

CANCER-RELATED FATIGUE AND EXERCISE CONSIDERATIONS

Cancer-Related Fatigue

- “Distressing, persistent, subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual functioning”

[National Comprehensive Cancer Network. Cancer-Related Fatigue (Version 2.2018). https://www.nccn.org/professionals/physician_gls/pdf/fatigue.pdf Accessed February 9, 2019.]

Subjective and objective components of CRF

- Physical performance
 - *Weakness or tiredness*
- Mood
 - *Depression, anxiety*
- Motivation
 - *Lack of initiative*
- Cognition
 - *Slowing of thought process, distraction or memory deficits*
- Social functions
 - *Reduced ability to sustain social relationships*

[Gerber LH. Cancer-Related Fatigue: Persistent, Pervasive, and Problematic. *Phys Med Rehabil Clin N Am.* 2017 Feb;28(1):65-88.]

Causes of Fatigue

- Cancer
- Cancer treatment
- Anemia
- Infection
- Hormonal changes
- Cardiac problems
- Pain
- Emotions/Stress
- Changes how body uses food for energy
- Trouble breathing or lack of oxygen
- Poor nutrition
- Dehydration
- Weight loss/muscle wasting
- Medications
- Being less active
- Lack of sleep

[National Cancer Institute: PDQ® Fatigue. Bethesda, MD: National Cancer Institute <https://www.cancer.gov/about-cancer/treatment/side-effects/fatigue/fatigue-pdq#section/all> Accessed on Feb 9, 2019.]

Theory on How Cancer Treatments Cause Fatigue

- Extra energy is required to repair and heal body tissue damaged by treatment
- Build-up of toxins due to cell death caused by cancer treatment
- Effect of biologic therapy on the immune system
- Altered sleep-wake cycle

[National Cancer Institute: PDQ® Fatigue. Bethesda, MD: National Cancer Institute <https://www.cancer.gov/about-cancer/treatment/side-effects/fatigue/fatigue-pdq#section/all> Accessed on Feb 9, 2019.]

Screening for Fatigue

- Numeric Rating Scale (0-10)
 - 0 = no fatigue and 10 = worst fatigue imaginable
 - Mild fatigue: 1 to 3
 - Moderate fatigue: 4 to 6
 - Severe fatigue: > 7
- Research shows that patients with scores > 7 have significant decreased functioning

[National Comprehensive Cancer Network. Cancer-Related Fatigue (Version 2.2018). https://www.nccn.org/professionals/physician_gls/pdf/fatigue.pdf Accessed February 9, 2019.]

History and Subjective Complaints

- Onset, Pattern, Duration, Changeover time
- Associated and alleviating factors
- Impact on function
- Social support
- Medications
 - Beta-blockers may elicit bradycardia and subsequent fatigue
 - Combination of medications such as narcotics, antidepressants, antiemetic, and antihistamines may contribute to drowsiness and increased fatigue
- Past medical history
 - Cardiac such as CHF
 - Hypothyroidism
- Sleep
 - Environment
 - Regular sleep schedule
 - Naps during the day
 - Quality
 - Feel rested when wake
- Diet habits
 - Caffeine, alcohol, high sugar foods before bed

[National Comprehensive Cancer Network. Cancer-Related Fatigue (Version 2.2018). https://www.nccn.org/professionals/physician_gls/pdf/fatigue.pdf Accessed February 9, 2019.]

Tests and Measures

	ICC (95%)	SEM	MDC95%
Physical Performance			
6 Minute Walk Test (meters)	0.960	18.5	51.4
10 Meter Walk Test (meters/second)	0.941	0.08	0.23
30 Chair Stand Test (repetitions)	0.948	>1	>3
Patient Reported Outcomes			
Modified Brief Fatigue Inventory	0.825	0.5	1.3-1.4
FACT - Fatigue	0.866	3.1-3.7	8.5-10.2

Note: SEM and MDC95% values calculated based on data provided in tables

[Eden M et al. Reliability and a correlational analysis of the 6MWT, ten-meter walk test, thirty second sit to stand, and linear analog scale of function in patients with head and neck cancer. *Physiotherapy Theory and Practice*. 2018;34:202-211.]

[Eden M, Kunkel K. Psychometric Properties of the Modified Brief Fatigue Inventory and FACT-Fatigue in Individuals with Cancer of the Head and Neck. *Rehabilitation Oncology*. 2016;34:97-103]

Treatment of Cancer Related Fatigue

- Cancer related fatigue is often caused by more than one problem so multiple health professionals (physicians, nurses, social workers, physical therapists, nutritionists) may be involved in treating cancer related fatigue.
- Although CRF may improve with addressing any medical condition that may be causing or worsening fatigue (i.e. pain, depression or anxiety, lack of sleep, poor nutrition, anemia, or other medical conditions), other treatments may have to be used to reduce or manage fatigue.
- Physical therapists role in the management of cancer related fatigue can include patient education (pattern of fatigue, self-monitoring, energy conservation, sleep hygiene) and exercise prescription.

Patient Education

■ **Pattern of Fatigue**

- Educate patient on the pattern of fatigue, which may depend on the type of cancer treatment
 - **Chemotherapy**
 - Fatigue peaking 2-7 days after receiving treatment. After this period there may be a decrease in fatigue but patient does not return to pre-treatment fatigue levels
 - **Radiation**
 - Fatigue gradually increases during treatment with a slow decline to pre-treatment levels by 3 months after treatment

[Schwartz AL, Nail LM, Chen S, et al. Fatigue patterns observed in patients receiving chemotherapy and radiotherapy. *Cancer investigation*. 2000;18(1):11-19.]
[Miller M, Maguire R, Kearney N. Patterns of fatigue during a course of chemotherapy: results from a multi-centre study. *European journal of oncology nursing : the official journal of European Oncology Nursing Society*. Apr 2007;11(2):126-132.]

Patient Education

■ **Self-Monitoring**

- Patients could be educated on how to monitor fatigue levels, sleep, activity, and other symptoms through a journal.
- By maintaining a journal, the patient can recognize peak energy periods so they can plan activities accordingly within a structured routine.
- An energy-conservation plan can also be created to manage valued activities and decrease fatigue interference.

[National Comprehensive Cancer Network. Cancer-Related Fatigue (Version 2.2018). https://www.nccn.org/professionals/physician_gls/pdf/fatigue.pdf Accessed February 9, 2019.]

Patient Education

■ **Energy Conservation**

- **Definition**
 - The deliberately planned management of one's personal energy resources to their depletion
- **Objective**
 - Balance rest & activity during times of high fatigue so the patients can perform valued activities and meet desired goals
- **Strategies**
 - **Prioritize:** eliminate or reduce tasks
 - **Delegate:** give tasks to family or friends
 - **Pace:** attend to one activity at a time
 - **Plan:** schedule tasks at peak times of energy & balance hard tasks with easier tasks
 - **Reduce Effort:** Sit down to accomplish tasks & hold objects close to body when carrying
 - **Organize:** Move items used frequently closer to you

[Barsevick AM. A pilot study examining energy conservation for cancer treatment-related fatigue. *Cancer Nursing*. 2002;25:333-341]

Patient Education

- **Energy Conservation Example**
 - *Tips for Cleaning/Housework*
 - Only clean one room per day
 - Use a rolling cart or apron with large pockets to carry supplies from room to room
 - Keep extra supplies on every floor
 - Vacuum rather than sweep
 - Don't bend to scrub – use a long handled sponge
 - If possible, drag or slide objects rather than lift
 - Take trash out in small bags to avoid heavy lifting
 - Stop working before you become too tired

Patient Education

- **Proper sleep hygiene**
 - *Educate patient on proper sleep , which should include:*
 - Conducive environment (dark, quiet & comfortable)
 - Eliminate factors that impact sleep (TV, computer, or cell phone usage & the consumption of caffeine, alcohol, or high sugary foods before bed)
 - *Educate patient on the benefits of daytime naps and how they replenish energy levels when they are less than 1 hour. More than 1 hour may interfere with sleep at night.*
- **Distraction-based activities**
 - *Distraction may be effective in reducing fatigue. Distraction-based activities can include games, music, reading, socializing.*

[National Comprehensive Cancer Network. Cancer-Related Fatigue (Version 2.2018). https://www.nccn.org/professionals/physician_gls/pdf/fatigue.pdf Accessed February 9, 2019.]

Patient Education

- **Relaxation techniques**
 - *Progressive Muscle Relaxation*
 - *Jacobson method*
 - *Consists of a systematic contraction and relaxation of muscle groups*
 - Patient tightens each muscle group progressively and once maximal contraction is reached they hold for 5 seconds and then relax for 30 seconds with a focus on breathing.
 - Sessions can last as long as 45 minutes

[Dimeo FC et al. Effect of aerobic exercise and relaxation training on fatigue and physical performance of cancer patients after surgery. A randomised controlled trial. Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer. 2004;12(11):774-779.]

Patient Education

- **Relaxation techniques**
 - *Mindfulness-based Stress Reduction*
 - Based on the notion that purposive management of awareness affords multiple points of application in the recursive process of adapting to illness.
 - *Intervention consists of three components:*
 - Theoretical material related to relaxation, meditation, and body-mind connection
 - Experiential practice of meditation & home-based practice
 - Problem solving related to impediments to effective practice, practical day-to-day applications, & supportive interaction

[Speca M et al. A randomized, wait-list controlled clinical trial: the effect of a mindfulness meditation-based stress reduction program on mood and symptoms of stress in cancer outpatients. *Psychosomatic medicine*. 2000;62(5):613-622.]

Exercise and Cancer Related Fatigue

Exercise has been shown to reduce CRF

- Fuller JT et al. (2018). Therapeutic effects of aerobic and resistance exercises for cancer survivors: a systematic review of meta-analyses of clinical trials. *Br J Sports Med*. 18 Oct;52(20):1311.
- Hilliker R et al. (2018). Exercise and other non-pharmaceutical interventions for cancer-related fatigue in patients during or after cancer treatment: a systematic review incorporating an indirect-comparisons meta-analysis. *Br J Sports Med*. May;52(10):651-658.
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- Menses-Echavaz et al. (2015). Supervised exercise reduces cancer-related fatigue: a systematic review. *Journal of Physiotherapy*, 61: 3-9.
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- Cramp and Byron-Daniel J. (2012). Exercise for the management of cancer-related fatigue in adults (review). *The Cochrane Library*, 11.
- Brown et al. (2010). Efficacy of exercise interventions in modulating cancer-related fatigue among adult cancer survivors: a meta-analysis. *Cancer Epidemiology, Biomarkers & Prevention*, 20: 123-133.

Exercise and Cancer Related Fatigue

Treatment Status

- Exercise has been shown to be effective in reducing CRF both during and after cancer treatment.

Cancer Type

- Greater reduction of CRF may be experienced in patients with solid tumors compared to hematologic and mixed malignancy types.

Delivery Method

- Both home-based and supervised exercise programs have been shown to reduce CRF.

Physical Activity & Exercise Continued

Type of Exercise

- Different types of exercise (aerobic, yoga, resistance, and mixed) have been shown to reduce CRF
- Greater reductions in CRF may be experienced by patients performing combined aerobic and resistance exercise

Physical Activity & Exercise Continued

Duration & Frequency

- No significant relationship between exercise duration (min/wk) and effect on CRF has been reported [Dennett, 2016].
 - Exercise sessions were 10-90 minutes long, and completed 2-3x/wk (average amount of exercise per week = 104 minutes) [Dennett, 2016]
- No significant dose-relationship between volume (number of sets for each muscle group per week) and reduction of CRF with resistance exercise [Strasseur, 2013].
 - The maximum number of sets for each muscle group per week at the end of the intervention program ranged from 4 to 12.

Physical Activity & Exercise Continued

■ Exercise Intensity

- Aerobic exercise intensity negatively associated with reductions in CRF [Dennett, 2016]
 - Greater reductions in fatigue seen in individuals performing moderate intensity exercise compared to high intensity exercise)
 - NOT found for aerobic exercise performed as a component of mixed exercise programs
 - [Note: No studies in Dennett et al. 2016's review assessed low-intensity exercise]

The impact of physical activity on health-related fitness and quality of life for patients with HNC

- Capozzi et al. 2016. Br J Sports Med, 50: 325-38
 - Systematic review
 - Exercise interventions were feasible, safe and beneficial in mediating cancer and treatment-related side effects
 - Improvements were found in lean body mass, strength, physical function, quality of life and fatigue.
 - Resistance Programs
 - Frequency: 2-3 days per week
 - Intensity
 - Light to heavy resistance bands
 - 8-12RM
 - Volume
 - 2 sets of 7-10 exercises

Fatigue

ORIGINAL ARTICLE
Pilot, randomized trial of resistance exercise during radiation therapy for head and neck cancer
 Louise D. Repper, MD, MPH¹, Philip M. Arora, PhD², Amanda Eggensten, BS³, Patricia Reardon, PhD⁴, Dawn Verheul, PhD⁵, Melissa Hay, MD, PhD⁶, James Murray, MD⁷, Nicola Nishi, MD⁸, Tara S. Coates, PhD⁹, Heather Norrish, MD¹⁰, Jay Meekins, MD¹¹, Thomas Siskin, MD¹²
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- Intervention**
- 12-week resistance exercise program
 - Up to 10 repetitions of 9 exercises targeting major muscle groups
 - Progression
 - Resistance bands progressed gradually every 2 weeks

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	Week 0 to 6	Week 0 to 12
Group Difference (SD)	-8.0 (12.5)	-3.4 (12.6)
Effect size d	-0.64	-0.27

Fatigue was assessed using the Functional Assessment of Cancer Therapy - Fatigue Subscale

Adherence to exercise sessions

- 83% during 1st 6 weeks
- 53% during weeks 7 through 12

Exercise Program Considerations

- Interested in participating in an exercise program
 - Yes (30%) *Maybe* (34%)
 - Preferred frequency
 - *No preference* (33%) *2-3 times/week* (34%)
 - Preferred duration
 - *No preference* (42%) *≤ 12 weeks* (26%)
 - Preferred intensity
 - *Not sure* (12%) *Light* (18%) *Moderate* (49%)
 - Timing
 - *Only 5% felt able to exercise before and during treatment*

[Midgley AW et al. Exercise program design considerations for head and neck cancer survivors. Eur Arch Otorhinolaryngol. 2018;275:169-179]

Exercise Program Considerations

- Type of exercise
 - *Walking* (68%)
 - *Flexibility* (35%)
 - *Water activities* (33%)
 - *Cycling* (31%)
 - *Weight machines* (19%)
 - *Yoga* (14%)
 - *Free weights* (13%)
 - *Resistance bands* (12%)
 - *Tai Chi* (11%)
 - *Pilates* (9%)
 - *Circuit training* (9%)
 - *Sport* (7%)

[Midgley AW et al. Exercise program design considerations for head and neck cancer survivors. Eur Arch Otorhinolaryngol. 2018;275:169-179]

Exercise Program Considerations

- Where would like to exercise on a regular basis?
 - *Home* (55%)
 - *Outdoors* (46%)
 - *Health club/gym* (33%)
 - *Hospital* (12%)
 - *Community center* (10%)
 - *Work* (1%)

[Midgley AW et al. Exercise program design considerations for head and neck cancer survivors. Eur Arch Otorhinolaryngol. 2018;275:169-179]

Exercise Program Considerations

- Barriers to Exercise
 - Dry mouth or throat (40%)
 - Fatigue (37%)
 - Shortness of breath (30%)
 - Muscle weakness (28%)
 - Difficulty swallowing (25%)
 - Shoulder weakness and pain (24%)
 - Lack of self-discipline (23%)
 - Lack of facilities or space (22%)
 - Lack of equipment (21%)

[Maggley AW et al. Exercise program design considerations for head and neck cancer survivors. Eur Arch Otorhinolaryngol. 2018;275:169-178]

Remember.....

- Exercise prescription should be individualized according to cancer survivor's:
 - Pretreatment aerobic fitness
 - Medical comorbidities
 - Response to treatment
 - Immediate or persistent negative effects of treatment
- Caution performing exercise with any of the following:
 - Thrombocytopenia (low platelets)
 - Anemia (low red blood cells)
 - Neutropenia
 - Bone metastases (cancer spread to the bone)

Questions

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