Mind-Body Medicine in Women’s Cancers and Health
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What is Mind-Body Medicine?

- uses awareness, relaxation, concentration, and intentional redirection of thoughts and emotions (words, images, feelings) to influence physical health
- the natural healing capacity within us is our most powerful ally in becoming and staying well
- thoughts, feelings, beliefs and attitudes affect the physical body positively or negatively
- exercise, posture, yoga, breathing practices – affect our mental-emotional state. There is a reciprocal relationship between body and mind.

The Language of Mind-Body Medicine

“The brain and peripheral nervous system, the endocrine and immune systems, and indeed, all the organs of our body and all the emotional responses we have, share a common chemical language and are constantly communicating with one another.” — Dr. James Gordon, Mind-Body specialist, Harvard psychiatrist, founder/director of the Center for Mind-Body Medicine

Our thoughts, consisting of words, images, body sensations and emotional feelings, are translated into the common chemical language of the:
1) nervous system – neurotransmitters
2) endocrine system – hormones
3) immune system – cytokines
Together, these thoughts, chemicals and systems inform our health.

Mind-Body Therapies

- Biofeedback
- Cognitive Behav Therapy
- Relaxation Techniques
- Visualization
- Mindfulness
- Meditation
- Prayer, Sacred Ritual
- Hypnosis
- Reiki, Therapeutic Touch
- Expressive Arts (Dance, Art, Music)
- Emotional Freedom Technique
- NMT/BodyTalk
- Breathing Exercises
- Yoga/Pilates
- Tai Chi
- Qigong
- Support Groups

Mechanisms by Which Mind-Body Medicine Affects Cancer

- nervous, endocrine and immune system are intimately linked = psychoneuroimunoendocrine system
- the cells of each of the 3 systems can express receptors for the mediators (cytokines, hormones and neurotransmitters) of the other 2 systems
- immune, nervous and endocrine products coexist in lymphoid, endocrine and neural tissue
- endocrine and neural mediators can affect the immune system because the immune organs are irrigated and innervated by them.
- immune mediators can affect endocrine and neural function. Some leukocytes pass blood-brain barrier.

Mechanisms by Which Mind-Body Medicine Affects Cancer

- immune mediators, such as cytokines, affect the brain
- CNS shows an immune response via glial cells, ependymal cells or neurons
- immune cells can produce neurotransmitters and hormones
- nervous and endocrine cells can produce cytokines
- thus stress and anxiety make us more vulnerable to infection, cancer and autoimmune disease
- wholeness, self-empowerment, joy and hope help us overcome immune related diseases and be healthier
- health results when the nervous, immune and endocrine systems and their mediators are in balance
What are Cytokines?
- soluble messengers that immune cells produce to either attack an invading organism or talk to other immune cells
- form part of the immune response that can either assist development of cancer or inhibit it
- are involved in chronic inflammatory pathways associated with cancer development
- cytokines may try to promote tissue repair, but inadvertently promote tumour growth and invasiveness

Cytokines and Cancer
- tumours contain immune cells and both pro and anti-inflammatory cytokines
- pro-inflammatory cytokines are associated with fatigue, depression, cognitive impairment, anorexia and cachexia, pain, toxicity of treatment and resistance to treatment
- physical activity modifies cytokine levels and decreases fatigue in cancer patients

Cytokines and Th1/Th2 Immunity
- Cytokines play an important role in both directing tumour progression or improving anti-tumour immunity
- they regulate key immune pathways through the balance between cell-mediated (Th1) and humoral (Th2) responsiveness.
- deregulation between Th1 and Th2 immune response is associated with cancer progression
- loss of Th1-type responses are evident in tumour bearing animals and cancer patients

Tai Chi Intervention Affects Cytokines
- A controlled study was performed in 32 lung cancer survivors who practiced Tai Chi during a 16-week period. The percentages of interferon γ-producing CD8+ T lymphocyte cells (T1) and interleukin 4-producing CD8+ T lymphocyte cells (T2) and CD3+ T lymphocyte subsets (Th1, Th2, cytotoxic T cell type 1 [Tc1], Tc2) were determined as well as levels of hormones β-endorphin, general catecholamines, and cortisol.

Tai Chi Intervention Affects Cytokines cont’d
- A 16-week Tai Chi exercise significantly diminished the magnitude of the decreased T1/T2 ratio in the natural course of recovery in a population of postsurgical non-small cell lung cancer survivors.
- Tai Chi may have a role in ameliorating the imbalance between humoral and cellular immunity, potentiating human immunity against tumors.
Yogic Meditation Decreases Pro-Inflammatory Cytokines

- one study found that brief daily yogic meditation may reverse the pattern of increased NF-κB-related transcription of pro-inflammatory cytokines in leukocytes
- yoga therapy has the potential to reduce cancer stem cell survival, self-renewal and tumor growth by modifying the tumor microenvironment through various mechanisms such as:
  1) reducing hypoxia and cancer stem cell activity by enhanced oxygenation
  2) promoting NK cell activity directly (or indirectly through downregulating NF-κB expression), thereby enhancing NK cell mediated cancer stem cell lysis
  3) by minimizing abnormal expressions or activities of various hormones, cytokines, chemokines and tumor signaling pathways. J Stem Cells 2012;7(4):261-7

Mindfulness Meditation Decreases Pro-Inflammatory Cytokines

- Early stage breast cancer patients, who did not receive chemotherapy, self-selected into an 8-week MBSR program or into an assessment only, control group.
- At the first assessment (i.e., before MBSR start), reductions in peripheral blood mononuclear cell NK cell activity (NKCA) and IFN-gamma production with increases in pro-inflammatory IL-4, IL-6, and IL-10 production and plasma cortisol levels were observed for both the MBSR and Non-MBSR groups of breast cancer patients.

Obesity, Exercise and Cytokines

- exercise interventions of moderate intensity led to significant reductions in circulating levels of IL-6, TNF-α, and IL-8 in healthy individuals. Prev Med 2005 Apr;40(4):432-7
- the biological response to exercise was found to be dependent on the intensity and duration of the activity. Sports Med 2001 Feb;31(2):119-44
- an acute session of high intensity exercise induced significant increases in interleukin (IL)-6, IL-8, IL-10, tumor necrosis factor-α, and monocyte chemotactic protein-1 compared with rest. J Inflamm Res 2014 Jan 9;7:9-17

Yoga Practice Increases Vitality and Decreases Inflammation

- Breast cancer treatment with chemotherapy and radiation often results in fatigue, decreased vitality and increased inflammation
- Inflammation can be measured by assessing the pro-inflammatory cytokines IL-6, TNF-α, and IL-1β
- Chronic inflammation is associated with cancer growth and recurrence.
- A controlled study of 200 breast cancer survivors who practiced hatha yoga for 90 minutes twice weekly for 12 weeks, found that yoga practice improved vitality, decreased fatigue and decreased IL-6, TNF-α, and IL-1β in comparison to a control group.
- The more frequently women practiced, the greater the increase in vitality and decrease in fatigue.
- Regular yoga practice has substantial health benefits due to its ability to decrease fatigue, increase vitality and decrease inflammation. J Clin Oncol. 2014 Apr 1;32(10):1040-9.

Obesity, Exercise and Cytokines

- obesity is characterized by chronic mild inflammation with increased CRP and fibrinogen. Int J Obes Relat Metab Disord 2001 Oct;25(10):1407-15
- adipose tissue functions as a secretory organ for inflammatory markers, including TNF-α, IL-6, IL-8, and VEGF. Biochem Soc Trans 2005 Nov;33(Pt 5):1078-81
- increased production and release of TNF-α, IL-6, and IL-8 by adipose tissue are associated with degree of obesity
- diet and/or exercise induced weight loss is associated with a reduction in these inflammatory factors. Am J Clin Nutr 2004 Apr;79(4):544-51

Yoga Helps Manage Breast Cancer Related Lymphedema

- Secondary arm lymphedema affects at least 20% of women after treatment for breast cancer, requiring lifelong professional treatment and self-management.
- Participants were randomised to receive either an 8-week yoga intervention (n=15), consisting of a weekly 90-minute teacher-led class and a 40-minute daily session delivered by DVD, or to a usual care wait-listed control group (n=13).
- Primary outcome measures were: arm volume of lymphedema measured by circumference and extra-cellular fluid measured by bioimpedance spectroscopy.
- Secondary outcome measures were: tissue indentation measured by plethysmometry, levels of sensations, pain, fatigue, and their limiting effects all measured by a visual analogue scale (VAS) and quality of life based on the Lymphedema Quality of Life Tool (LYMQOL).

Measurements were conducted at baseline, week 8 (post-intervention) and week 12 (four weeks after cessation of the intervention).
Yoga Helps Manage Breast Cancer Related Lymphedema

- At week 8, the intervention group had a greater decrease in tissue induration of the affected upper arm compared to the control group, as well as a greater reduction in the symptom sub-scale for QOL. There was no difference in arm volume of lymphedema or extra-cellular fluid between groups at week 8; however, at week 12, arm volume increased more for the intervention group than the control group (p=0.032).
- Yoga may reduce lymphedema when practiced regularly. *BMC Compl Altern Med* 2014 Jul 1;14:214

Yoga Improved Wound Healing After Breast Cancer Surgery

- distress in breast cancer patients can delay recovery from surgery
- one study of breast cancer patients compared a post-surgery 4 week yoga program (33 women) vs supportive therapy and exercise rehabilitation (36 women)
- the yoga group had a decreased duration of hospital stay, decreased days of drain retention and suture removal compared to controls
- the yoga group had a decrease in TNF-alpha levels following surgery. *Int J Yoga* 2008 Jan;1(1):33-41

Relaxation and Visualization Improves Wound Healing

- 60 patients were randomised to receive standard care or standard care plus a 45 min psychological intervention that included relaxation and guided imagery with take-home relaxation CDs for listening to for 3 days before and 7 days after surgery.
- In both groups tubes were inserted during surgery and removed at 7 days after surgery and analysed for hydroxyproline as a measure of collagen deposition and wound healing.
- Intervention group patients showed a reduction in perceived stress compared with the control group, controlling for age.
- Patients in the intervention group had higher hydroxyproline deposition in the wound that did control group patients.
- A brief relaxation intervention prior to surgery can reduce stress and improve the wound healing response in surgical patients. The intervention may have particular clinical application for those at risk of poor healing following surgery. *Brain Behav Immun.* 2012 Feb;26(2):212-7

Mindfulness Meditation Decreases Pro-Inflammatory Cytokines cont’d

- Over time women in the MBSR group re-established their NKCA and cytokine production levels.
- In contrast, breast cancer patients in the Non-MBSR group exhibited continued reductions in NKCA and IFN-gamma production with increased IL-4, IL-6, and IL-10 production.
- Moreover, women enrolled in the MBSR program had reduced cortisol levels, improved QOL, and increased coping effectiveness compared to the Non-MBSR group. In summary, MBSR is a program that is feasible for women recently diagnosed with early stage breast cancer and the results provide preliminary evidence for beneficial effects of MBSR; on immune function, QOL, and coping. *Brain Behav Immun.* 2008 Aug;22(6):969-81

Psychoneuroimmunoendocrine Markers Improve After 8 Week MBSR Program

- One study investigated the ongoing effects of participation in a mindfulness-based stress reduction (MBSR) program on quality of life (QL), symptoms of stress, mood and endocrine, immune and autonomic parameters in early stage breast and prostate cancer patients.
- Forty-nine patients with breast cancer and 10 with prostate cancer enrolled in an eight-week MBSR program that incorporated relaxation, meditation, gentle yoga and daily home practice. Demographic and health behaviors, QL, mood, stress symptoms, salivary cortisol levels, immune cell counts, intracellular cytokine production, blood pressure (BP) and heart rate (HR) were assessed pre- and post-intervention, and at 6- and 12-month follow-up.

Psychoneuroimmunoendocrine Markers Improve After 8 Week MBSR Program

- Patients were assessed pre- and post-intervention and at 6- and 12-month follow-up, respectively.
- Significant improvements in overall symptoms of stress were maintained over the follow-up period.
- Cortisol levels decreased systematically over the course of the follow-up.
- Immune patterns over the year supported a continued reduction in Th1 (pro-inflammatory) cytokines. Systolic blood pressure (SBP) decreased from pre- to post-intervention and heart rate reduced. *Brain Behav Immun.* 2007 Nov;21(8):1038-49.
Stress, Cortisol and Cancer

- DNA damage is increased by exposure to stress and stress hormones (cortisol, catecholamines).
- Stress-related psychosocial factors are associated with higher incidence, poorer survival and increased mortality in cancer patients.

Cortisol and Cancer

- Women’s stress increases with a cancer diagnosis, as well as anxiety about treatment, prognosis, and disruptions in daily living.
- Cancer-related stress has a negative impact on health, possibly via neuroendocrine pathways and their effects on the immune system.
- Cortisol, a steroid hormone secreted by the adrenal cortex, is used to assess hypothalamic-pituitary-adrenal axis function and is a reliable measure of physiological stress.
  - J Clin Pathol 2012;65:934-9
- Cortisol affects multiple physiological processes, including metabolic and immune responses (e.g., suppresses T lymphocyte functions and natural killer cell cytotoxicity).

Cortisol and Cancer

- Women living with breast cancer have higher cortisol levels compared to healthy women, and higher cortisol levels are associated with greater disease severity in women with breast cancer.
- Neuroendocrine regulation of cortisol and other adrenal hormones may contribute to cancer progression and health outcomes through multiple mechanisms.
- Women with breast cancer may show decreases in cortisol levels if they are taught stress management techniques.

Exercise, Depression and Cortisol

- 85 women treated for breast cancer were randomly allocated to a 6-month exercise and hypocaloric healthy eating program plus usual care, or usual care alone (control group).
- Women in the intervention group received three supervised exercise sessions per week and individualized dietary advice, supplemented by weekly nutrition seminars.
- Compared with the control group, the intervention group exhibited a reduction in depressive symptoms.
- The intervention group had an increase in morning salivary cortisol at the 6-month follow-up indicating a change in HPA axis regulation.
  - Breast Cancer Res. 2014 Apr 14;16(2):R39

Exercise, Depression and Cortisol cont’d

- One study examined the effects of a cognitive-behavioral stress management group intervention on serum cortisol levels in women being treated for stage I or II breast cancer.
- Women were taught to examine the positive benefits breast cancer had made on their lives, and to reframe their experiences in this light.
- The participants who showed increased benefit-finding had reduced serum cortisol levels, whereas control subjects did not.
- These findings suggest that positive interpretations of the breast cancer experience can influence physiological parameters such as cortisol among women with early stage breast cancer.
Cortisol, Cytokines and Cancer

- Fatigued breast cancer survivors show a blunted cortisol response to an experimental psychological stressor.
- Relative to non-fatigued control survivors, fatigued breast cancer survivors showed increases in production of pro-inflammatory IL-1 beta and IL-6 following the stressor.
- Fatigued participants showed significantly less salivary cortisol increase after the stressor.
- Blunted cortisol responses were associated with significantly increased production of IL-6 in response to stress.

Mood, Neurotransmitters and Cancer

- Reduced emotional expression has been consistently related to susceptibility or fast progression of breast cancer, often occurring after rejection or separation-related events.
- The neuropeptide oxytocin is low in response to rejection or separation.
- Oxytocin may protect against the development of breast cancer and slow its progression.

Personality Traits and Cancer

- 118 women, 58 diagnosed with breast cancer and 60 healthy women, of similar ages and personal circumstances were assessed in psychological aspects and stressful life events.
- The results revealed more stressful vital events in the last two years in the group of women with breast cancer and significant differences in the degree of current distress.
- Women with breast cancer obtained higher scores in current anger, resignation, and neuroticism.

How to Facilitate Emotional Expression in Patients?

- Ask open-ended questions about their life and relationships such as:
  - “What is your relationship like with your parents?”
  - “What is your relationship like with your work?”
  - “What is your relationship like with your spouse?”
  - “What is your relationship like with your children?”
  - “What causes you anxiety?”
  - “What are your current stressors?”

- Health is about wholeness - our emotional, physical, and spiritual lives come together with integrity.
Ways to Increase Oxytocin

- higher oxytocin levels increase the strength of human bonding, increase our trust in others, decrease our anxiety in social situations, decrease aggressive behaviour and help us to feel calm and content in our intimate relationships.
- a deficit of oxytocin may make us more susceptible to social isolation and depression, and we’ll have trouble nourishing ourselves and others.

Mind-Body Factors that Disrupt the Psychoneuroimmunoendocrine System

- social isolation increases morbidity and mortality
- maternal deprivation or loss early in life
- long term care-giving to an ill partner
- disruption of the circadian rhythm (night shifts)
- age-related dysregulation
- obesity
- chronic stress, with blunted or elevated cortisol and catecholamines
- oxidative and inflammatory stress, which occur with aging, anxiety, infection, toxicity
  

Mind-Body Practices that Restore the Psychoneuroimmunoendocrine System

- conscious breathing
- mindfulness/present moment awareness
- emotional authenticity
- being able to say “no”
- stretching – yoga, Pilates, Tai Chi
- sleep
- exercise
- meditation
- chanting, singing
- daily relaxation
- social connection, support, love
- visualization of a positive outcome, refreshing
- prayer
- faith/spirituality
- forest bathing, gardening, time in nature
- self-expression
- laughter
- purpose and meaning
- self-actualization
- creative arts

Healing the Person vs Curing Cancer

- ideally we heal the whole person while simultaneously helping to cure cancer
- 2 in 5 Canadians will get cancer in their lifetimes and 1 in 4 will die from it – it takes us out
- if we aren’t able to cure it, how can we help patients heal despite having cancer?
- Mind-Body Medicine presents NDs with opportunities to facilitate profound healing in people with cancer.
What Does It Mean to Be Healed?
- we are relaxed and at peace with “what is” and with our past
- we love and accept ourselves and others and have meaningful social connections
- we have resolved internal conflict
- we experience self-appreciation, self-forgiveness
- we find meaning, purpose and joy in the moment
- we express ourselves authentically
- we are connected with our spirit and the larger whole
- we share our talents, creativity and resources and envision a bright future, or are at peace with dying

Cancer as an Opportunity for Transformation
- after the fact, many cancer patients are grateful for the experience
- gives them permission to live their “unlived life”
- brings the focus back to them, rather than needs of the family or work
- cancer as a dramatic spiritual journey; loss of ego identity; need to submit, surrender, connect with spirit
- an opportunity to change partners, career, focus and attitude
- can be a time of integration, saying “no”, spiritual renewal
- importance of becoming a “different person” than who you were when you became sick. Change the thoughts, words, images, beliefs, body sensations and feelings that promoted the illness

Cancer, Post-traumatic Growth and Cortisol
- In the aftermath of a traumatic event, such as being diagnosed with breast cancer, an individual may also experience beneficial changes in life perspective, relationships with others, and more.
- These changes are collectively known as post-traumatic growth.
- There was a significant correlation between post-traumatic growth and a diurnal cortisol slope.
- This indicates that positive psychological changes and healthier endocrine functioning in cancer patients can result in more normal (i.e., steeper diurnal) cortisol patterns. *Psychoneuroendocrinology* 2014 Jun;44:83-7

How Can You Re-Invent Yourself?
- What is the new story that wants to be lived?
- What beliefs need to change to support the new story?
- Does your environment need changing?
- Who are the people you like to be around, who support you?
- What are you passionate about? What gives you meaning? How can you use your gifts?

The Meaning Mandala
Have person draw a large daisy, or tree or mandala. On each petal, branch or section, answer one of the following 18 questions:
- What did I come here to heal?
- What did I come here to express?
- What did I come here to create?
- Who did I come here to forgive?
- What talents have I come to develop?
- What causes have I come to serve?
- What did I come here to see?
- What did I come here to do?
- Who did I come here to be?
- What brings me joy?
- What did I come here to hear?
- What did I come here to feel?
- Where lies my passion?
- What did I come here to experience?
- What did I come here to learn?
- Who did I come here to love?
- What did I come here to enjoy?
- What am I to start or finish?

Social Support
- when you can talk to someone about your illness, it becomes less threatening
- social sharing gives greater sense of control
- social sharing can occur through extended family, friendships, volunteering for a charity, belonging to a club or religious/spiritual group, participating in online forums
- positive involvement with others helps maintain healthy habits ie Healthy Breast Program facebook group
Social Support cont’d

- Social support increases oxytocin, blunts the stress response.
- Heightened stress response caused by chronic social isolation is linked to increased mammary tumor growth in rodent models of breast cancer.
- Social isolation and stress-induced changes in neuroendocrine axis in mice are associated with increased expression of key metabolic genes in mammary adipocytes linked with increased glucose metabolism, lipid synthesis, leptin secretion, and increased proliferation of mammary cancer cells.

Cancer Prev Res 2013 Jul;6(7):634-45

Social Support cont’d

- The effect of psychosocial intervention on time of survival of 86 patients with metastatic breast cancer was studied prospectively.
- The 1 year intervention consisted of weekly supportive group therapy with self-hypnosis for pain. Both the treatment (n = 50) and control groups (n = 36) had routine oncological care.
- At 10 year follow-up, only 3 of the patients were alive, and death records were obtained for the other 83. Survival from the onset of intervention was a mean 37 months in the intervention group compared with 19 months in the control group, a significant difference.


Components of a Daily Mind-Body Medicine Program

1. Moderate exercise 40-60 min
2. Breathing exercises or meditation of 11 min or more
3. Yoga/taichi/Qigong 1 hour
4. Relaxation breaks, naps of 10-20 min x 3
5. Emotional awareness and expression
6. Acceptance, gratitude, focus on positive
7. Meaningful work, sense of purpose
8. Meaningful, loving social interactions, physical contact
9. Healthy boundaries, capacity and permission to say “no”
10. 8 hours quality sleep