Evidence Informed Basis for Integrating Yoga into Cancer Care

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Objectives

Review: What is Yoga?

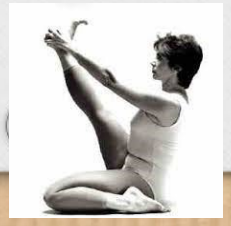
Hypothesize: Yoga Mechanisms of Action

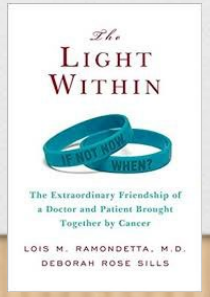
Discuss: Applications and NCCN Guidelines

Experience: Pranayama Practice

Who Am I?

- Gynecologic Oncologist-28 years
- Practicing “wannabe” Yogi-always learning, always learning
  - Courses/festivals (Shridhar/White), SVADHYAYA-self study
- Yoga Teacher 200hr & 300hr Certification-2017- 2019
- American College Lifestyle Medicine Diplomat 2020
- Yoga Therapist 1000 hr SVYASA- 2021
  - Swami Vivekananda Yoga Anusandhana Samsthana (SVYASA) USA established in 1999 Bangalore, India





Comprehensive Yoga Therapy Based Lifestyle Prehabilitation Program for Women with Ovarian Cancer: Protocol Number: 2024-0374

Primary Objective:

To assess the feasibility of a CYT prehabilitation program in women with ovarian cancer scheduled to receive NACT and IDS.

Feasibility criteria -1-percent eligible pts who consent (feasibility defined as 30% of those approached and are eligible end up consenting)
2- study retention by last follow-up (feasibility defined as 60% of those undergoing surgery remaining in the study).

Secondary Objectives

1. Examine effects of CYT program on physical conditioning as assessed by 2-minute step test (2MST) and sit to stand (30secSTS) c/w WLC.
2. Examine group differences in surgical outcomes incl. post op stay, readmission rate, post op morbidity, surgical site infection rate, and time to 1st post op chemotherapy
3. Examine group differences in PROs including QOL, fatigue, stress, sleep disturbances, mental health, social support, and mindfulness.
4. Examine if there are group differences in preoperative albumin level, vit D, magnesium levels.
5. Examine group differences and changes over time in microbiome biodiversity.
6. Examine group differences in body composition (sarcopenia) as measured by routine abdominal CT scans.
7. Explore association between adherence to CYT with ability to sustain behavior changes and between changes in lifestyle parameters with outcomes.

Why a lecture about yoga and cancer care?

- Plenty of data about exercise as a preventative of chronic disease and in some cases cancer as well as an integral part of the treatment for mood disorders
  - Yoga is a form of exercise
- Plenty of data about how QOL is linked to cancer outcomes (early intervention/adherence?)
  - Yoga improves QOL
- Plenty of data about stress and depression as risks for illness and poor cancer outcomes
  - Yoga can reduce stress
- Limited approved (and effective) pharmacologic options for side effects of cancer therapies (neuropathy, arthralgias, insomnia)
  - Yoga data supports incorporating
- Integrative, palliative and psychology staff are in short supply and wait times long
  - Many cognitive therapists tend to work only above the neck
  - Yoga is a whole person approach
- Yoga Teachers/Yoga Therapists employed by hospitals and it's important to know data
  - Integrative therapies cost money---patients are vulnerable

Yoga is more than exercise….

- Yoga, in its simplest form, permits continued ADLs
  - twisting/turning/balancing, reaching and breathing
- Yoga encourages embodiment (internal perception)
  - Embodiment helps with emotional regulation, healthy decision-making
- Yoga empowers with words, symbolism and philosophy
  - Yoga stresses continued effort with equanimity
  - Yoga, like Frankl's Logotherapy, may help some discover meaning
    - Creating, experiencing, influencing attitude
- Yoga is an antidote to stress
  - Yoga engages the parasympathetic system (bottom up)
  - Yoga calms the fluctuations of the mind (top down)
- Yoga yolks physical body, mental activities, and spiritual focus

Exercise for Cancer Related Mental Health Symptoms

- **27 English language RCTs (1929 pts)**
  - PubMed, Embase, PsycINFO, and Cochrane databases were searched
  - Cancer patients >= 60 years
- **Exercise associated** with a significant **reduction in depression** (SMD = -0.53; 95% CI, -0.79 to -0.28) **and anxiety** (SMD = -0.39; 95% CI, -0.66 to -0.12) and improved **overall HRQOL** (SMD = 0.63; 95% CI, 0.10 to 1.17).
- **C/W conventional exercises, mind-body exercises associated with**
  - **improved depression (SMD = -0.89; 95% CI, -1.51 to -0.27) and**
  - **Anxiety levels (SMD = -0.77; 95% CI, -1.54 to -0.01)**

Soong Ry et al JAMA Netw Open. 2025 Feb 3;8(2):e2457859. doi: 10.1001/jamanetworkopen.2024.57859. PMID: 39903465; PMCID: PMC11795328.

Yoga Improves QOL: RCT in women with breast cancer undergoing radiotherapy

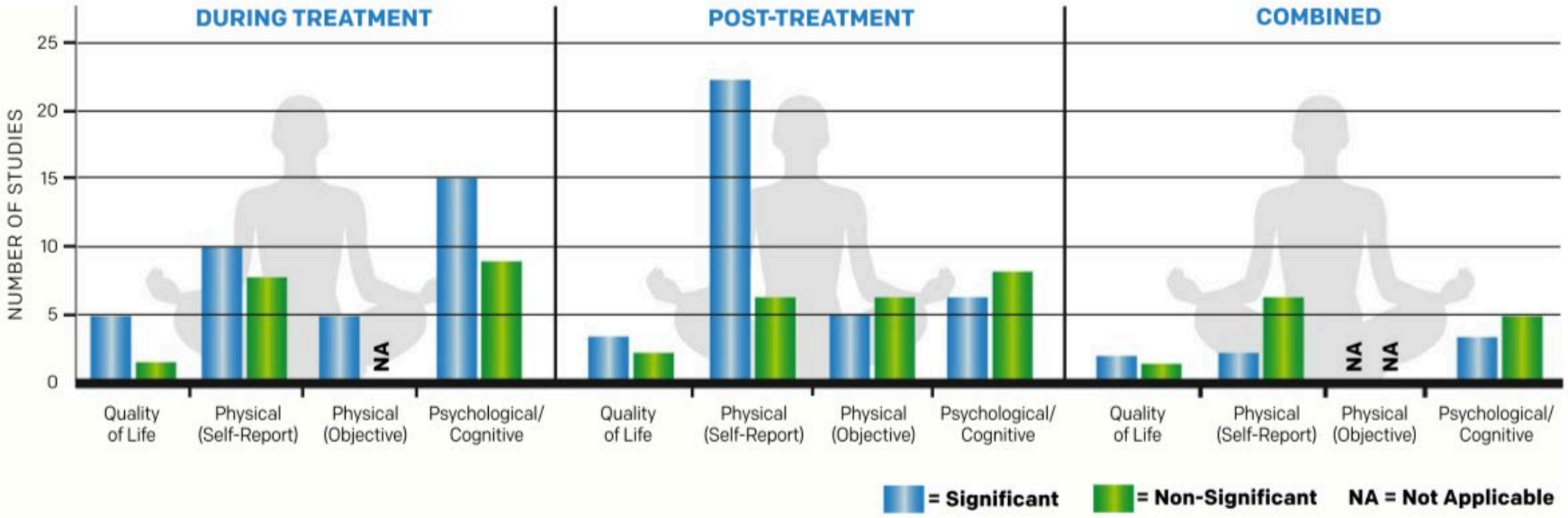
- Patients with breast cancer assigned to **YG** (n = 53) or **stretching** (ST; n = 56) **3x/week for 6 weeks during XRT** or **waitlist** (WL; n = 54) control.
- At 1, 3, and 6 months, YG group had greater increases in **physical functioning** c/w both ST and WL groups (P < .05)
- By end of XRT, YG and ST groups had a reduction in **fatigue** (P < .05).
- **Cortisol slope steepest** for YG group c/w ST and WL groups at end (P = .023 and P = .008) and 1 month after XRT (P = .05 and P = .04).
- **Conclusion: YG improved QOL and physiological changes assoc. with XRT beyond benefits of simple ST exercises, and with long-term durability.**

Chandwani KD et al J Clin Oncol. 2014 Apr 1;32(10):1058-65.[8] doi: 10.1200/JCO.2012.48.2752.

Yoga for Symptom Management in Oncology: A Review of the Evidence Base and Future Directions for Research

Suzanne C. Danhauer, PhD [1]; Elizabeth L. Addington, PhD [2]; Lorenzo Cohen, PhD [3]; Stephanie J. Sohl, PhD [1]; Marieke Van Puymbroeck, PhD [4]; Natalia K. Albinati [5]; and S. Nicole Culos-Reed, PhD [5]

Because yoga is increasingly recognized as a complementary approach to cancer symptom management, patients/survivors and providers need to understand its potential benefits and limitations both during and after treatment. The authors reviewed randomized controlled trials (RCTs) of yoga conducted at these points in the cancer continuum (N = 29; n = 13 during treatment, n = 12 post-treatment, and n = 4 with mixed samples). Findings both during and after treatment demonstrated the efficacy of yoga to improve



29 RCTs

Danhauer SC, et al. Cancer. 2019 Jun15;125(12):1979-1989. doi: 10.1002/cncr.31979.

What is "YOGA"

- *TAM YOGAM ITI MANYANTE STIRAM INNDRIYA DHARANAM*
  - ***YOGA IS HOLDING THE SENSES STEADY*** ***(Upanishad*** 800-300 BCE)
- *SAMATVAM YOGA UCCHYATE*
  - ***YOGA IS A STATE OF EQUANIMITY*** ***(Bhagavad-Gita*** 4th cent BCE - 3rd cent CE***)***
- *YOGAH CHITTA VRITTI NIRODHAH*
  - ***YOGA IS CONTROLLING THE DISTURBANCES OF THE MIND***

(Patanjali Yoga Sutras 2nd cent BCE and 5th cent CE***)***

What is the point of Yoga?
To find a Natural state of Effortless Joy

Courtesy of NV Raghuram

ACLM principles

- Nutrition
- Sleep
- Exercise
- No Toxic Subst.
- Reduced stress
- Social support

8 Limbs or "Y"oga

1. Yama-don't do's (ethical considerations). No Harm, Steal, Lie, hoard, misuse energy
2. Niyama-do do's (discipline) cleanliness, contentment, self study, disciplined, humility
3. Asana-practice for physical resilience (circulation, flexibility, stability)
4. Pranayama-regulating 4 components of breath

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5. Pratyahara-withdrawal of senses (going inward)

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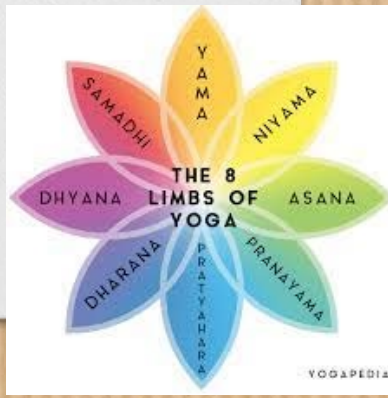
6. Dharana-concentration
7. Dhyana-meditation
8. Samadhi-absorption-union with your true Self



Hatha Yoga Pradipika 15th century CE

Location:

- **The Room:** Should be a 4-cubit (approximately 6-foot) square room, free of stones, fire, and dampness.
- **Hygiene:** Should be well-plastered with cow dung, clean, and free from dirt, insects, and holes.
- **Surroundings:** Should be enclosed and feature an arbor, a raised platform, and a well.
- **Country:** Practice in a solitary, well-governed country where food is easily obtained and good people live.

Dietary Rules

- **Moderate and Salutary:** Eat moderate, salutary (wholesome), and well-sweetened foods.
- **Beneficial Foods:** Consuming wheat, rice, barley, milk, ghee, honey, and specific vegetables is encouraged.
- **Avoid:** Overeating is to be avoided.

Lifestyle Rules

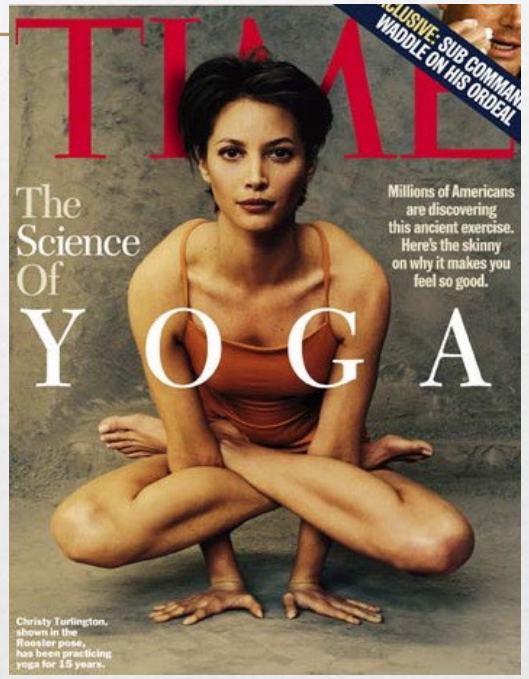
- **Avoid Distractions:** Steer clear of public contact, excessive talking, and severe austerities.
- **Avoidance of Harm:** Keep aloof from fire, women, and traveling.
- **Focus on Practice:** Success comes from dedicated practice, not from reading books or adopting a specific dress.

Mental and Physical Discipline

- **Mindfulness:** The environment is designed to remove distractions from the mind, supporting mindfulness.
- **Purification:** The practice aims to purify the body and mind for spiritual awakening.
- **Discipline:** Practice daily with an intellect free from the impurities of activity and sloth.

What Yoga is not

- A cure or even a primary treatment for cancer
- Magic
- Acrobatics
- One size fits all
- A passive therapy
- A detachment from the world
- Fully understood (mechanism)
- Exercise alone
- For everyone
- **EASY**



Chandwani et al., 2014;
Gothe et al., 2016
Ratcliff et al., 2016

Stress after 6 Mos of Different Exercise Modalities in Breast Ca Survivors

Breast cancer survivors (N=50)

Self-reported stress, salivary cortisol, and HR-QOL constructs

One of three different exercises (3 hours a week) over 6 mos

- therapeutic yoga-based exercise (YE),
- comprehensive exercise (CE) (aerobic, resistance, flexibility), or
- choosing (C) their own exercise activities.

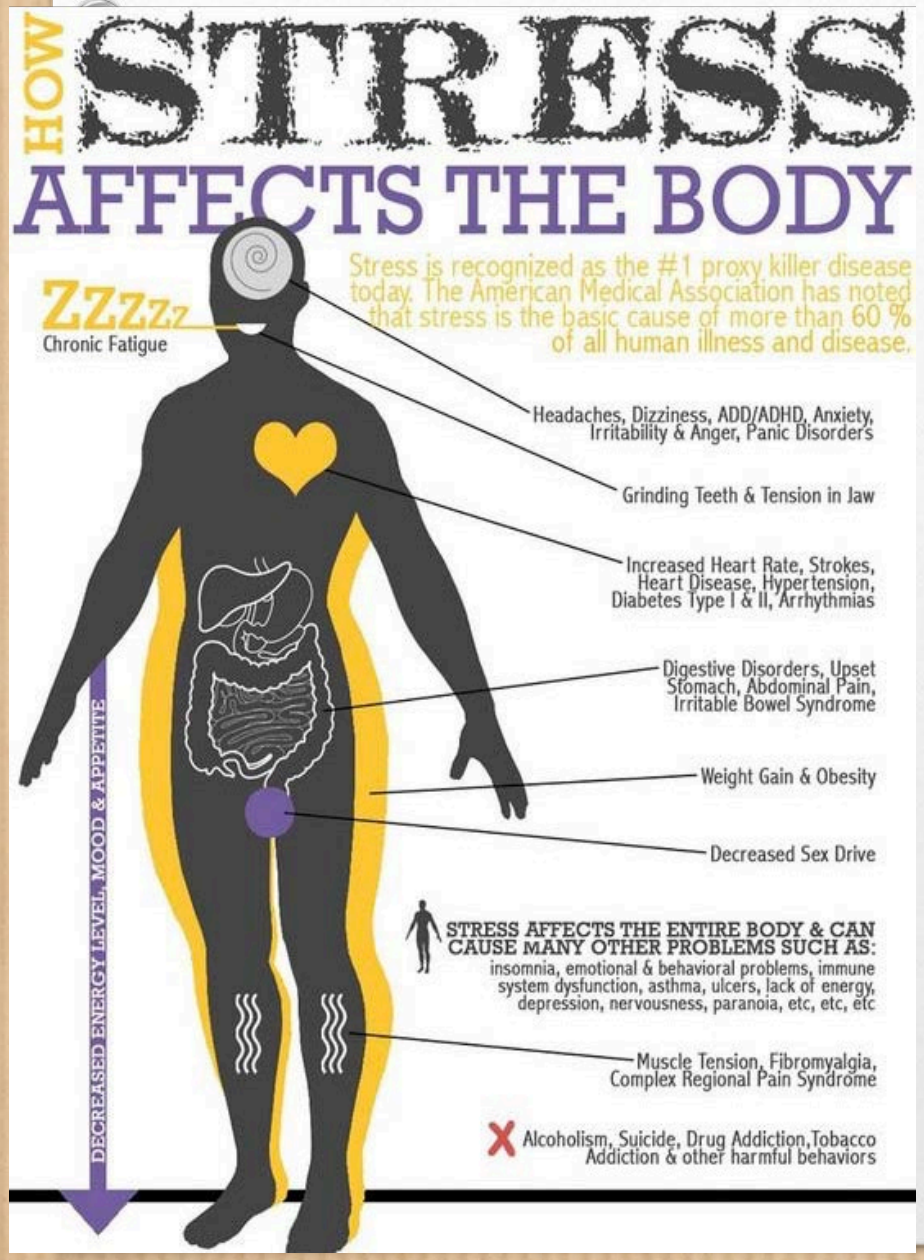
Results:

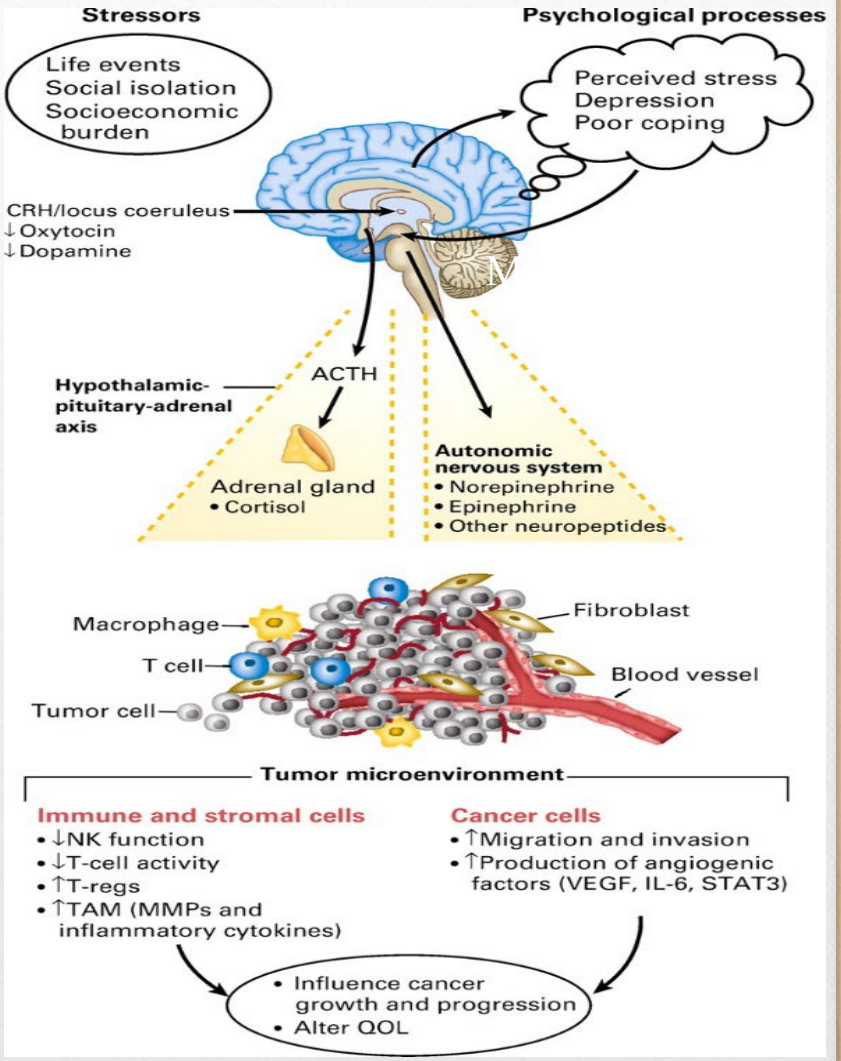
- **All groups improved** HR-QOL (PSS; 5/10 SF-36 scales (Mental Component, Social Functioning, Mental Health, Physical Component, and Physical Functioning subscale).
  - 5 samples salivary cortisol from 2 consecutive days
- **No significant decrease in cortisol between groups were noted.**
- **Engagement of, rather than the specific type of exercise, which is associated with improved HR-QOL**

Daniel C Hughes [1], et al Cancers (Basel). 2024 Oct 4;16(19):3398. doi: 10.3390/cancers16193398.

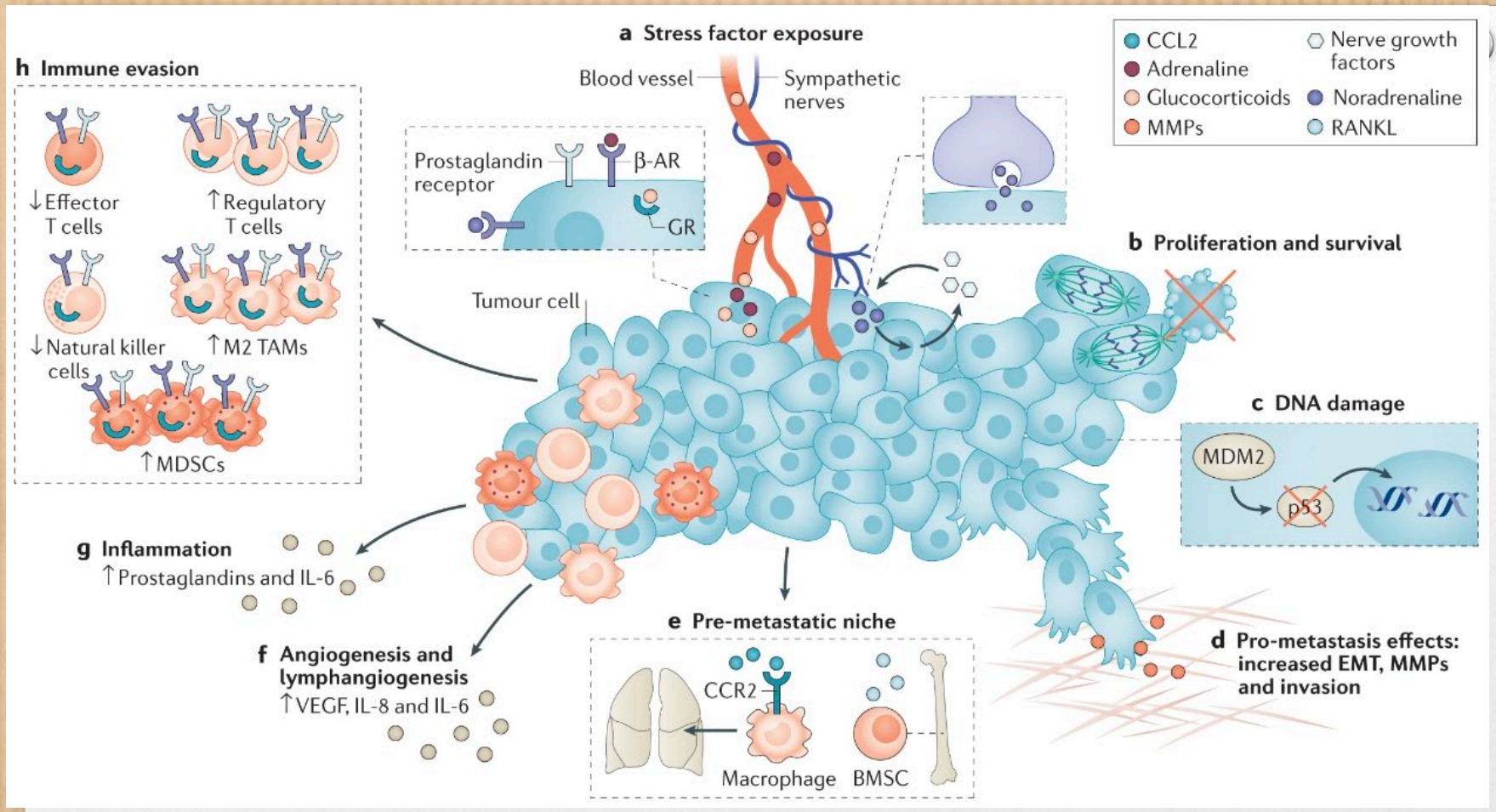
So How Might Yoga Work?

*apart from the exercise





Eckerling, A. et al. Nat Rev Cancer 21, 767–785 (2021). https://doi.org/10.1038/s41568-021-00395-5
P.H. Thaker et al Nat Med 12 (2006) 939-44
Antoni MH et al. Nat Rev Cancer. 2006 Mar;6(3):240-8
Lutgendorf S et al Psychosom Med 2011;73:724-730

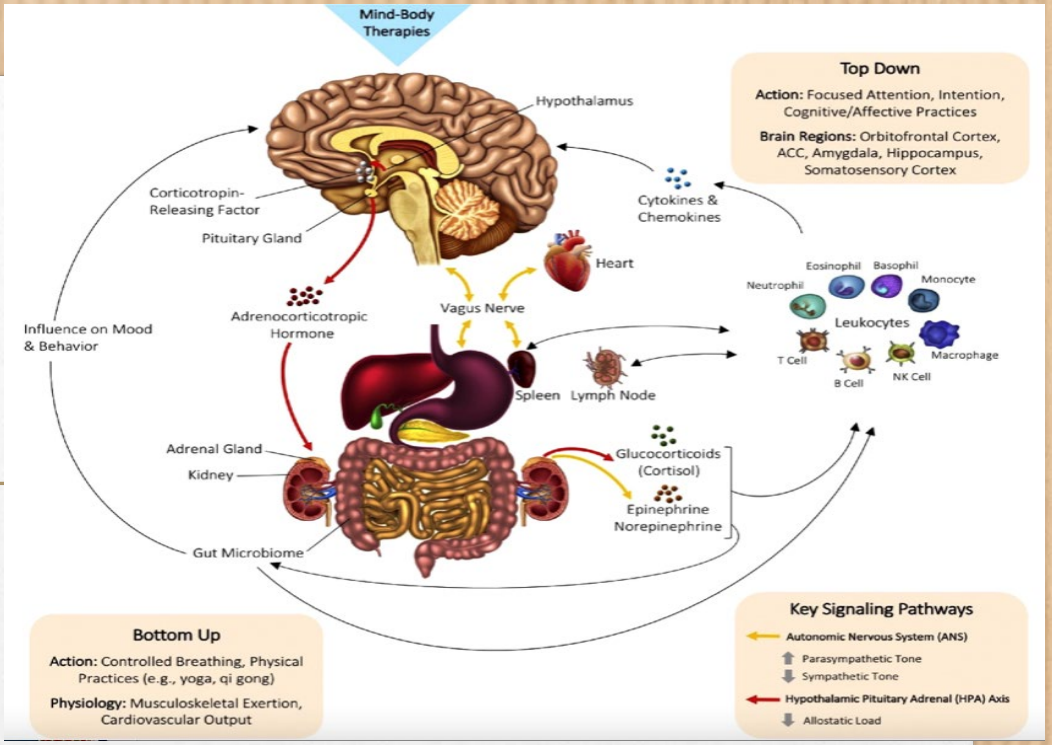


"Recent clinical trials support our hypothesis that psychological and/or pharmacological inhibition of excess adrenergic and/or inflammatory stress signaling, especially alongside cancer treatments, could save lives".

Eckerling, A. et al. Nat Rev Cancer 21, 767–785 (2021).nhttps://doi.org/10.1038/s41568-021-00395-5

BOTTOM UP

Removing physical drama (asanas, pranayama, pratyahara)



- **Increased Thalamic GABA levels (assoc with less anxiety) after yoga c/w walking**
  - Streeter CC et al J Altern Complement Med. 2010 Nov;16(11):1145-52.
- **Meditation can increase diurnal DHEA/melatonin and improve sleep (HPA access)**
  - Nagendra et al Sleep Sci 2022 Apr-Jun;15(2):179-187
  - Carlson LE et al Psychoneuroendocrinology. 2004 May;29(4):448-74
- **Body Position influences thinking and emotions**
  - W.F.J. Flack Cogn Emot, 20 (2006), pp. 177-195
  - Francis AL et al Comp Ther Med 43 (2019) 170-175

Muehsam D et al Neurosci Biobehave Reve 2017 73 165-181

Top Down

Increasing inner stillness (pratyahara, dharana, dhyana)

Mindfulness may partially moderate yoga outcomes

- Becoming more accepting/non-reactive
- Maintaining awareness of habitual tendencies (reactivity, fears, beliefs) that cause suffering
- By removal of illusion of separation from yourself-allowing for more kindness and compassion (no need to have an opinion on everything)
- Self-care, self-compassion, mindfulness, feelings of physical competence, establishing a routine, and being around similar others
- Mindfulness increased eudaimonic well-being and reduced depression.
  - Eudaimonic well being=A sense of purpose and meaning in life, social embeddedness, and the potential for personal growth

"aint nobody messing with you but you…."

Bergomi C et al Mindfulness. 20156(6):1411-1421. doi: 10.1007/s12671-015-0415-6
Nila K et al Ment Health Prev. 2016;4(1):36–41. doi: 10.1016/j.mhp.2016.01.001
Francis AL Complement Ther Med. 2019 Apr;43:170-175
E McLaughlin et al Ann Med. 2024 Dec;56(1):2309275. doi: 10.1080/07853890.2024.2309275. Epub 2024 Jan 30.

Hypothetical Mechanisms of Action:

- **Interoception**
  - Sensing internal bodily signals, incl. cardiovascular, respiratory, immune, and nervous systems
  - Breath can increase interoceptive awareness (sensing and processing of visceral stimuli) and may allow sense of control and stress regulation
  - People with panic have less tolerance for breathlessness and heightened activity in anterior insula (relates to interoception)
- **Enteroception**
  - Enteroception –the sensing of internal signals from digestive system, eg hunger, fullness-making choices
- **Direct CNS effects**
  - Modifying respiration may affect brain electrical activity resulting in synchrony of brain waves (thought, emotion)-In mice, breathing rhythms modulate via the activity of locus coeruleus
  - Theory that controlled breathing can directly influence the central autonomic network (mood/sleep) and cortical structures regulating emotion, mood, and arousal
  - Nasal breathing and cyclic sighing may affect amygdala / hippocampus (emotional processing)
- **Increased HRV via ANS modulation/ Increased parasympathetic activity/Cardiac Coherence**
  - Measured by HRV (oscillations in HR connected to breathing)-Associated with improved health
- **Polyvagal theory-**Suggests the vagal nerve responsible for bidirectional communications between body and brain

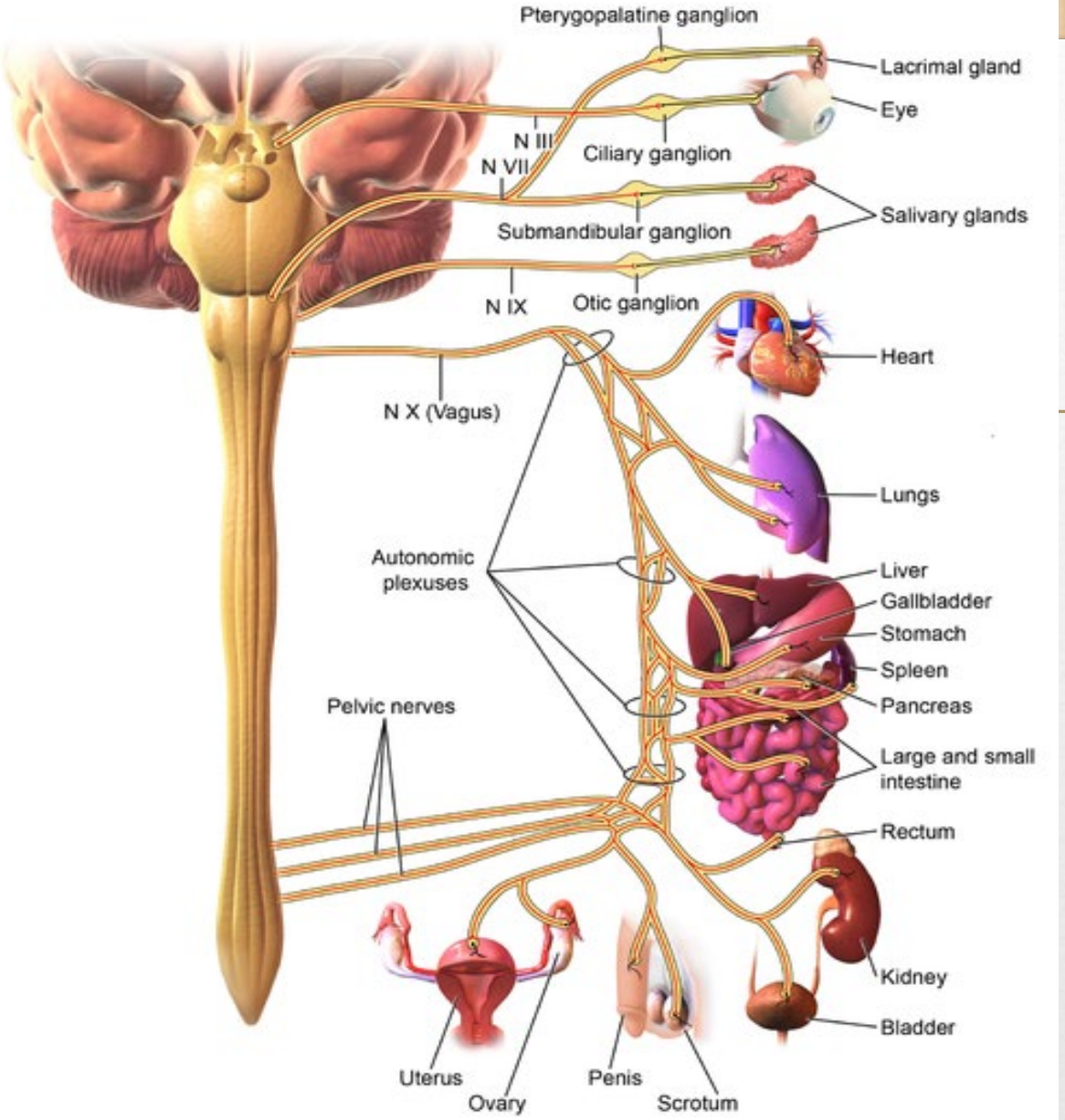
Heart Rate Variability (& Breath)

- HRV-the HR changes from beat to beat producing oscillations in the time intervals between consecutive heart beats and reflects the influence of the ANS on the heart
  - Arises from respiratory sinus arrhythmia
  - Higher HRV reflect robust PNS control - Activity of vagus nerve can be estimated by HRV.
  - Low HRV correlates with higher stress, anxiety and depression
- HRV predict less all-cause mortality, lower risk of /better prognosis after MIs, and better survival in cancer.
  - Gitler A et al. J Clin Med. 2022 Oct 8;11(19):5927.
- Hypothesis –synchrony enables diverse brain regions to communicate more effectively
  - Slow, deep breathing increases activity of vagus nerve, part of parasympathetic NS
  - When vagus is stimulated, calmness pervades: HR slows; BP decreases; muscles relax.
    - Increases baroreflex sensitivity
    - Decreases sympathetic nerve activity

Hummel et al. Cereb Cortex 15 670-8. 2005
Lutz A et al Proc Natl Acad Sci USA 101 16369-73. 2004
Hsu SM et al J Neurophysiol 123, 289-299. 2020.

Vagus and Very Slow Breathing

- Slow-paced breathing (SPB) with heart rate variability (HRV) biofeedback (BF) is empirically proven to reduce stress and anxiety
  - Goessl, V et al. *Psychological Medicine, 47*(15), 2578-2586 (2017)
  - Pizzoli SFM et al Sci Rep 11, 6650. 2021
- Increase in HRV with VSB exercises could a low-tech / low-cost/ low risk technique
  - Laborde S et al.. Neurosci Biobehav Rev. 2022 Jul;138:104711.
- SPB strengthens vagus nerve and anti-inflammatory pathway (inverse assoc between HRV and IL 6/CRP)
  - Wheat, A.L., Larkin, K.T..*Appl Psychophysiol Biofeedback* **35**, 229–242 (2010)
  - Williams, DP et al. Brain, Behavior, & Immunity, Vol 80, 219-226 (2019)
- Below 8.5 BPM, vagal activity generates oscillations via the parasympathetic stimulation
  - **Breathing at freq of baroreflex (4.5-6.5 breaths/min) increases HRV during and after SDB intervention**
    - Bernardi L et al. J Hypertens 2001 (19) 2221-2229
- Higher PNS activity assoc. with self-regulation and higher pain inhibition capacity.
  - Forte G et al . Heart Rate Variability and Pain: A Systematic Review. Brain Sci. 2022 Jan 24;12(2):153



Parasympathetic Innervation

Câmara, R. Anatomy of the vagus nerve. In *Nerves and Nerve Injuries*; Academic Press: Cambridge, MA, USA, 2015; pp. 385–397

Bonaz B et al J Physiol. 2016 Oct 15;594(20):5781-5790. doi: 10.1113/JP271539

Vagal afferent fibers stimulate the HPA axis to release cortisol by adrenal glands.

Vagal afferent fibers target the nucleus tractus solitarius in the brainstem which controls the baroreflex that helps maintain BP

Where the Mind goes, so the Prana flows- What you meditate on, so you become

- Agitated mind, breathing is shallow and fast
- Calm mind, breathing is slow and deep
- Not always easy but by regulating breath, we regulate & quiet the mind

"As long as there is breath in the body, there is life. When breath departs, so too does life. Therefore, regulate the breath"

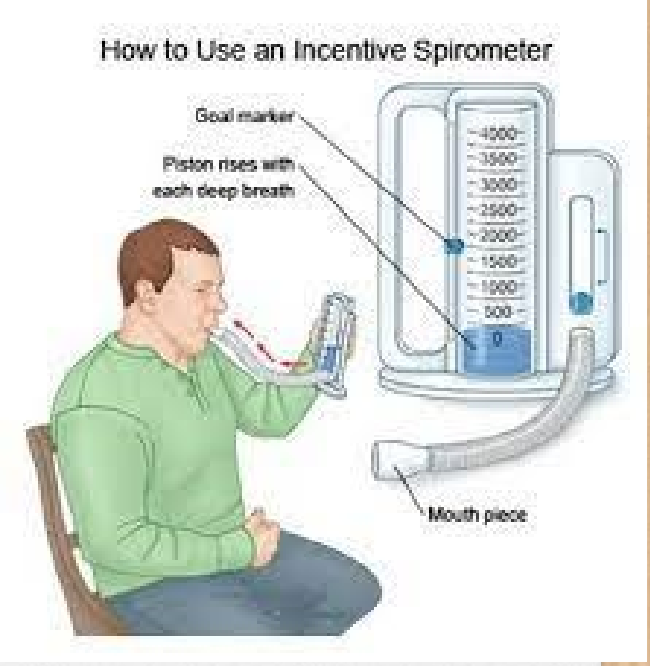
Hatha Yoga Pradipika 1400AD

How well he is controlling his mind?

Lose energy (prana) through:
Strong emotions
Strenuous activity
Talking too much
Useless activity

If unconscious manipulation of breath can lead to agitation-why not learn to manipulate consciously?

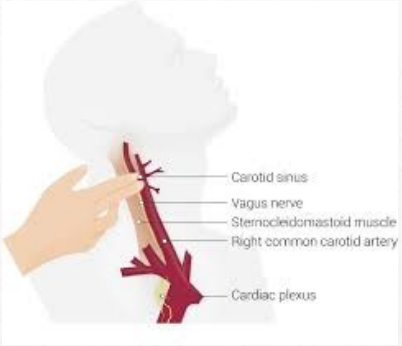
Medically Accepted Benefits of Slow Deep Breathing

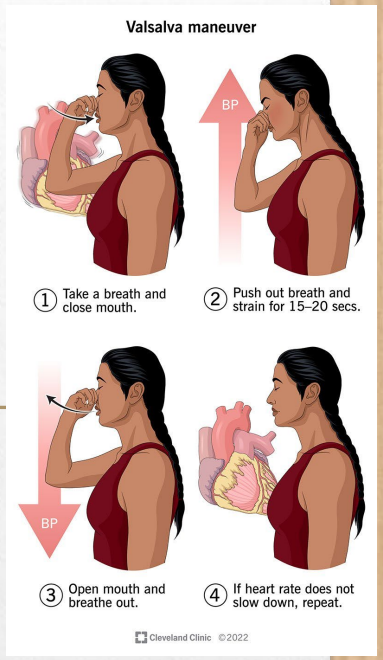


- Decrease incidence and severity of pulmonary complications,
  - pneumonia, shortness of breath, atelectasis, and hypoxemia
- Improve inspiratory muscle strength, tidal volume, oxygenation
  - Vital capacity, breath hold time, insp/exp pressures
- Reduces Pain (pain sensation*)
- Reduces Anxiety, panic attacks
- Reduction in fatigue, insomnia
- Decreased hot flashes, head aches
- Decreases Intra-ocular pressure in Glaucoma
- Improves Attention? Via locus coeruleus

- **H. Jafari**.J Anesthesia 2020 34; 944-949
- **Barassi**. G Adv Exp Med Biol. 2018;1096:19-29
- **Udenia**. H J Glaucoma 2021 Feb 1;30(2):115-123
- **Kulkarni A** Clin Ophthalmol 2022 Dec 9;16:4047-4054
- **Almeida**. LB Support Care Cancer. 2022 Nov;30(11):9393-9402
- **Casuso-Holgado MJ** Support Care Cancer. 2022 Dec;30(12):10335-10357
- **Melnychuk MC** Psychophysiology. 2018 Sep;55(9):e13091.
- **Banushi**. B Brain Sci. 2023 Feb 2;13(2):256

Medically accepted vagal maneuvers





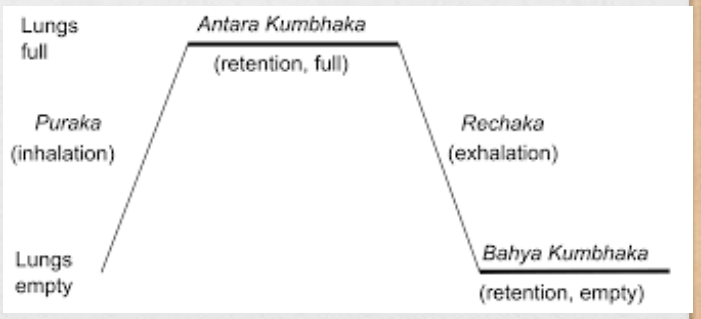
- Valsalva maneuver
  - bearing down like you're having a bowel movement
- Carotid sinus massage.
- Coughing.
- Going upside down for 30 seconds (baroreflex)
- Applied abdominal pressure.
  - Lying on back and folding your lower body toward your face until your feet are past your head. Take a breath and bear down for 20-30 secs.

•**Vagal tone:** The ability to regulate between sympathetic parasympathetic state

•Practicing increases vagal tone

Not just any slow deep breathing… SDB ratios & Pain

- 4 techniques (N=48 healthy volunteers)
  - Unpaced
  - Paced at spontaneous frequency
  - SDB at 6 BPM with high I/E ratio (SDBH)
  - SDB at 6 BPM with low I/E ratio (SDBL)
- During each breathing technique- a painful heat stimuli (5 sec) 3 diff temps (personalized) was introduced
- RR, HR and BP recorded
- Participants had less intense pain during each of the 3 instructed patterns
- **SDB L attenuated more pain**
- Why?
  - Sense of control/emotional modulation
  - Expectations about the breathing tasks effect
  - It isn't just SDB but the ratio of I/E
    - Vagal activity, level of distraction, something else?



Jafari H et al The Journal of Pain vol 21 no 9-10 2020 pp1018-1030

NCCN/ASCO/SIO Guidelines

National Comprehensive Cancer Network®

NCCN Guidelines Version 1.2019
Adult Cancer Pain

NCCN Guidelines Index
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Discussion

INTEGRATIVE INTERVENTIONS

Consider integrative interventions in conjunction with pharmacologic interventions as needed. Integrative interventions may be especially important in vulnerable populations (eg, frail, elderly) in whom standard pharmacologic interventions may be less tolerated or based on patient preference. The utility of integrative interventions underscores the necessity for pain management to be carried out with a team approach that contains a wide range of treatment options. (See PAIN-L)

Pain likely to be relieved or function improved with cognitive, physical, or interventional modalities:

- **Cognitive modalities**
  - **Mindfulness-based stress reduction**
  - **Imagery**
  - **Hypnosis**
  - **Biofeedback**
  - **Acceptance-based training**
  - **Distraction training**
  - **Relaxation training**
  - **Active coping training**
  - **Graded task assignments, setting goals, pacing, and prioritizing**
  - **CBT, cognitive restructuring**
  - **Behavioral activation**
- **Spiritual care (See NCCN Guidelines for Distress Management)**

"Consider" yoga for improving some survivorship areas such as:

- Distress
- Cognitive functioning
- Menopausal symptoms
- Pain

National Comprehensive Cancer Network®

NCCN Guidelines Version 3.2021
Survivorship: Anxiety, Depression, Trauma, and Distress

ANXIETY, DEPRESSION, TRAUMA, AND DISTRESS: MANAGEMENT AND TREATMENT

NONPHARMACOLOGIC INTERVENTIONS

- For all survivors:
  - Address treatable contributing factors
    - Pain, sleep disturbance, fatigue, toxic metabolic/endocrine/other medical comorbidities, substance use disorder
  - Provide reassurance that symptoms of worry, stress, fear of recurrene, anxiety, and depression are common problems among cancer survivors and that these symptoms can be treated
  - Provide support and education to patient and family regarding normal recovery phases after treatment, common stresses, distress and fears, and strategies for managing uncertainty and distress
  - Provide resources for social support networks and specific social, emotional, spiritual, intimacy, and practical problem needs, including online and mobile phone apps. Consider referral to social work services, patient navigator, and/or financial navigator (if available). (See SURV-B)
  - Develop a plan for regular physical activity and healthy nutrition. (See HL-1)

- For adjustment disorder or distress without safety risk, mania, or psychosis (See DIS-10 and DIS-17 from the NCCN Guidelines for Distress Management):
  - Refer to a therapist, preferably one with psycho-oncology training if available (ie, psychologist, psychiatrist, social worker, advanced practice clinician, licensed therapist):
    - Cognitive behavioral therapy (CBT) (eg, mindfulness, behavioral activation, structured CBT) can be effective for distress, fear of recurrence, trauma symptoms, insomnia, or other symptoms related to distress and can be delivered as individual therapy in structured groups, or with digital modalities (category 1)
    - Social work for complex social factors
    - Supportive normalizing of survivor's experience
    - Existential therapy related to values, meaning, and purpose in life
  - Consider referral to chaplain for spiritual support for religious conflict, concerns about death and afterlife, guilt, grief, and meaning and purpose in life
  - Consider referral for integrative therapies (ie, mindfulness meditation, imagery/hypnosis, yoga)
  - Consider referral for couples, family, caregiver, or relationship counseling/support

- For moderate to severe intensity major depression, generalized anxiety, panic, or PTSD symptoms:
  - Refer for evaluation and treatment by a mental health professional[h]
  - Consider pharmacologic and/or nonpharmacologic treatments

- For substance used disorder:[p]
  - Safety evaluation (SANXDE-A)
  - See DIS-21 from the NCCN Guidelines for Distress Management
  - Refer to substance use disorder specialist

- Reevaluate symptoms and function at next visit
- Revise referrals and interventions if symptoms are persistent or increased

Consider pharmacologic interventions (See SANXDE-9)

[h] Psychiatrist, psychologist, advanced practice clinician, and/or social worker.
[p] For additional resources, See SURV-B 4 of 4.

Note: All recommendations are category 2A unless otherwise indicated.
Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.

SIO Integrative Oncology ASCO Guidelines

INTEGRATIVE ONCOLOGY CARE OF SYMPTOMS OF ANXIETY AND DEPRESSION IN ADULT PATIENTS WITH CANCER

GUIDELINE AT-A-GLANCE RECOMMENDED INTERVENTIONS

Anxiety

During Active Treatment

- Mindfulness-based interventions
- Yoga
- Hypnosis
- Relaxation therapy
- Music therapy or music-based interventions
- Reflexology
- Lavender essential oil inhalation

Post-Treatment

- Mindfulness-based interventions
- Yoga
- Acupuncture
- Tai chi and/or qigong
- Reflexology

Depression

During Active Treatment

- Mindfulness-based interventions
- Yoga
- Relaxation therapy
- Music therapy or music-based interventions
- Reflexology

Post-Treatment

- Mindfulness-based interventions
- Yoga
- Tai chi and/or qigong

Carlson et al *J Clin Oncol* 2023
asco.org/survivorship-guidelines

Note. Evidence quality and strength of recommendations are available in the guideline publication.

Literature search - 1990-2023. 30 systematic reviews & 80 RCTs inform evidence base. Outcomes; anxiety, depression and adverse events.

Limitations: bias, non standardization of therapies, lack of diversity, and lack of active control

ANTICIPATORY EMESIS PREVENTION/TREATMENT

Anticipatory nausea/vomiting →

- Prevention is key:
  - Use optimal antiemetic therapy during every cycle of treatment
  - Avoid strong smells that may precipitate symptoms
- Behavioral therapy:
  - Relaxation/systematic desensitization
  - Hypnosis
  - Relaxation exercises
    - Guided imagery
    - Progressive muscle relaxation (PMR)
    - Biofeedback
    - Music therapy
  - Cognitive distraction
  - Yoga (if approved by physician)
- Acupuncture/acupressure
- Consider anxiolytic therapy:
  - For example, lorazepam 0.5–2 mg PO beginning on the night before treatment and then repeated the next day 1–2 hours before chemotherapy begins

→ See Emesis Prevention and Breakthrough Treatment for Chemotherapy-Induced Nausea and Vomiting (Antiemesis Table of Contents)

See Principles of Emesis Control for the Cancer Patient (AE-1)

Note: All recommendations are category 2A unless otherwise indicated.
Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.

INTERVENTIONS FOR PATIENTS ON ACTIVE TREATMENT[e,f]

Nonpharmacologic

- Physical activity (category 1)
  - Maintain optimal level of activity
  - Cautions in determining level of activity:
    - ◊ Bone metastases
    - ◊ Thrombocytopenia
    - ◊ Anemia
    - ◊ Fever or active infection
    - ◊ Limitations secondary to metastases or other comorbid illnesses
    - ◊ Safety issues (ie, assessment of risk of falls)
  - Consider initiation and/or encourage maintenance of a physical activity/exercise program, as appropriate per health care provider, consisting of cardiovascular endurance (walking, jogging, or swimming) and resistance (weights) training.[j]
  - Consider referral to rehabilitation: physical therapy, occupational therapy, and physical medicine
  - Yoga (category 1)
- Physically based therapies
  - Massage therapy (category 1)
- Psychosocial interventions
  - Cognitive behavioral therapy (CBT)[k]/Behavioral therapy (BT)[l] (category 1)
  - Psycho-educational therapies/Educational therapies (category 1)
  - Supportive expressive therapies[m]
- Nutrition consultation
- CBT[k] for sleep
  - Stimulus control/Sleep restriction/Sleep hygiene
- Bright white light therapy[n]

Pharmacologic

- Consider psychostimulants[o] (methylphenidate) after ruling out other causes of fatigue
- Treat for pain, emotional distress, and anemia as indicated per NCCN Guidelines (See appropriate NCCN Guidelines for Supportive Care)
- Optimize treatment for sleep dysfunction, nutritional deficit/imbalance, and comorbidities

→ Repeat screening and evaluation
See (FT-3) and (FT-4)
See (FT-5) for General Strategies for the Management of Fatigue

[e]See Discussion for information on differences between active treatment, post-treatment, and end-of-life treatment. (See MS-1)
[f]Interventions should be culturally specific and tailored to the needs of patients and families along the illness trajectory, because not all patients may be able to integrate these options due to variances in individual circumstances and resources.
[j]See NCCN Guidelines for Survivorship (SE-3).
[k]A type of psychotherapy that focuses on recognizing and changing maladaptive thoughts and behaviors to reduce negative emotions and behaviors and to facilitate psychological adjustment.
[l]CBT/BT influences thoughts and promotes changes in behavior; it includes relaxation strategies.
[m]Supportive expressive therapies (eg, support groups, counseling, journal writing) facilitate expression of emotion and foster support from one or more people.
[n]Bright white light therapy of 10,000 lux is most frequently self-administered in the early morning for 30–90 minutes. Timing needs to be adjusted for those who sleep during the day.
[o]Pharmacologic interventions remain investigational, but have been reported to improve symptoms of fatigue in some patients. Methylphenidate should be used cautiously and should not be used until treatment- and disease-specific morbidities have been characterized or excluded. Optimal dosing and schedule have not been established for use of psychostimulants in older adults and patients with cancer.

Note: All recommendations are category 2A unless otherwise indicated.
Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.

SIO Society for Integrative Oncology ASCO® Guidelines

MANAGEMENT OF FATIGUE IN ADULT SURVIVORS OF CANCER

During Active Treatment	After Active Treatment	Post-Treatment
Recommended Interventions:		
• Exercise (aerobic, resistance, or a combination) • Cognitive behavioral therapy with or without hypnosis • Mindfulness-based programs (MBSR, MBCT) • Tai chi or qigong • Psychoeducation • American ginseng (Panax quinquefolius)	• Exercise (aerobic, resistance, or a combination) • Cognitive behavioral therapy • Mindfulness-based programs (MBSR, MBCT, MAPs) • Yoga • Acupressure • Moxibustion	• Cognitive behavioral therapy • Corticosteroids
Interventions Clinicians Should NOT Recommend:		
• Wakefulness agents • Psychostimulants • L-carnitine • Antidepressants	• Wakefulness agents • Psychostimulants	• Wakefulness agents • Psychostimulants

Bower et al *J Clin Oncol* **2024**
asco.org/survivorship-guidelines

Abbreviations. MAPs, mindful awareness practices; MBCT, mindfulness-based cognitive therapy; MBSR, mindfulness-based stress reduction

Note. Evidence quality and strength of recommendations are available in the guideline publication.

Strong recommendations for management of cancer fatigue after cancer treatment were given to mindfulness-based programs

Krisstina Gowin[1], et al Am Soc Clin Oncol Educ Book. 2024 Jun;44(3):e431554. doi: 10.1200/EDBK_431554. DOI: 10.1200/EDBK_431554
J E Bower et al J Clin Oncol. 2024 Jul 10;42(20):2456-2487. doi: 10.1200/JCO.24.00541. Epub 2024 May 16.

What is an Effective Yoga Prescription?

Why is the data so weak, inconsistent, and hard to prove?

How was Yoga defined?

- Most yoga interventions include combination of:
  - movement (asana),
  - breath work (pranayama),
  - meditation (dhyana) in protocols
- It's difficult to determine which aspect was most impactful
- In fact, the true eight limbed yogic approach is much more-it is the original lifestyle-based medicine

Lyman GH et al. J Clin Oncol 36:2647-2655, 2018.
Denlinger CS, et al: NCCN Clinical Practice Guidelines in Oncology: Survivorship. Version 3.2018.
Berger AM, et al: NCCN Clinical Practice Guidelines in Oncology: Cancer-Related Fatigue. Version 1.2021.
Ettinger DS, et al: NCCN Clinical Practice Guidelines in Oncology: Antiemesis. Version 1.2021.

Drug Trial vs Yoga Trial

Classical Trials

Endpoints

Tumor measurements (PR, CR, SD)

QOL PROs

MTD

Toxicity – Established Safety Scales

Prescription

Escalating dose, Frequency

Exclusion/variables

Pharmacologic interactions

Mechanism: Pharmacology

Yoga Trials

Endpoints-physical, mental, existential

QOL, Anxiety/Depression, Fatigue

Open heartedness, transformation, interconnectedness, meaning

Toxicity- Safety (Mental/Physical)

Prescription-asana, pranayama, meditation (freq, duration, length)

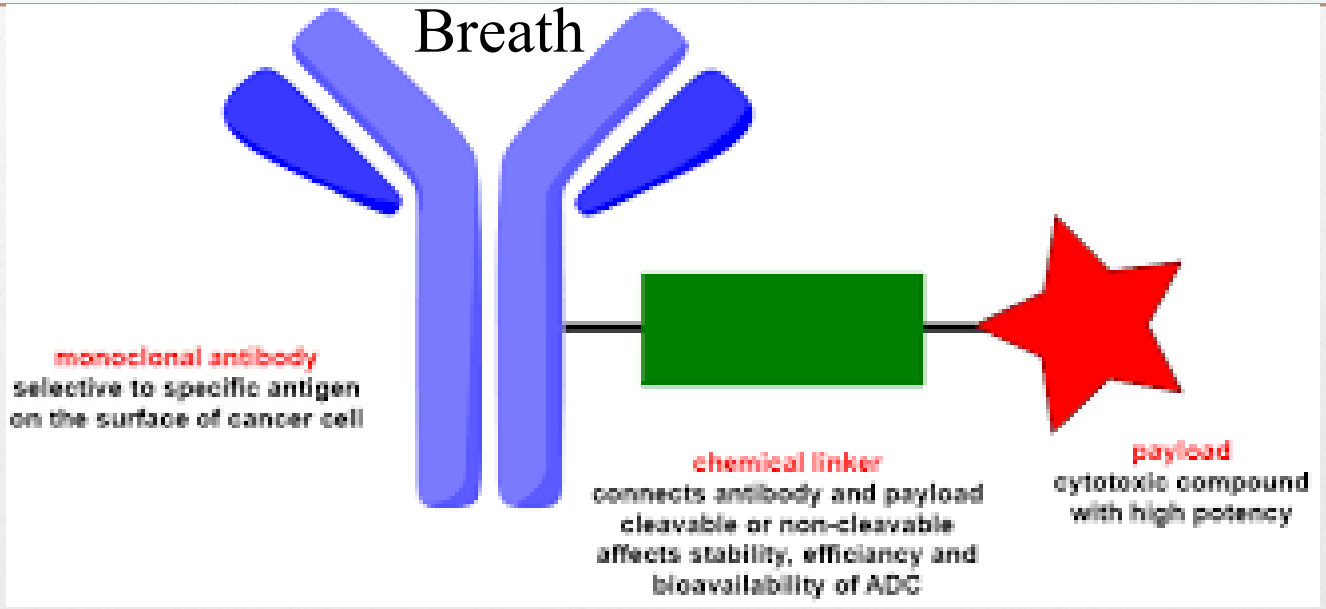
Exclusion/variables

Selectivity, bias, triggers, memories

Mechanism: How does it work?

How Do You Target The "Yoga" Endpoint?

Asana
Meditation
Breath



YOGA TOOLS

Layers/koshas	Natural state	Altered state	Yogic remedy
Physical (*annamaya*)	Relaxed	Muscular tensions, abdominal pain, bloating, constipation, and diarrhea	Stimulate the body with various loosening practices, relax with postures, and cleanse the internal organs with cleansing techniques
Life force (*pranamaya*)	Slow rhythmic breath	Haphazard breathing, wrong direction, wrong quantities, and imbalances	Slow down the breath with breath control and balance the flow of vital life force
Mind (*manomaya*)	Calm state	Mental agitations, stress, anxiety, and depression	Calm down the mind with meditation and devotion
Intellectual (*vijnanamaya*)	Wisdom	Wrong perceptions, distorted cognition, and lack of discrimination	Notional corrections and self-inquiry for better judgment and increased self-confidence
Bliss (*anandamaya*)	Harmony	Disharmony and unhappiness	Action in relaxation, to experience the bliss continuously, selflessness, and happiness within

Yoga trials vs Drug trials

Words cannot convey the value of yoga – it has to be experienced.

B.K.S. Iyengar

CLARIFY, CheckList stAndardising the Reporting of Interventions For Yoga.

1	Title	
1a	Succinctly describe the yoga intervention.	Include the word 'yoga' in the publication title.
2	Theory	
2a	Describe any rationale, theory or goal of the elements essential to the yoga intervention.	Describe why specific population included in study.
3	Activities	
3a	Describe the yoga practices or activities used in the intervention.	Describe type of yoga practices included (eg, postures breathing, meditation, relaxation).
3b		Describe the duration of yoga practices within the yoga session (eg, 20 min postures, 10 min breathing).
4	Expertise	
4a	Describe the expertise, background, and training of those providing the yoga intervention.	Describe the qualifications of the yoga instructor(s).
5	Delivery	
5a	Describe how the yoga intervention was delivered (eg, class, video/audio) and whether it was provided individually or in a group.	Describe the teaching approach including: visual demonstration, verbal guidance and assistance.
6	Dose	
6a	Describe the no of times the yoga intervention was delivered and over what period, including the no of sessions, their schedule and their duration and intensity.	Describe the duration of each session (in minutes).
6b		Describe the duration of intervention (ie, over 8 wks).
6c		Describe the frequency of sessions (eg, twice weekly).
6d		Describe the no of yoga sessions.
7	Home practice	
7a	Describe aspects of home practice if any.	Describe duration /frequency of home practice (if any)
7c		Report whether yoga was available to participants during the follow-up period (if relevant), and list any recommendations made for home practice dose.
		Describe if /how adherence measured.
8	Protocol changes	
8a	If the yoga intervention was modified during the course of the study in ways not described in the protocol, please describe the changes.	Describe any changes to yoga protocol during study.
8b		Describe rationale for changes during study.
9	Participant adherence	
9a	If adherence to the yoga intervention was assessed, describe how and by whom, and what, if any strategies were used to maintain or improve adherence.	Describe if and how attendance was measured.
9b		Describe trategies used to promote adherence.
10	Instructor fidelity	
10a	Describe the extent to which the yoga intervention was delivered as planned.	Describe the assessment of protocol fidelity
10b		Describe the reasons for deviation from study plan.
10 c		Describe any differences between proposed programme and actual programme delivery.
10d		Describe when protocol was modified.

Moonaz S et al BMJ Open. 2021 Aug 5;11(8):e045812. doi: 10.1136/bmjopen-2020-045812. PMID: 34353794; PMCID: PMC8344321.

Prescription Variables

- Intervention Timing (during treatment, after treatment, survivor)
- Comparison arm
- Duration of individual practice and length of practice period
- Group, Individual, Partnered, Virtual, In-person, Recorded
- Type of yoga (power, restorative, Iyengar, Hatha, Yin, Kundalini)
  - No real difference Hatha vs Iyengar in review of 11 studies (low quality)
    - Cristina García-Muñoz et al Support Care Cancer. 2023 Dec 5;32(1):3. doi: 10.1007/s00520-023-08174-8.PMID: 38049680
- Percentage of Pranayama, Asana, Dhyana
- Music vs silent…type of music and inclusion of mantra?
- Preconceived notions of yoga (readiness for action), engagement
- Yoga therapist vs Yoga teacher
- Goals of intervention (physical, mental, symptom control, existential)

Variables : Fatigue & Session Length

- Meta-analysis 29 studies (n = 1828 patients).
  - Effect sizes (Hedge's *g*) were calculated for fatigue, depression, and quality of life.

- **Results:**
- **Yoga practice associated with small, significant decrease in fatigue** (g = 0.45, *P* = .013).
- **Yoga type a significant moderator** of this relationship (*P* = .02).
  - **Physical practice more effective than non physical (breathing/meditating)**
- Yoga associated with moderate decrease in depression (g = 0.72, *P* = .007) but not with significant changes in QOL (*P* = .48).
- **Session length a significant moderator of relationship between yoga and depression (*P* = .004).**
  - Average was 77min range 15-120 min
  - Longer more effective
- Timing of treatment (during treatment vs posttreatment) not important
- The effect of yoga on fatigue and depression was larger when the comparator was a "waitlist" or "usual care" than when the control group was another active treatment (*P* = .036).

JS Armer and Sussan K Lutgendorf JNCI Cancer Spectr. 2019 Dec 17;4(2):pkz098. doi: 10.1093/jncics/pkz098. eCollection 2020 Apr.

Other potential benefits of yoga….

Yoga & Cognitive Dysfunction

- Physical activity benefits cognitive function in non-cancer populations
- Sedentary breast or ovarian cancer survivors (N=35) randomized to restorative yoga (more meditative practice / minimal physical exertion) or vigorous yoga (considerable physical exertion and minimal meditative practice)
- 60-minute supervised sessions 3 x/week for 12 weeks, then 12 weeks home practice.
- In the restorative yoga group,
  - overall cognitive function significantly improved at weeks 12 and 24 c/w baseline (*P* = .03 and 0.004).
  - Fluid cognitive function also significantly improved at weeks 12 and 24 (*P* = .02 and 0.0007
  - crystallized cognition did not change not significant.
- In the vigorous yoga group,
  - significant improvement seen only in tasks of crystallized cognition at week 24 (*P* = .03).
- **Conclusions**. Restorative yoga may be more effective in improving fluid cognitive function at week 24 when compared to vigorous yoga
  - Deng G, Bao T et al Integr Cancer Ther. 2022 Jan-Dec;21:15347354221089221. doi: 10.1177/15347354221089221. PMID: 35861215; PMCID: PMC9403449.JNCI Cancer Spectr. 2020 Jun 4;4(6):pkaa048.

RCT: Yoga and Self-Reported Cognitive Problems in Breast Cancer Survivors

Breast ca survivors (N = 200) RCT 12-wk 2x/wk Hatha yoga or wait-list control.

- Breast Cancer Prevention Trial (BCPT) Cognitive Problems scale at baseline, immediately post-intervention, and 3-month follow-up.

Results

- Cognitive complaints did not differ between groups immediately post-intervention (p = .250).
- **At the 3-month follow-up, yoga participants' BCPT Cognitive Problems scores were an avg 23% lower than wait-list scores (p = .003).**
  - differences remained after controlling for distress, fatigue, and sleep quality.
- More frequent practice resulted in better cognitive performance ($p < 0.001$).

Derry HM et al Psychooncology. 2015 Aug;24(8):958-66. doi: 10.1002/pon.3707. Epub 2014 Oct 21. PMID: 25336068; PMCID: PMC4405403.

Yoga & Inflammatory Markers

- Yoga impacts circulating cortisol and inflammatory markers
  - C-reactive protein (CRP)
  - Cytokines such as interleukin-1 beta (IL-1β), interleukin 6 (IL-6), tumor necrosis factor-alpha (TNF-α) and interferon-gamma (INF-γ)
- Evidence exists for yoga impacts on
  - telomerase activity,
  - β-endorphins,
  - Immunoglobulin A (IgA) and
  - brain-derived neurotrophic factor (BDNF) .

Carolina Estevao Brain Behav Immun Health. 2022 Feb 1:20:100421. doi: 10.1016/j.bbih.2022.100421.

Yoga's impact on inflammation, mood, and fatigue in breast cancer survivors: a RCT

200 breast ca survivors-RCT 3-month trial conducted with two post-treatment assessments

- 90-minute 2x/wk hatha yoga classes or a wait-list control.

Outcomes-

- PROs and lipopolysaccharide-stim production of proinflammatory cytokines IL-6, TNF-α, IL-1β

Results **Immediately post-treatment:**

- **fatigue** not lower (*P* > .05) but **vitality** was higher (*P* = .01) in yoga group c/w control group

At 3 months post-treatment,

- fatigue lower in yoga group (*P* = .002), vitality higher (*P* = .01), and IL-6 (*P* = .027), TNF-α (*P* = .027), and IL-1β (*P* = .037) lower for yoga participants c/w control group.
- At 3 months post-treatment, increasing yoga practice led to a decrease in IL-6 (*P* = .01) and IL-1β (*P* = .03) production but not TNF-α production (*P* > .05).

Groups did not differ on **depression** at either time (*P* > .2).

Frequency of yoga practice had stronger associations with fatigue at both post-treatment visits (*P* = .019; *P* < .001), as well as vitality (*P* = .016; *P* = .0045), but not depression (*P* > .05) –[49]

Kiecolt-Glaser JK et al. J Clin Oncol. 2014 Apr 1;32(10):1040-9. doi: 10.1200/JCO.2013.51.8860.

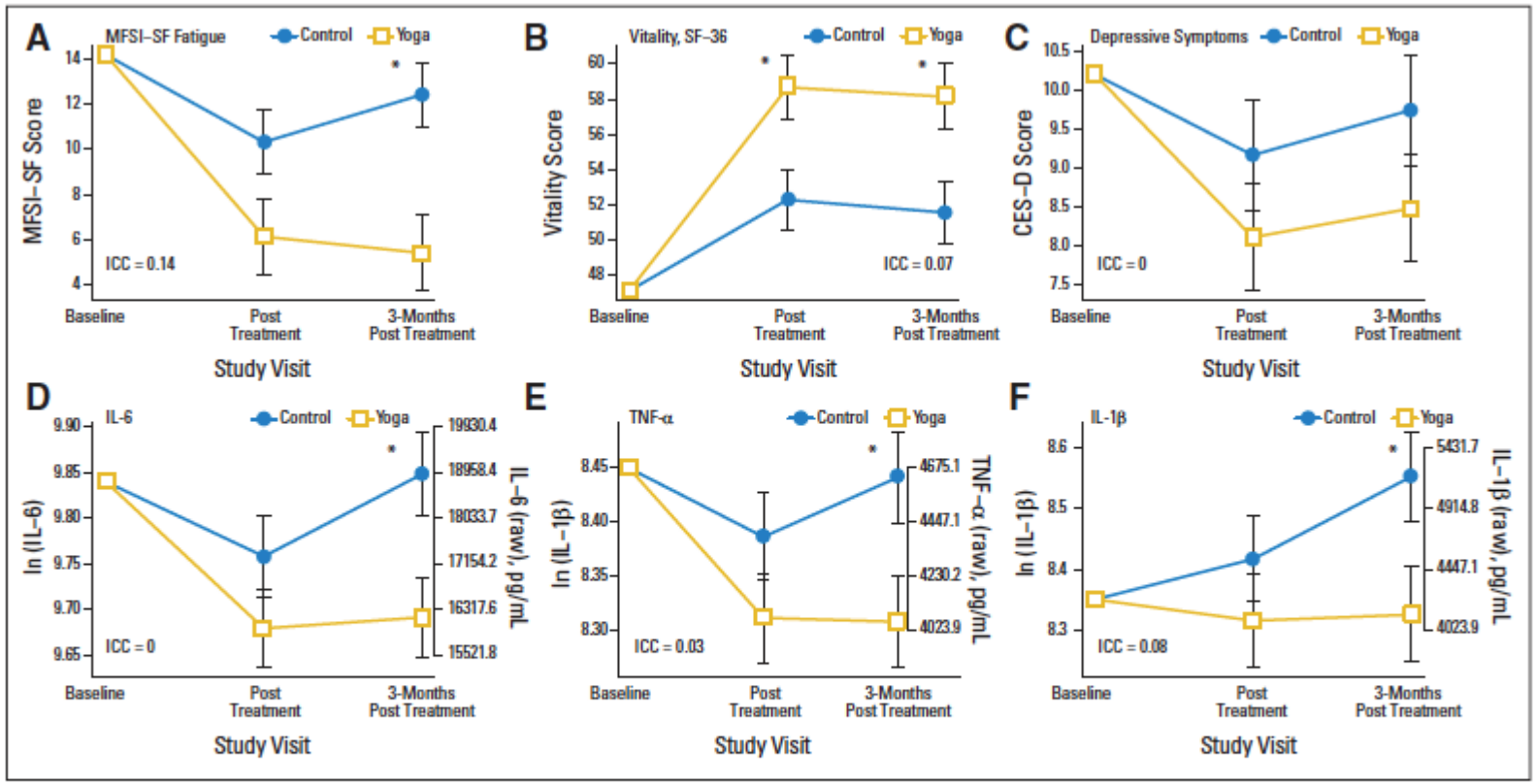


Fig 2. Changes in (A) Multidimensional Fatigue Symptom Inventory–Short Form (MFSI-SF) fatigue scores, (B) vitality scores (36-item short form [SF-36]), (C) depressive symptoms (Center for Epidemiological Studies–Depression [CES-D]), and (D, E, F) lipopolysaccharide-stimulated cytokine production (interleukin-6 [IL-6], tumor necrosis factor alpha [TNF-α], and interleukin-1β [IL-1β]) immediately post treatment and 3 months post treatment in the yoga and control groups. Results shown are mean ± SE from mixed models adjusting for baseline levels. All models conditioned on baseline outcome levels as specified a priori in the trial protocol. ICC, intraclass correlation coefficient. (*) $P < .05$ for group comparison. ln, natural log.

Kiecolt-Glaser JK et al. J Clin Oncol. 2014 Apr 1;32(10):1040-9. doi: 10.1200/JCO.2013.51.8860.

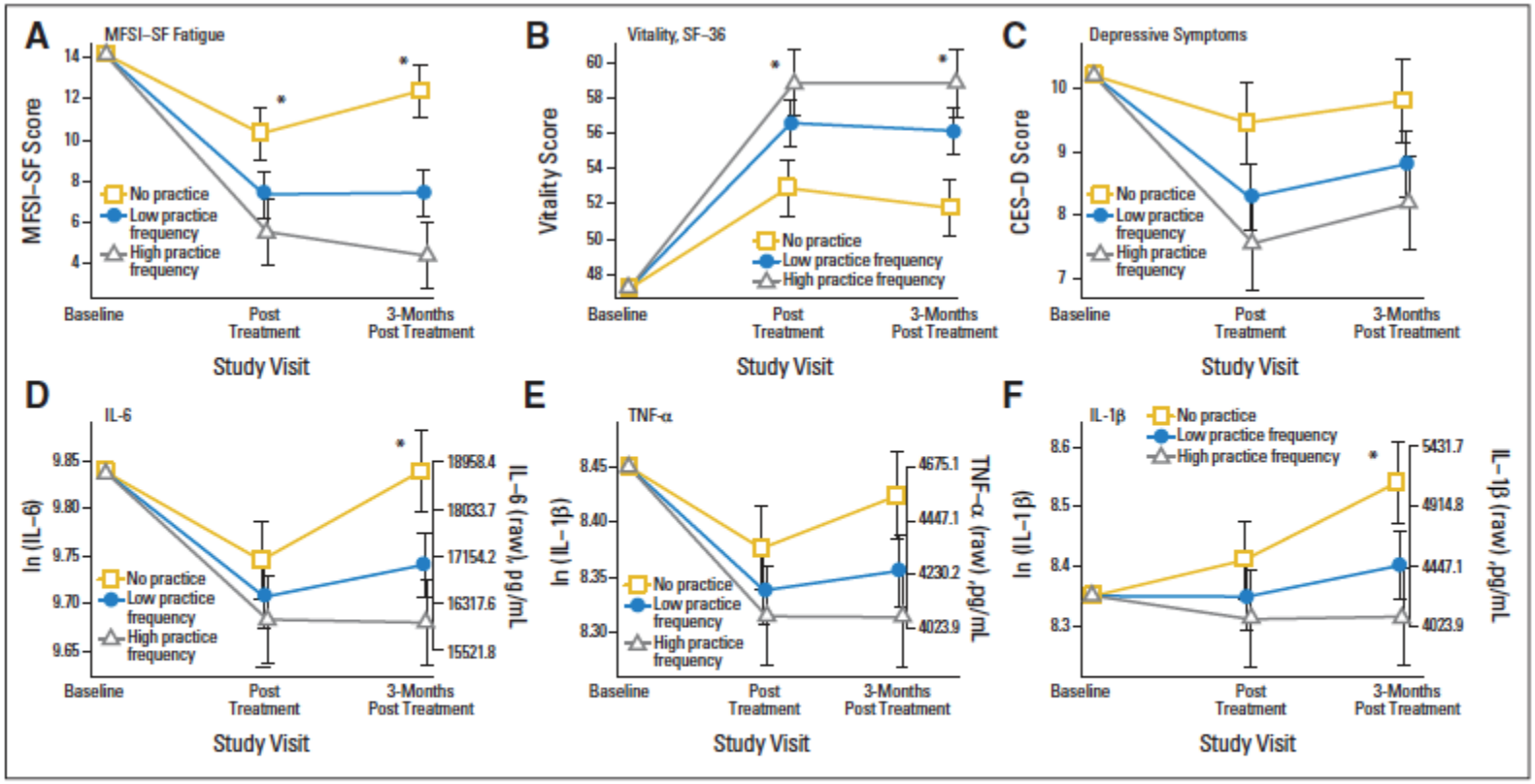


Fig 3. Changes in (A) Multidimensional Fatigue Symptom Inventory–Short Form (MFSI-SF) fatigue scores, (B) vitality scores (36-item short form [SF-36]), (C) depressive symptoms (Center for Epidemiological Studies–Depression [CES-D]), and (D, E, F) lipopolysaccharide-stimulated cytokine production (interleukin-6 [IL-6], tumor necrosis factor alpha [TNF-α], and interleukin-1β [IL-1β]) immediately post treatment and 3 months post treatment as a function of yoga practice frequency. Results shown are mean ± SE from mixed models adjusting for baseline levels, age, and sagittal abdominal diameter at yoga practice frequency levels of 0 minutes per day (control, no practice), 18 minutes per day (25th percentile; low practice), and 29 minutes per day (75th percentile; high practice). (*) $P < .05$ for the slope estimate in yoga practice frequency. ln, natural log.

- **Conclusion:** Chronic inflammation may fuel declines in physical function leading to frailty and disability. A regular practice could have substantial health benefits.

Kiecolt-Glaser JK et al. J Clin Oncol. 2014 Apr 1;32(10):1040-9. doi: 10.1200/JCO.2013.51.8860.

Chemotherapy Induced Peripheral Neuropathy (CIPN)

- Complicated topic
- Impact on ADLs, walking etc
- Symptoms: Tingling, numbness, pain
- Balance/Fall Risk/ Sensorimotor
  - Zhi WI, et al . Cancer Med. 2021 Aug;10(16):5456-5465. doi: 10.1002/cam4.4098. PMID: 34213086;
  - Bajaj P, et al Osteoporos Int. 2025 Feb;36(2):193-224. doi: 10.1007/s00198-024-07307-x.
- Variables-
- PS (cardiovascular, strength)
- Fear/Anxiety/ empowerment
  - Sidhu D et al Cancers (Basel). 2025 Jul 31;17(15):2533. doi: 10.3390/cancers17152533.
  - Ronconi G, et al Eur J Phys Rehabil Med. 2024 Jun;60(3):505-513. doi: 10.23736/S1973-9087.24.08197-8.

RCT: Yoga for Chemotherapy-Induced Peripheral Neuropathy and Fall Risk

- Breast and gyn ca survivors with persistent moderate-to-severe CIPN pain, numbness, or tingling with score of >= 4 /10 for >=3 mos after chemotherapy
- Randomized to 8 weeks usual care or yoga (breathwork & MSK conditioning)
- N= 41: yoga (n = 21) or usual care (n = 20).
- **Results:**
- At week 8, mean **NRS pain decreased** by 1.95 points (95% CI]= -3.20 to -0.70) in yoga vs 0.65 (95% CI = -1.81 to 0.51) in usual care **(*P* = .14).**
- **FACT/GOG-Ntx improve**d by 4.25 (95% CI = 2.29 to 6.20) in yoga vs 1.36 (95% CI = -0.47 to 3.19) in usual care **(*P* = .035).**
- **Functional reach** (predicts risk of falls) **improved** by 7.14 cm (95% CI = 3.68 to 10.59) in yoga and decreased by 1.65 cm (95% CI = -5.00 to 1.72) in usual care **(*P* = .001).**
- 4 grade 1 adverse events in the yoga arm.

Ting Bao et al JNCI Cancer Spectr. 2020 Jun 4;4(6):pkaa048. doi: 10.1093/jncics/pkaa048. eCollection 2020 DecPMID: 33225208 PMCID: PMC7666827

Yoga & Sleep

- 30-90% of cancer survivors report impaired sleep quality post-treatment
- Lifestyle interventions, such as exercise, are recommended in conjunction with drugs and cognitive behavioral therapy for the treatment of impaired sleep.

Multicenter, RCT of Yoga for Sleep Quality Among Cancer Survivors

- 410 breast ca survivors with sleep disruption up to 2 years post tx
  - Standard care vs
  - 4-wk yoga intervention: Yoga for Cancer Survivors (YOCAS) – pranayama, postures, meditation;
  - Two 75-min sessions/week.
  - PSQI and actigraphy pre- and postintervention.

- Improved global sleep quality
- (all P ≤ .05) c/w SOC
  - subjective sleep quality,
  - daytime dysfunction,
  - wake after sleep onset,
  - sleep efficiency,
  - Decreased medication use at 4 wks

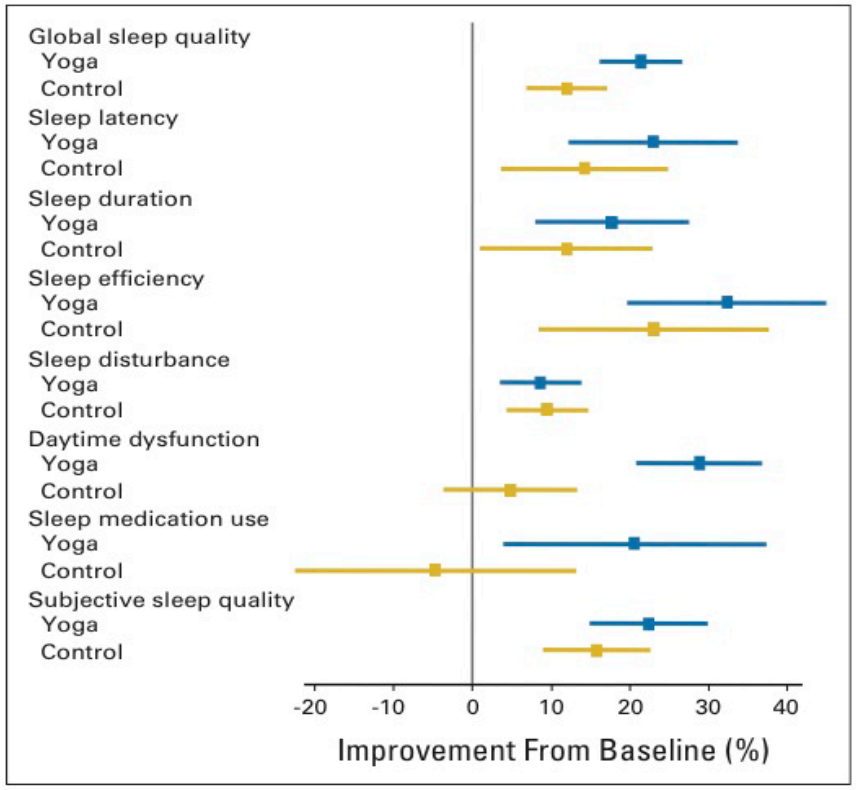


Fig 2. Percent improvement in global sleep quality and subscales from baseline to postintervention on the Pittsburgh Sleep Quality Index.

Mustian Kmet al . J Clin Oncol. 2013 Sep 10;31(26):3233-41. doi: 10.1200/JCO.2012.43.7707. Epub 2013 Aug 12. PMID: 23940231; PMCID: PMC3757292.

Online Yoga and Sleep in women with breast cancer: RCT

Establish an online yoga program for breast cancer patients and survivors-launched during the (COVID) pandemic

Participants (n = 173) had breast cancer or h/o breast cancer

Randomized to 6 wks online yoga, 2xwk, 45 min vs waiting control group.

Evaluated by standardized questionnaires (EORTC-QLQ 30 BR 23 and PSQI).

Protocol

- 10 min pranayama, 20–30 min medium paced yoga asanas and 10 min of meditation.

Results:

- 1/3 lost to follow up in both groups
- NO DATA on how many did the 2x/week
- The EORTC QLQ 30 BR 23 improved after yoga intervention c/w waiting group , but not significant $p = 0.140$.
- The physis score improved after 6 weeks of yoga c/w waiting group ($p = 0.04$).
- Dyspnea reduced after yoga practice c/w waiting group ($p = 0.012$).

- PSQI improved after 6 weeks yoga c/w waiting group ($p = 0.007$)
  - statistical significance was reached for sleep disturbance, sleep latency and day sleepiness.

D Đorđević et al Arch Gynecol Obstet. 2024 Jul;310(1):571-575. doi: 10.1007/s00404-024-07563-6. Epub 2024 May 30.

Stress, Mood, Depression/Anxiety

Yoga as a complementary therapy in prostate cancer survivors: a systematic review

- 5 studies involving 129 **prostate** cancer survivors.
- Systematic review observed that yoga has potential to:
  - enhance erectile function,
  - reduce fatigue and urinary symptoms,
  - alleviate psychological stress,
  - boost immune function,
  - improve the overall quality of life
  - feasibility of incorporating yoga into their regular routine.

D Boopalan et al Support Care Cancer. 2024 Jul 27;32(8): 553. doi: 10.1007/s00520-024-08754-2

Efficacy of exercise interventions on depression and anxiety in cancer patients: systematic review & meta-analysis

72 studies (6235 patients) & eight types of exercise : **Depression**

- Top three ranked by surface under cumulative ranking curve (SUCRA)
  - yoga (highest probability, SUCRA=74.9 %),
  - combination exercise (SUCRA=72.6 %), and
  - dance (SUCRA=68.7 %).

45 studies (3845 patients) & six types of exercise : A**nxiety**

- Top three ranked by surface under cumulative ranking curve (SUCRA)
  - yoga (highest probability, SUCRA=92.5 %),
  - aerobic exercise (SUCRA=61 %), and
  - walking (SUCRA=54.4 %).

Liang Li et al Neurosci Biobehav Rev. 2025 Jul 26:176:106304. doi: 10.1016/j.neubiorev.2025.106304.

Procedure related anxiety (Dyadic)

37 dyads were randomized.

Yoga group completed mean of 12.5 sessions

Sessions 45-60 min, total 15 sessions (3x/wk)

Sessions while receiving chemoradiation treatment.

Patients in yoga group had significantly less symptom interference and HNC symptom severity and better QOL than those in WLC

Yoga Group less likely to have a hospital admission (OR = 3.00), emergency department visit (OR = 2.14), and/or a feeding tube placement (OR = 1.78).

Milbury K et al J Pain Symptom Manage. 2024 Jun;67(6):490-500. doi: 10.1016/j.jpainsymman.2024.02.565. PMID: 38447621.

Yoga Therapy Protocol:

- Joint Loosening and facial exercises: 15 minutes
- Asanas: 20 minutes
- Pranayama (abdominal breathing, alternate nostril breathing and cooling breath):
- 10 minutes-Visualization if nasal cavity limitations
- DRT with sound resonance: 5 minutes
- Meditation: 5-10 minutes

RCT Breathwork

One Month Practice (N=114) 5 min daily

- **Cyclic Sighing (I<E) vs Box Breathing (equal I:E:& Retentions) vs Cyclic Hyperventilation (I>E)**
- Endpoints: improvement in mood/anxiety and reduced sympathetic arousal (RR, HR, HRV).
- Results –Positive and Negative Affect Schedule (PANAS)
  - Self reported questionnaire two 10 item scales
  - Mediation and Breath work group practiced avg 17-19/28 days
  - **Breathwork group: higher increase in daily positive affect esp. exhale-focused cyclic sighing, produces greater improvement in mood ($p < 0.05$) and reduced respiratory rate ($p < 0.05$)**
  - Effect correlated with higher adherence
  - **Cyclic sighing group had highest increase in positive affect over the month**
  - Breathwork had lower RR (no change in HRV)
  - Theoretically, breath work may allow greater sense of control over one's internal state

Balban MY et al 2023 Cell Reports Medicine (4) 100895

Experience

Monday	Tuesday	Wednesday	Thursday	Friday
Yoga for Health 10:30-11:30 a.m. **Connect & Reflect with Music** 1:30-2:30 p.m. **Yoga for Health** 5-6 p.m.	**Pranayama/Breathing** 10-11 a.m. **Yoga for Health (In-person)*** 10:30-11:30 a.m.	**Yoga for Health** 10:30-11:30 a.m. **Healing Through Writing** 2-3 p.m. (second Wednesday of the month only)	**Chair Yoga** 10:30-11:30 a.m. **Yoga Nidra** 2-3 p.m.	**Yoga for Health** 10:30-11:30 a.m.

Yoga Studies…

Yoga Positives

- Low-cost, potentially high yield
- Low risk
- Practices are not patented and are available to everyone

Yoga Unknowns

- Data weak (small numbers)
- Data limited (women, variables, culture, age, language, lasting effects, safety
- Is it tied to placebo effect?

Future Needs

- Readiness for action?
- RCT- standardization of “everything”
- Yoga ADC equivalent

Yoga Benefits

Improved Physical Function:

- Yoga can help increase strength, flexibility, and range of motion, making daily activities easier.

Reduced Fatigue:

- Yoga can help combat this by improving energy levels and reducing tiredness.

Pain Management:

- Yoga can be a helpful addition to pain management strategies, potentially reducing need for pain medication.

Improved Sleep:

- Yoga can improve sleep quality and reduce insomnia.

Reduced Stress and Anxiety:

- Yoga helps regulate the body's stress response and reduce anxiety levels.

Improved Mood:

- Yoga can help improve mood and reduce symptoms of depression.

Enhanced Well-being:

- Promotes relaxation and mindfulness, and a greater sense of overall well-being.

Improved Cognitive Function:

- Some research suggests yoga can improve cognitive function and memory.

Thank You