (CBT vs. mindfulness training vs. disease education)[1]
- Supporting the importance of any discussion/focus on disease understanding impacting pain

  N=144 patients with RA clustered into groups of 6-10 people and assigned to 1 of 3 treatments

CBT = cognitive behavioral therapy.

1. Young LA. *Rheum Dis Clin North Am.* 2011;37(1):63–75

Practicing Mindfulness: Tips

Take time to be still.

- Sit quietly in purposeful thought (meditate) and reflection each day
- Avoid filling time with activities

Slow down, eat mindfully.

- Enjoy the sight, taste and smell of food - it allows for easier digestion

Focus on one task at a time.

- Practice moment-to-moment awareness in everyday activities

Stop, just breathe.

- Take frequent breaks and breathe deeply several times during the day
- Fosters calmness and focus

Listen well – to everyone.

- Listen actively and mindfully to coworkers, family members and friends
- Strong relationships form a strong support network

https://health.clevelandclinic.org/practice-mindfulness-to-improve-your-well-being-11-tips/. Accessed February 15, 2019.

Practicing Mindfulness: Tips

Appreciate the world around you.

- Take a walk, use your senses to enjoy what surrounds you

Practice gratitude.

- Write down 5 things you are grateful for 3 times per week

Feed your body well.

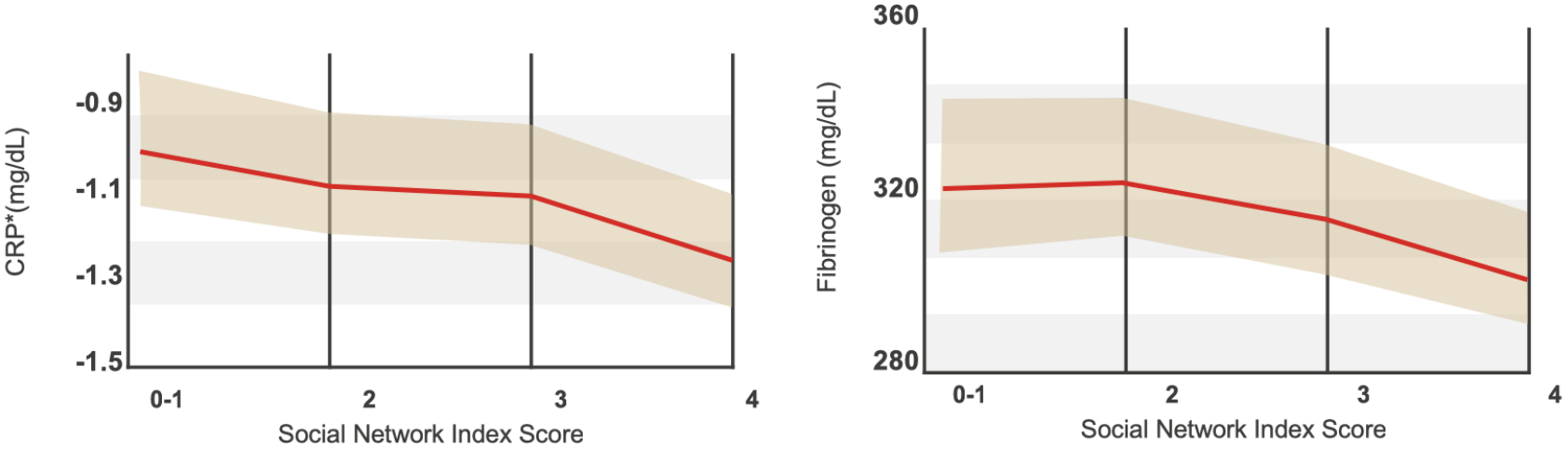
- Choose seasonal, colorful produce packed with healthy phytonutrients

Prepare for bed.

- Soothe yourself at the end of each day
- One hour before bed, dim the lights, set aside the electronics, take a warm bath, read

Social Network Ties and Inflammation

Predicted Values of Inflammatory Markers by Social Network Index Score in Adults With History of Cancer
N=1075



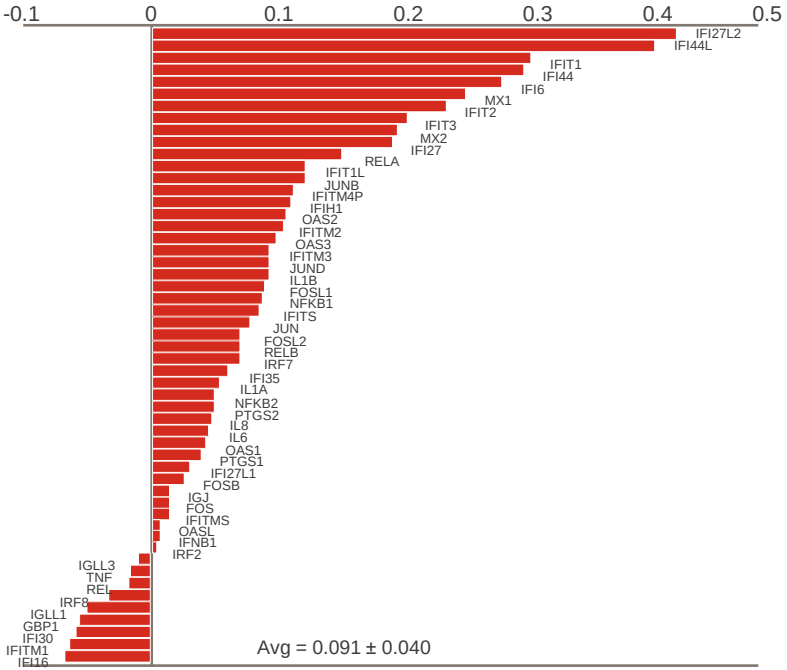
Lower Social Network Index scores were associated with greater inflammation marked by CRP (P=0.028), fibrinogen (P=0.038), and albumin.‡

*Transformed by natural logarithm;‡Not statistically significant.
CRP = C-reactive protein.
Yang YC, et al. *Biodemography Soc Biol*. 2014;60(1):21-37.

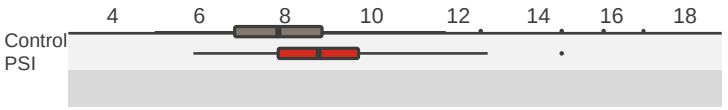
Effect of Loneliness and Social Isolation

Differential CTRA Gene Expression

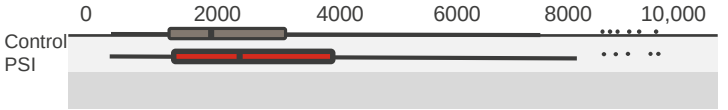
(Perceived Social Isolation (PSI) vs control, SD units)



Monocytes
(% WBC)



Norepinephrine
(ng/dL)



Epinephrine
(ng/dL)

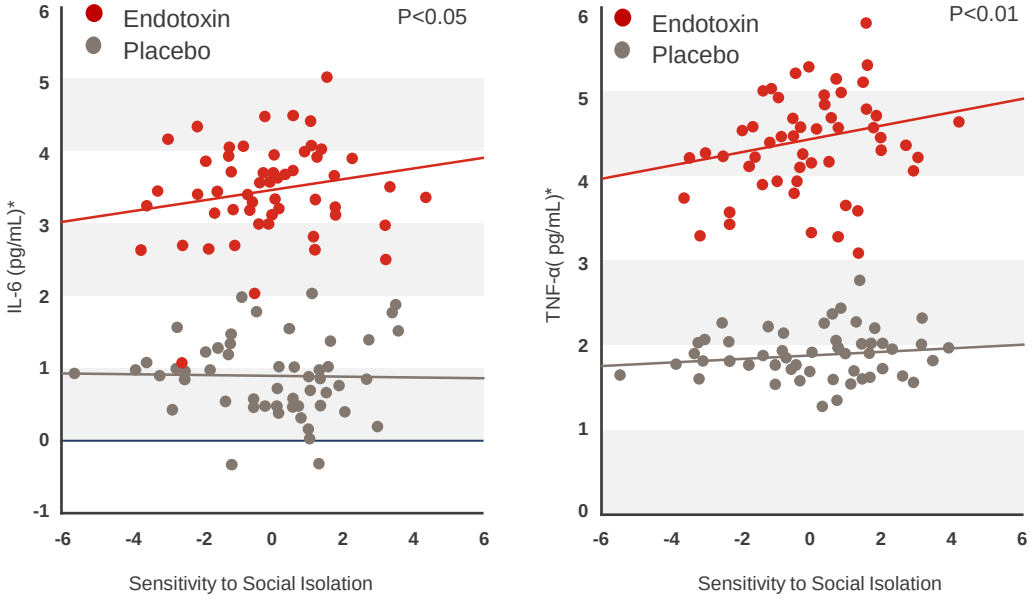
Cortisol
(ng/dL)

CTRA = conserved transcriptional response to adversity; PSI = perceived social isolation; WBC = white blood cell.

Cole SW, et al. *Proc Natl Acad Sci USA.* 2015;112(49):15142-15147.

Social Isolation May Be Associated With Enhanced Inflammatory Response to Stress

Relationship Between Sensitivity to Social Disconnection and TNF-α or IL-6 Response to Endotoxin



*Cytokine values (pg/mL) transformed and plotted on a natural log scale.
Moieni M, et al. *Psychoneuroendocrinology*. 2015;62:336-342.

Greater sensitivity† to social isolation was related to increased inflammation in response to endotoxin.

Found for both proinflammatory cytokines and multiple gene transcripts.

†composite score comprised of loneliness, anxious attachment, fear of negative evaluation, and rejection sensitivity

Social Connections are Important to Fostering Wellness

fMRI data shows correlation between the quality and quantity of social networks tied with functional connectivity (motor, vision, speech) in the prefrontal cortex.[1]

- Studies also support that increased social networks are associated with enhanced mental and physical health

Harvard's Grant and Glueck 75 year study, found that good relationships keep us happier and healthier.[2]

- Importantly, having someone to rely on helps the nervous system relax, the brain stay healthier for longer, and reduces both emotional as well as physical pain

1. Pillemer S, et al. *Soc Neurosci.* 2017;12:242-252; 2. https://www.adultdevelopmentstudy.org/grantandglueckstudy.

Social Connections are Important to Fostering Wellness

Tips to increase Social Connectedness

Volunteer.

- Get involved with your community or a cause you are passionate about

Connect with a pet.

- Social connectedness does not need to be interacting with humans only

Resolve conflicts.

- Take care of disagreements, avoidance and escalation cause stress

Join a group.

- Choose a hobby and become engaged in a group to move to the next level of the craft

Be less critical of yourself and others in social situations.

Social Connections are Important to Fostering Wellness

Tips to increase Social Connectedness

Practise looking more confident.

- Maintain eye contact and appear interested and engaged

Seek out groups on social media.

- People who share similar interests and values (but don't spend all your time here –physical connection is important)

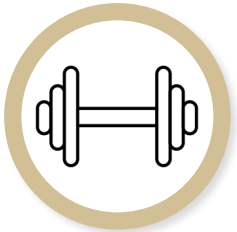
If you feel nervous, take a friend or family member with you to social gatherings.

Nurture friendships.

- Catch up with some old friends

Don't avoid social situations.

Anti-Inflammatory Wellness Behavior Examples



EXERCISE

Exercise **30 minutes daily**; aim for at least **moderate** intensity

Implement **sleep hygiene** practices daily

Log your daily meals/snacks/beverages/alcohol

Practice mindfulness for at least **8 minutes daily**

Call a friend or family member daily

Jain S, et al. Presented at: 29th Annual US Psychiatric and Mental Health Congress; October 2016; San Antonio, Texas.

Anti-Inflammatory Wellness Behavior Examples

Exercise **30 minutes daily**; aim for at least **moderate** intensity

SLEEP

Implement **sleep hygiene** practices daily

Log your daily meals/snacks/beverages/alcohol

Practice mindfulness for at least **8 minutes daily**

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Exercise **30 minutes daily**; aim for at least **moderate** intensity

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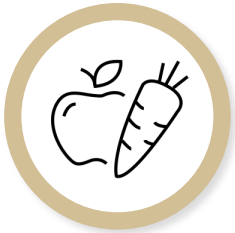

NUTRITION

Log your daily meals/snacks/beverages/alcohol

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MINDFULNESS

Practice mindfulness for at least **8 minutes daily**

Call a friend or family member daily

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Anti-Inflammatory Wellness Behavior Examples

Exercise **30 minutes daily**; aim for at least **moderate** intensity

Implement **sleep hygiene** practices daily

Log your daily meals/snacks/beverages/alcohol

Practice mindfulness for at least **8 minutes daily**

SOCIAL CONNECTEDNESS

Call a friend or family member daily

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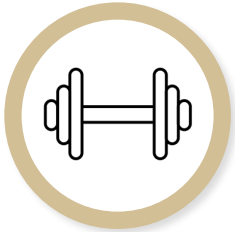
Anti-Inflammatory Wellness Behavior Implementation Suggestions



Exercise

Exercise **30 minutes daily**;
aim for at least **moderate** intensity

Mindfulness

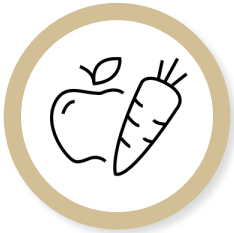
Practice mindfulness for at least **8 minutes daily**

Sleep

Implement **sleep hygiene** practices daily

Social Connectedness

Call a friend or family member daily



Nutrition

Log your daily meals/snacks/beverages/alcohol

Jain S, et al. Presented at: 29th Annual US Psychiatric and Mental Health Congress; October 2016; San Antonio, Texas.

Wellness is Not Merely the Absence of Illness

- **Overlap exists** between wellness, stress, and inflammation
- The HPA axis, **nervous** and **immune systems** have a **bidirectional** relationship with inflammation
- Stress leads to an elevated cytokine response
- Positive affect may be associated with lower levels of inflammation
- Scientific evidence proves that the 5 wellness behaviors exert protective **anti-inflammatory effects**

HPA = hypothalamic-pituitary-adrenal axis; ANS = autonomic nervous system.
WHO Constitution. www.who.int/about/who-we-are/constitution.

Resources

Best Exercises for RA

BEST EXERCISES FOR RA

STRETCHING. Recommend reaching for the sky or the toes – to reduce stiffness and maintain the range of motion: stretch and hold different muscles and joints for 10 to 20 seconds before releasing: repeat 10–15 mins, 2 days/week.

HELPS WITH:
flexibility, range of motion

WALKING. Walking is a low-impact exercise that helps joints, heart and mood. Recommend to start off slow and increase the pace and distance safely over time: 30-60 mins, 3-5 days/week.

HELPS WITH:
aerobic conditioning and mood

FLOWING MOVEMENTS, such as tai chi and yoga combine deep breathing, gentle, flowing movement, poses and meditation: repeat 10–15 mins, 2 days/week.

HELPS WITH:
flexibility, range of motion, balance, stress

CYCLING. Helps get the heart and joints moving and relieves stiffness: 30-60 mins, 3-5 days/week.

HELPS WITH:
range of motion, aerobic conditioning, endurance, leg strength

STRENGTH TRAINING. Weight or strength training helps take stress off weakened joints by strengthening the muscles. Using a resistance band is a good way to challenge the body and build muscles: 8–12 reps/exercise, 2–3 sets, 2–3 days/week.

HELPS WITH:
strength, aerobic conditioning

WORK OUT IN WATER. Reduces joint stress, reduce stiffness (warm water), provides natural resistance to increase aerobic and strengthening workout: 30-60 mins, 3–5 days/week.

HELPS WITH:
flexibility, range of motion, aerobic conditioning, strength

HAND EXERCISES. Bending the wrists up and down, slowly curling the fingers, spreading the fingers wide on a table, and squeezing a stress ball can help increase strength and flexibility in the hands.

HELPS WITH:
aerobic conditioning and mood

Lilly

Cooney JK, et al. *J Aging Res*. 2011; 2011: 681640

Practicing Mindfulness: Tips

PRACTICING MINDFULNESS: TIPS

- Take time to be still. Sit quietly in purposeful thought (meditate) and reflection each day. Avoid filling time with activities.
- Slow down, eat mindfully. Enjoy the sight, taste and smell of food, it allows for easier digestion.
- Focus on one task at a time. Practice moment-to-moment awareness in everyday activities.
- Listen well – to everyone. Listen actively and mindfully to coworkers, family members and friends. Strong relationships form a strong support network.
- Stop, just breathe. Take frequent breaks and breathe deeply several times during the day. Fosters calmness and focus.
- Appreciate the world around you. Take a walk, use your senses to enjoy what surrounds you.
- Practice gratitude. Write down 5 things you are grateful for 3 times per week.
- Feed your body well. Choose seasonal, colourful produce packed with healthy phytonutrients.
- Prepare for bed. Soothe yourself at the end of each day. One hour before bed, dim the lights, set aside the electronics, take a warm bath, read.

Implement Sleep Hygiene Practices – Different Experiences for Chronic Pain Sufferers

IMPLEMENT SLEEP HYGIENE PRACTICES – DIFFERENT EXPERIENCES FOR CHRONIC PAIN SUFFERERS

- Have a regular schedule. As much as you can, go to sleep and get up at the same time every day, even on days off.
- For people in pain – any minute of wasted sleep matters – sleep lowers pain and fatigue and will help improve sleeping the next night
- Sleep when sleepy. Go to sleep when getting sleepy not when exhausted - the act of getting into bed takes time and energy – it is harder to sleep when exhausted.
- Avoid caffeine, alcohol and nicotine.
- The bed is for sleeping and relaxing. Avoid using phone, computer, tablet –read and relax. Nap.
- Lie down in the afternoon when possible, relax, listen to meditation music and rest the body/ mind. Over fatigue impacts sleep.
- Use sleep rituals that encourage sleep. These may include a heating pad, sleep herbs, reading, relaxing music.
- Use a warm bath or shower to relax, one or two hours before bed.
- Don't watch the clock. Watching the clock causes stress.
- Use a sleep diary. Helpful for some to track their habits and understand what may be impeding their sleep.
- Exercise regularly. Not close to bed time, but it is important to move every day.
- Eat right. Don't go to bed hungry and don't have a heavy meal close to bedtime.
- Keep bedroom cool, and dark. Helps circadian rhythm to encourage sleep.

Sangani S, et al. *Arthritis Rheumatol.* 2016;68 (suppl 10); Taylor-Gjevre RM et al. *Musculoskeletal Care*. 2011;9(3):152-9.

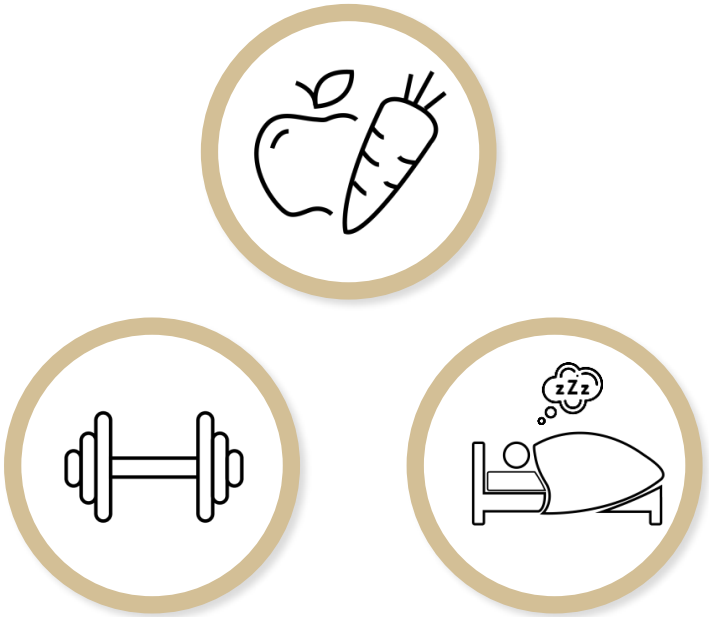
Social Connections are Important to Fostering Wellness

SOCIAL CONNECTIONS ARE IMPORTANT TO FOSTERING WELLNESS

TIPS TO INCREASE SOCIAL CONNECTEDNESS

- Volunteer
- Join a group (e.g. book club, neighbourhood club, painting group or environmental group) Choose a hobby and become engaged in a group to move to the next level of the craft
- Nurture friendships. Catch up with some old friends.
- Connect with a pet. Social connectedness does not need to be interacting with humans only.
- Resolve conflicts. Take care of disagreements, avoidance and escalation cause stress.
- Practise looking more confident – maintain eye contact and appear interested and engaged
- Seek out groups on social media who share similar interests and values (but don't spend all your time here –physical connection is important)
- Be less critical of yourself and others in social situations
- Don't avoid social situations
- If you feel nervous, take a friend or family member with you to social gatherings

Three-Component Lifestyle Modification Programme to Improve Disease Outcomes in RA



- Low-fat low-sodium Mediterranean diet rich in fruits, vegetables, whole grains and nuts and poor in sugar-sweetened beverages, red and processed meat and trans fats, and the supplementation with omega-3 fatty acids, non-essential amino acids and probiotics
- Appropriate physical activity programme based on an active daily lifestyle, aerobic exercise and resistance training
- Adequate sleep hygiene and smoking reduction/cessation

Chehade L, et al. *Curr Rheumatol Rev*. 2019 Jan 21.