



ACTIVE LIVING FOR OLDER ADULTS IN TREATMENT FOR CANCER



UW WELL-FIT

**Faculty of
Applied Health
Sciences**

**University of
Waterloo
Waterloo, Ontario**



**Active Living
Coalition for
Older Adults**

**FRAMEWORK FOR
PROGRAM DESIGN**

ACTIVE LIVING FOR OLDER ADULTS IN TREATMENT FOR CANCER

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*Lack of activity destroys the good condition of every human being,
while movement and methodical physical exercise save it and preserve it.*

~Plato

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INTRODUCTION

The use of exercise in the management of chronic disease is not new. Decades ago, exercise was introduced to help patients recover from heart disease and it has continued to be advocated in almost all chronic disease populations. It is now common to find exercise rehabilitation for stroke, pulmonary disease, osteoporosis and even dementia. Never before has there been such a thrust to expand the network for medically supervised exercise regimes. This strategy now includes exercise interventions in the prevention and treatment of various cancers. Research started to unfold in the 1980's that documented the benefits of exercise while undergoing treatment for cancer. This exercise science is impressive and growing at an exponential rate to help understand the mechanisms for functional improvements. It also helps guide the exercise prescriptions for this diverse group of patients undergoing very different and often changing treatment pathways. In response to this information, a unique group-exercise program affectionately called UW WELL-FIT at the University of Waterloo was initiated for individuals undergoing chemotherapy, radiation, or hormonal therapy treatment for various cancers. It evolved in 2002 as a result of working partnership between the University of Waterloo and Grand River Regional Cancer Centre. The Oncologists embraced and supported the initiation of this exercise program as part of a "holistic plan to enhance and maintain health." The main goals of the UW WELL-FIT exercise program are to minimize the negative side effects that individuals experience with cancer treatments, as well as improve quality of life for cancer patients. Negative side effects of cancer treatment may include:

- ♥ fatigue
- ♥ muscle weakness
- ♥ nausea
- ♥ depression
- ♥ lymphedema
- ♥ decreased immune function
- ♥ weight gain or loss
- ♥ decreased aerobic capacity

Appropriate, individualized exercise programs help reduce the severity of these symptoms and side effects leading to an improvement in quality of life. Among cancer patients and survivors, anecdotal and research evidence suggests that physical activity benefits cardiopulmonary function and quality of life, reduces fatigue and depression, and improves muscular fitness. For further information refer to the reference list in Appendix A.

Cancer is a serious public health burden in Canada with aging being the major demographic risk factor. The estimates for 2008 indicate that 69% of new cases and 82% of cancer deaths will occur in Canadians 60 years of age or older.³ Exercise is an effective intervention that provides both physiological and psychological benefits in cancer patients undergoing treatment.¹³ Nevertheless, disease/treatment-related symptoms can be a major barrier in terms of adhering to an exercise program during this phase.⁸ Older adults undergoing cancer treatment pose a unique challenge in that they may already be experiencing an age-related decline in their physical functioning and have increasing comorbidities. Combined with treatment/disease related symptoms are a number of complex issues specific to the elderly that make exercising and adhering to an exercise program even more challenging.⁶ Unfortunately, limited research is avail-

able on this population; exercise studies have not specifically targeted older cancer patients, or due to their comorbidities and age, they fail to meet inclusion criteria for specific studies.¹⁰ That said, there is substantial evidence demonstrating the benefits of exercise in attenuating the age-related functional decline among older people with established chronic disease and frailty.³⁶ Therefore, it is believed that exercise can be beneficial in improving quality of life in the elderly while undergoing cancer treatment.

To date, 320 clients have completed the 12-week UW WELL-FIT program; however, the median age for those participants is 52 years. With only 11.5% of participants over the age of 60, it appears that this program is being overlooked by older cancer patients. To address this concern, The Public Health Agency of Canada funded a research project through the Active Living Coalition for Older Adults (ALCOA) for UW WELL-FIT to uncover the major barriers that prevent older cancer patients from joining an exercise program like UW WELL-FIT. The overall goal was to find ways to overcome these barriers by making the program more accessible and appealing to an older population and to share this knowledge with other communities across Canada.

Results from the study revealed "fatigue" as the most commonly-cited barrier (cited by 50%) preventing individuals from participating in an exercise program. Of the top six barriers reported, three were treatment/disease-related: "fatigue", "difficulty on radiation and chemotherapy days" and "pain/aching"; two were non-treatment/disease-related: "too far to travel" and "lack of motivation" and one was age-related: "lacking the strength to exercise". When comparing older adults (>60 years) to younger adults (<60) no differences in the mean number of non-treatment/disease-related barriers or age-related barriers were noted. There was however a significant difference in the number of treatment/disease related symptoms reported among those under 60 and those older than 60. It appeared that younger individuals had a greater number of treatment/disease-related barriers. This may be due to the more vigorous treatment protocols to which younger individuals are often subjected. Many individuals were not even aware that the program existed, which is a barrier in itself. It appeared that several of the barriers can be attributed to a lack of knowledge and can easily be overcome by educating and increasing awareness, to all parties involved, from the patients to the referring oncologists. This will help bring about awareness that this program is available, thereby reducing the "not aware of the program" barrier and help provide motivation which was another highly cited barrier. By educating patients on the benefits of physical activity during cancer treatment and ensuring that the program is available and appropriate for individuals of all ages, will help to reduce the belief that patients "lack the strength". Making connections with supportive care groups in the community is valuable in terms of advertising the program and could also be helpful in solving the "lack of transportation" barrier as some community support groups provide a ride service.

The purpose of this document is to provide a "framework" that would identify the tools and critical pathway necessary for an Allied Health Care Professional to initiate an exercise program for people undergoing treatment for cancer. Specific emphasis within this manual is directed to the older adult (i.e. those over 60 years of age).



GETTING STARTED

“Cancer Rehabilitation involves helping a person with cancer obtain maximum physical, social, psychological, and vocational functioning with the limits imposed by the disease and its treatment.”¹¹ Regional cancer centers offer a range of resources, professional staff and services directed to this goal. Exercise programs for people in treatment are relatively new and not usually part of supportive care services. However, establishing a relationship with a Regional Cancer Center is the initial step in launching a program, regardless of whether the exercise program will be within the hospital or within a community facility. It is necessary to complete the following steps:

- ♡ Contact medical oncologists and supportive care services to provide detailed information about the program and benefits to patients undergoing treatment for cancer
- ♡ Establish a referral process
- ♡ Ensure support of the program and open communication with the medical community
- ♡ Establish contact with a Cardiologist to facilitate medical clearance for those individuals who have co-morbidities that may prevent them from accessing the exercise program

It is also important to establish a relationship with group support programs within the community that work with older adults and others that work with cancer patients. This provides an avenue to promote the program and provide awareness, as well as highlighting the benefits of physical activity during cancer treatment.

EXERCISE PROGRAM OVERVIEW

This is a unique exercise program that focuses on restoring and improving the physiological and psychological well being of individuals receiving treatment for cancer (chemotherapy, radiation and/or hormonal therapy). The effects of cancer treatment are wide ranging and individualized. Thus, it is important to have trained exercise professionals perform assessments and develop individualized exercise programs. This is a comprehensive exercise program offered twice per week for 12 weeks. Each participant is assessed before and after the 12 week exercise sessions. These assessments include: pre and post fitness assessment, quality of life assessment, fatigue assessment and program satisfaction.

The objectives of the program, while receiving treatment, are to:

- ♡ Improve or maintain cardiovascular function, muscular strength/endurance and range of motion
- ♡ Reduce or help manage fatigue and other side effects associated with cancer treatment
- ♡ Improve quality of life
- ♡ Educate participants about the benefits of exercise and guidelines for safe exercise
- ♡ Provide program satisfaction



ELIGIBLE CANDIDATES

- ♥ Adults undergoing outpatient treatment
- ♥ Must have medical clearance from treating Oncologist
- ♥ All fitness levels, pending medical clearance
- ♥ Must currently be receiving treatment for cancer (chemotherapy, radiation, hormonal therapy)

REFERRAL

Before participating in the exercise program, the patient must receive clearance by their Oncologist to participate in the exercise program. The completed and signed referral form is returned to the exercise program staff.

See *Appendix B* for a sample *Referral Script*.

A sample referral process would consist of the following:

STEP 1	Patient talks to his/her oncologist to see if he/she qualifies for the program and if exercise is safe for him/her. All participants require this clearance prior to joining the exercise program.
STEP 2	The Oncologist will fax the referral script to the exercise program staff. (It can also be mailed in or brought in by the patient if a fax machine is not available.)
STEP 3	The patient contacts the program staff and arranges the initial consultation and fitness appraisal.

It has been found to be more successful to have the patient make the initial contact with the program to set up an appointment. Firstly, it leaves the choice up to the participant so he/she is often more likely to adhere to the program. Secondly, this is a good way to verify that the referral script was actually sent in. If, after two weeks, the patient hasn't called, the exercise program staff will contact the patient to facilitate or encourage the patient to become involved in the program.



ASSESSMENT

Before beginning the exercise program, individuals must come to the program facility for an initial assessment. This appointment can be scheduled upon receiving the referral script. The assessment should take approximately one hour to complete. Prior to arriving on assessment day, preliminary instructions should be provided to the individual. This can be done by phone, via email or direct mail. Some individuals, older adults in particular, may not have an email address, so this information can be explained to them over the phone or mailed.

Information for the Patient for Assessment Day:

Request that the patient bring in a list of his/her current medications on assessment day.

Dress requirements:

Short sleeved shirt and shorts/track pants/yoga pants should be worn (something comfortable to move in). Running shoes are the recommended footwear. Indicate if change facilities and/or showers are available.

Food and beverages:

Recommend to avoid eating a heavy meal within 3-4 hrs of the assessment. A light meal/snack is fine, as the assessment should not be attempted on an empty stomach.

Avoid caffeinated beverages for 2 hrs prior to the assessment. Alcoholic beverages must be avoided for 6 hrs prior to the assessment. Bring a water bottle to the assessment. If a water cooler or fountain is available at the facility, indicate that to the individuals so they know they can fill their bottle up when needed.

Smoking:

If patient is a smoker, avoid smoking for 2 hrs prior to the assessment.

Exercise:

Exercise should be avoided 6 hrs prior to the assessment.

Directions & Parking Instructions:

Directions should be provided to the individual explaining how to get to the facility as well as where to park. If there is a parking fee or if a pass needs to be purchased, this should be indicated to the participant.

Initial Assessment

The purpose of the assessment is to:

- ♥ Gather relevant medical and activity history to determine any contraindications or special considerations for exercise
- ♥ Measure and quantify cardiovascular fitness, muscular strength and/or endurance, and range of motion in a joint or series of joints to establish a baseline for changes that will accompany exercise intervention

- ♥ Develop a safe and effective exercise prescription
- ♥ To provide motivation to the patients by setting attainable and measurable goals
- ♥ Quantify the physiological changes from the exercise program

Summary of Assessment Procedures

- ♥ Introductions and tour of facility
- ♥ Screening procedure
 - ☆ Medical history and current medical treatment and medication
 - ☆ Current and previous activity level
 - ☆ Exercise goals
- ♥ Obtain signed informed consent (including procedures, protocols & risks)
- ♥ Administer Surveys
 - ☆ SF-36 or FACT-G
 - ☆ Revised Piper Fatigue Scale or FACT-F
- ♥ Accurately record pre-exercise blood pressure and heart rate
- ♥ Confirm adherence to pre-test instructions
- ♥ Recognize contraindications to exercise testing
- ♥ Recognize the significance of patient history/physical exam findings as they relate to exercise testing, special considerations for cancer patients
- ♥ Administer the chosen body composition measurements
 - ☆ Height, weight
 - ☆ Skinfolds
 - ☆ Girths
- ♥ Instruct the patient in the use of Rating of Perceived Exertion (RPE) scale
- ♥ Administer the chosen cardiovascular test protocol
 - ☆ Treadmill; proper instruction and demonstration of walking
 - ☆ Cycle ergometer; adjust seat, explain cadence, select protocol
- ♥ Choose and hook up selected ECG leads
- ♥ Obtain accurate pre-exercise values (HR, BP, RPE)
- ♥ Record subjective and objective responses to exercise (symptoms, ECG, blood pressure, HR, RPE)
- ♥ Terminate test at appropriate endpoints for exercise testing
- ♥ Administer the chosen muscular strength and endurance tests
 - ☆ 1-RM or Predicted 1-RM
 - ☆ Functional tests
- ♥ Administer the chosen flexibility measurements
- ♥ Be prepared to respond to an emergency situation during a test
- ♥ Record, organize, and perform necessary calculations of test data
- ♥ Interpretation of the exercise test for exercise program

Consent

The consent form will provide a clear, concise outline of the exercise program that the participant is joining and an explanation of the tests/procedures that will be conducted during the initial and final assessments. Potential risks and discomforts associated with exercise as well as expected benefits must be indicated. There should be an "inquiries section" which states that, if the participant requests further explanation on any tests or procedures, they can be provided to them. Lastly, the "freedom of consent" requires the participant and a witness to sign and date the consent form.

See Appendix C for a sample Consent Form.

Quality of Life Surveys

Quality of life (QoL) has been measured extensively in individuals with cancer. The cancer experience and cancer treatment have the potential to greatly impact QoL. There is growing evidence that exercise programs can improve various quality of life indices.¹⁹ Assessment of quality of life is done primarily with the use of surveys. There are various types of quality of life surveys including the Functional Assessment of Cancer Therapy-General (FACT-G), and the 36-item short form health survey (SF-36). While certain surveys are not validated for older adults, the FACT-G is an instrument containing questions from the Functional Assessment of Chronic Illness Therapy (FACIT) database which has been demonstrated to be valid and reliable for the assessment of quality of life in older patients with cancer.²⁸ The SF-36 is another validated survey instrument for which norms specific to older adults have been developed³⁸; however, this instrument is not designed specifically for cancer patients. There are many other quality of life surveys which can be used, with only a couple highlighted here. The use of a QoL survey is an effective way to look at the impact of the program (pre-post comparisons)

See Appendix D for a copy of the FACT-G, and Appendix E for the SF-36 surveys.

Cancer-Related Fatigue

One of the most common side effects associated with cancer treatment is cancer related fatigue (CRF). The National Comprehensive Cancer Network defines CRF as an 'unusual, persistent, subjective sense of tiredness related to cancer or cancer treatment that interferes with usual functioning'.²⁴ In addition, unlike more usual fatigue related to exertion or lack of sleep, CRF is not alleviated by sleep or rest. There are several self-report fatigue scales available to use. The revised Piper Fatigue Scale is one of the first multidimensional models developed specifically for CRF.³⁰ FACIT contains a fatigue (FACIT-F) subscale that has undergone validation.⁴ Both the Piper Fatigue Scale and the FACIT-F are widely described in CRF literature but differ with respect to the evaluation period in that the FACIT covers a 1 week period and the Piper Fatigue looks at current fatigue.

See Appendix F for a copy of the FACIT-F survey, and Appendix G for a copy of the Revised Piper Fatigue Scale.

Goals & Current/Previous Physical Activity Level

The next step is to determine what the patient is hoping to achieve from being in the program. Setting specific and realistic goals provides insightful information for programming and motivation for the patient. Some individuals want to focus more on improving strength, some flexibility and others cardiovascular function. It is also important to know whether the individual is currently physically active. For older adults, this doesn't mean exercising in a gym and using a treadmill or bike; walking and housework activities can often count as physical activity. Ask about physical activity levels in the past because the participant may have been active prior to initiating cancer treatment and have ceased all activities since the onset. All this information is helpful for exercise prescription, and it is also useful when determining what cardiovascular, strength and flexibility tests/protocols to use later on in the assessment.

Health and Medical Review

The purpose of the health and medical review is to screen potential participants for any risk factors or signs and symptoms of disease. This will ensure that proper exercise tests are used and will also optimize exercise prescription. There are various pre-participation screening procedures which can be used; however, the main goal is to identify any coronary artery disease risk factors, any signs or symptoms of cardiovascular, pulmonary, metabolic, and/or muscular conditions or any known cardiovascular, pulmonary and/or metabolic diseases. Older adults tend to have an increased number of co-morbidities. Therefore, combined with the side effects experienced from cancer treatment, it is important to do a thorough medical review. The screening process is designed to yield information regarding risk stratification. ACSM has developed Coronary Artery Disease Risk Factor Thresholds that, in conjunction with age, health status, and symptoms, classify participants into one of three risk strata.¹ Depending on the risk strata of the patient, further screening procedures may be suggested. Please refer to ACSM's Guidelines for Exercise Testing and Prescription for the full risk stratification process.¹ The last part of the medical review is to gather the list of current medications that the patient is taking. The exercise professional needs to be familiar with medications the patients are taking, with particular emphasis on those that may have an impact on the individual's response to exercise. Also, if the patient forgets to take any medications on the day of his/her cardiovascular test, the test should be postponed because the training intensity prescribed may not be accurate when the participant is actually on the medication. Additionally, ensure the patient has adhered to pre-test instructions for eating, smoking, alcohol and exercise. At this point the patient's resting heart rate and blood pressure should be taken before moving on in the assessment.

See Appendix H for a Sample Patient Information and Medical Review form.

There are some contraindications to exercise testing as indicated in the ACSM Guidelines text. If the patient has any of the following conditions, medical clearance must be granted prior to completing the initial assessment.

Absolute and Relative Contraindications to Exercise Testing

Absolute Contraindications

1	Acute myocardial infarction (within 2 days)
2	Unstable angina
3	Uncontrolled cardiac arrhythmias causing symptoms of hemodynamic compromise
4	Uncontrolled symptomatic heart failure
5	Acute aortic dissection
6	Suspected or known dissecting aneurysm
7	Acute myocarditis or pericarditis
8	Acute pulmonary embolus or pulmonary infarction

Relative Contraindications

1	Left main coronary stenosis
2	Moderate stenotic valvular heart disease
3	Known electrolyte abnormalities (hypokalemia, hypomagnesemia)
4	Severe arterial hypertension; resting diastolic BP > 110 mmHg and/or resting systolic BP > 200 mmHg
5	Tachyarrhythmias or bradyarrhythmias
6	Hypertrophic cardiomyopathy and other forms of outflow tract obstruction
7	High-degree atrioventricular block
8	Mental or physical impairment leading to inability to exercise adequately

* Gibbons, R.J., Balady, G.J., Bricker, J.T., et al. ACC/AHA 2002 guideline update for exercise testing: summary article: a report of the ACC/AHA Task Force on practice Guidelines (Committee to Update the 1997 Exercise Testing Guidelines). *Circulation*. 2002; 106:1883-1892

Note that these are guidelines, and the exercise program can use more conservative guidelines if desired.



Medical Clearance

If any of the abnormalities listed above are detected during the initial assessment, medical clearance must be obtained before that patient may be admitted to the exercise program. An explanation of what was observed plus an explanation of the exercise requirements should be included in a letter to be sent to the patient's family physician or to a cardiologist.

A template letter to a physician detailing the abnormalities is available in Appendix I.

Possible Assessments

1) Body Composition

Depending on the goal of the program, many different body composition measurements can be taken. Standard measurements would include:

- ♥ Height
- ♥ Weight
- ♥ BMI
- ♥ Circumference (waist, hips, upper arm, thigh, calf)
- ♥ Skinfolds

Waist circumference alone is a simple and frequently used measure with an established relationship between premature mortality and chronic disease.

Selected sites for skinfold measurement can provide estimates of body fat percentage through prediction equations or be used to track the patient's skinfolds over the duration of the program. Specific skinfold locations may need to be modified based on surgical or radiation site or be avoided all together if there are treatment-related issues such as lymphedema, radiation burns, picc lines or blisters. If predicted equations are used, they need to be validated for this population. Note that it is important to carry out these measurements prior to the cardiovascular function test. Certain cancer treatments can cause severe excess weight gain or weight loss. Some individuals may already feel extremely uncomfortable, and discretion should be used in selecting any of these measurements.

2) Cardiovascular Function

The exercise professional should be familiar and comfortable with the general procedures for administering a graded exercise test (GXT). These can be reviewed in *Advanced Fitness Assessment and Exercise Prescription*¹⁶ or in *ACSM's Guidelines for Exercise Testing and Prescription*.¹ For cardiovascular function tests, either a submaximal or a maximal test can be performed. Using the participant's risk classification, the exercise professional can determine whether the test should be maximal or submaximal and whether a physician needs to be present during the exercise test. The decision largely depends also on the reasons for the test and the availability of appropriate equipment.

Modes of Testing

There are many types of graded exercise tests (GXT's) that can be used. Equipment availability and the focus of the exercise program largely determine choices. Using a metabolic cart to directly measure oxygen uptake is an option. However, caution should be taken as the use of a mouth piece could irritate sensitive mucosal linings in the mouth. Equations have been developed to estimate the metabolic cost of exercise. Generally, for older cancer patients, the purpose of the cardiovascular test is to determine a functional maximum capacity. Based on the individual's heart rate and blood pressure response, and rate of perceived exertion values, a safe and tolerable exercise strategy can be prescribed.

Treadmill Protocols

Treadmills can be used for either maximal or submaximal testing. The GXT is performed by varying the speed and grade of the treadmill. A practice session may be necessary to acclimatize the individual if he/she is not familiar with a treadmill. There are several protocols more appropriate for high risk individuals. A "ramp protocol" is common because it avoids large, unequal increments in workload and also because older adults may be limited in the speed at which they can walk. The Modified Bruce Protocol is a maximal test which is more suitable for high risk and elderly individuals.¹⁶ The proper prediction equations to determine VO_2 must be used.

Cycle Ergometer Protocols

A cycle ergometer is useful for either submaximal or maximal testing protocols. The workload can be adjusted in small increments and is non-weight-bearing; this is ideal for both older adults and cancer patients as they often have a reduced cardiovascular function. Blood pressure and electrocardiogram can be measured more easily than on a treadmill. The YMCA cycle ergometer submaximal exercise test protocol is useful because the workloads are adjusted based on the individual's heart rate response. The data can be extrapolated and the individual's aerobic capacity can be estimated if so desired.

Field Tests

Field tests are easy to administer, require little equipment and are ideal when assessing large groups of individuals. An appropriate field test for older cancer patients would be the 12 minute walk test, where the objective is to cover the greatest distance during the allotted time period. This test has been demonstrated to be efficient and valid for classifying individuals with lower cardiovascular function.²¹ There is also a 6 minute walking test that follows the same format as the 12 minute walk test and has been validated for measuring functional status in elderly patients.¹² This test may be more appropriate because some older individuals may not be able to walk a full 12 minutes. Norms are available so that the distance walked can then be compared to predicted values for the specific age category. The Rockport One-Mile Fitness Walking Test measures how long it takes an individual to walk one mile. However, when working with cancer patients, walking a mile may be exceedingly challenging especially for those over the age of 60 years.

Step Tests

Step tests are inexpensive, and require little equipment and acclimatization. However, this may not be appropriate for individuals with balance problems or for those who are extremely deconditioned. A 2-minute step test has been designed specifically for older adults.³¹ If no other equipment is available, this test could be a reasonable alternative. It is moderately correlated to the Rockport 1 mile walking scores in older adults.

The following chart indicates absolute and relative criteria for terminating a graded exercise test. If any of the following symptoms are noticed during the test, an active cooldown should be initiated or in the extreme case, activate emergency medical services (EMS).

Absolute and Relative Indications for Termination of a Clinical Graded Exercise Test	
Absolute Indications	
1	moderate-to-severe angina
2	Drop in systolic blood pressure of 10 mmHg from baseline blood pressure despite an increase in workload, when accompanied by other evidence of ischemia
3	Increasing nervous system symptoms (eg. Ataxia, dizziness, or near syncope)
4	Signs of poor perfusion (cyanosis or pallor)
5	Technical difficulties monitoring the electrocardiogram or systolic blood pressure
6	Client's desire to stop
7	Sustained ventricular tachycardia
8	ST elevation (≥ 1.0 mm) in leads without diagnostic Q waves (other than V1 or aVR)
Relative Indications	
1	Drop in systolic blood pressure of ≥ 10 mmHg from baseline blood pressure despite an increase in workload, in the absence of other evidence of ischemia, or failure of systolic blood pressure to increase with increased workload
2	Increasing chest pain
3	Fatigue, shortness of breath, wheezing, leg cramps, or claudication
4	Hypertensive response (systolic blood pressure > 250 mmHg and/or diastolic blood pressure > 115 mmHg)
5	Arrhythmias other than sustained ventricular tachycardia, including multifocal pre-ventricular contractions (PVC's), triplets of PVCs, supraventricular tachycardia, heart block, or bradyarrhythmias
6	Development of bundle-branch block or intraventricular conduction delay that cannot be distinguished from ventricular tachycardia
7	ST or QRS changes such as excessive ST-segment depression (≥ 1 mm horizontal or downsloping ST-segment depression) or marked axis shift.
* Gibbons, R.J., Balady, G.J., Bricker, J.T., et al. ACC/AHA 2002 guideline update for exercise testing: summary article: a report of the ACC/AHA Task Force on practice Guidelines (Committee to Update the 1997 Exercise Testing Guidelines). Circulation. 2002; 106:1883-1892	

3) Muscular Strength and Endurance

To assess an individual's muscular strength and/or endurance, various equipment and protocols can be used. The tests that are performed will depend on equipment available and functional limitations of the patient.

Dynamic Strength/Endurance

Free weights as well as constant-resistance, variable-resistance, and isokinetic exercise machines, are used to assess dynamic strength and endurance. The 1-repetition maximum (1-RM) is the standard for dynamic strength assessment. However, older cancer patients (as well as untrained individuals) may not be familiar with or not feel comfortable with this protocol and so an estimated 1-RM protocol can be used. Several prediction methods have been developed specifically for older adults and are gender specific. The exercise professional can select an upper body and a lower body multi-joint exercise to be completed and that can provide a view of the participant's overall upper and lower body strength. For dynamic muscular endurance, there are several tests available. The patient will lift a weight that is set to a percentage of their body weight as many times as possible. This is useful for looking at pre-post comparisons.

Functional tests assess an individual's ability to perform everyday activities; these activities are also known as Activities of Daily Living (ADL's). Functional tests are frequently used when working with older adults. The exercise professional must remember that older adults undergoing cancer treatment often experience severe fatigue and lack strength so ADL's often are challenging enough. Pre-post comparisons can be measured in a variety of functional movements such as the sit-to-stand, wall sits and step ups. The Senior Fitness Test includes 2 measures of muscular strength: a biceps curl for a measure of upper body strength, and a 30 second chair stand for lower-body strength.³¹ This test battery is valid; however, the arm curl test requires the use of a 5 lb dumbbell and many individuals will find this weight to be too heavy. If the purpose of the strength/endurance measurement is to make pre – post comparisons, then a lighter weight can be used.

Static Strength/Endurance

Static strength and muscular endurance are measured using dynamometers, cable tensiometers and load cells. A proper station can be set up to measure the static strength of any muscle group of interest. However, it should be noted that there are limited norms available for adults over 69 years of age. Even without norms, pre-post comparisons will demonstrate the impact of the strength intervention. At least one practice trial (followed by rest) will minimize changes simply due to learning the task.

4) Flexibility

Flexibility is highly specific; so it should be determined if there is a specific area of interest to be measured. Direct methods for assessing static flexibility include the use of a goniometer, a flexometer or an inclinometer. Reliability of these tools is highly dependent on the technician's skill and the joint measured. Selection of sites will be determined, in part, relative to the cancer site and mode of treatment. For example, a common site of measurement is the shoulder joint. Often, treatment for breast cancer involves surgery, and following that, patients can experience limited range of motion in that joint. However, notwithstanding the limitations for these with breast cancer, the joint is appropriate to measure for older adults as they don't have to sit on the floor, because sitting down and getting up from the floor can be quite challenging. An indirect method for measuring static flexibility is the sit-and-reach test however this test would not be appropriate if the patient has a history of back problems or osteoporosis. A modified chair sit-and-reach test is available specifically for older adults³¹ and other functional tests are available for older adults if further flexibility measurements are desired.

Measurements/protocols carried out during the initial assessment are discretionary and depend on time restraints, the facility and equipment, and the focus of the program.

See Appendix J for a Sample Assessment Form.



Post Assessment

A post-assessment can be completed to quantify the physiological changes associated with the exercise program. It can be used to modify the existing program or used in the creation of a home-based program.

All the measurements which were taken in the initial assessment are repeated at the end of the program, or at selected time points throughout the program. Assessing the outcomes is important for program evaluation to look at the effectiveness of the program as a whole. A program satisfaction survey will provide feedback from participants about the program which could help shape constructive changes in the program.

See Appendix K for a Sample Program Satisfaction Survey.

EXERCISE PRESCRIPTION

The physical activity program should be all-encompassing, consisting of cardiovascular conditioning, exercises to improve muscular strength and endurance, and flexibility. It is important to incorporate a proper warm up prior to starting the exercises as well as an appropriate cooldown at the end of the session that adequately lowers heart rate and prevents venous pooling in the lower extremities. The exercise prescription should be done by an exercise professional who is qualified to work with special populations. Prescribed exercises will vary depending on available equipment as well as the individual. The prescription should be based on the information gathered from the initial assessment. If additional medical issues arise or medications change, the exercise prescription should be adjusted accordingly. Clearly, the specificity of knowledge and experience for health professionals dealing with cancer patients exceeds what is typically required for the optimal physical activity management of apparently healthy individuals.



Exercise Recommendations for Cancer Patients

The components of exercise for cancer patients are the same as those recommended by ACSM for the general population: mode, frequency, intensity, duration and progression.³³ Cancer patients, however, have unique needs created by the toxicities that result from the interaction between their cancer and the cancer treatment. The aim of exercise guidelines is to preserve the positive relationship between exercise and cancer/cancer treatment-related symptoms and to avoid any possible negative effects.³³ In 2000, specific exercise guidelines were published for cancer patients.⁷ The guidelines were based on a comprehensive review of recent literature at the time. However, the studies reviewed focused on early stage cancer, were limited to aerobic activity, and only used a single exercise group compared to a control condition. Thus there is no direct evidence concerning optimal type, frequency, duration, intensity and progression. Nevertheless, general recommendations were made for individuals with early stage cancer and can be found in the table on the following page.

MODE	Use of large muscle groups (often cycling or walking because they are safe and tolerable). Exercises should be modified based on acute or chronic treatment effects from surgery, radiation or chemotherapy.
FREQUENCY	At least 3-5 times/week. Daily exercise may be better for deconditioned individuals who would do lighter intensity for a shorter duration.
INTENSITY	Moderate intensity (depending on fitness level and medical treatments). Guidelines recommend 50-70% VO ₂ max or HR reserve, 60% to 80% HRmax, or an RPE of 11 to 14. HR reserve is the best guideline if HR max is estimated rather than measured.
DURATION	At least 20-30 min of continuous exercise; however, deconditioned patients or those experiencing severe side effects of treatment may need to combine short exercise bouts (e.g. 3-5 min) with rest intervals.
	Patients should focus on meeting the frequency and duration goals before increasing intensity. Progression should be slower and more gradual for deconditioned patients or those who are experiencing severe side effects of treatment.

Modified from Courneya K. S., Mackey J. R., Jones L. W. (2000). Coping with cancer: Can exercise help? *The Physician and Sports Medicine*, 28(5), 49-59. Physician and Sportsmedicine is a registered trademark of JTE Multimedia, LLC 1235 Westlakes Drive Suite 220, Berwyn PA, 19312(610)889-3730

Evidenced-based guidelines on resistance training for cancer patients have not yet been created due to the fact that very few studies have looked at the effects of an isolated resistance training program in patients receiving adjuvant treatment.^{9,35} However, the studies which have examined resistance training during cancer treatment have for the most part followed ACSM's resistance training guidelines for the novice individual.²⁰

Prescription must be individualized due to the extreme variability in the effects of cancer treatment regimens on functional capacity.³² It is also important to individualize programs due to the wide range in fitness levels, presence of co-morbid conditions or changes in medical treatments. Often, patients experience "down days" related to their treatment regimen where fatigue and other symptoms are at their worst. At these times, it is necessary to build flexibility into a prescription program so that one can modify the frequency, intensity, and duration depending on the patient's current response to treatment. The recommended guidelines noted previously were created for those with early stage cancer; therefore, such parameters might be too demanding for late stage (i.e. Stage III, IV) cancer patients as well as for those experiencing debilitating treatment side effects.³² As a result, further modifications may need to be made. It is important to avoid high intensity training and thereby prevent potential immunosuppressive effects.³² Low intensity exercise, on the other hand, can strengthen immune function and reduce susceptibility to disease.²⁹ Exercise during cancer treatment provides both functional and psychological benefits, so it is important the program be enjoyable for the patient.

Special Considerations for Cancer Patients

Exercising

There are additional contraindications to exercise that apply to cancer patients due to the toxicities occurring from the various cancer treatments. Courneya proposed the following exercise contraindications specific for cancer patients.⁷ Exercise professionals may not have direct access to these values on a day to day basis, so looking for signs and symptoms (as listed in the following chart) provides insight into potential problems arising.

Contraindication	Implications	What to look for	Comments
Hemoglobin level < 8.0 g/dL ¹	Anemia Reduced oxygen carrying capacity	Elevated heart rate, arrhythmias, rapid/difficulty breathing, extreme fatigue ² and high blood pressure	Avoid activities requiring high O ₂ transport (high intensity) ¹
Absolute neutrophil count ≤ 0.5 x 10 ⁹ /microliters ¹	Low white blood cell count Granulocytopenia High susceptibility to infection	If client knows values, they must relay them to exercise professional	Avoid activities increasing risk of bacterial infection ¹ Limit group sizes, restrict those who are contagious from attending class
Platelet count < 50 x 10 ⁹ /microliters ¹	Thrombocytopenia Easily bruised	Bruising, Swelling at site of venipunctures ²	Avoid activities increasing risk of bleeding ¹ – e.g. eccentric work and lifting heavy weights (because of increased tissue damage), high impact sports
Fever > 38 C (100.4 F) ¹	May indicate systemic infection and should be investigated ¹ May indicate pulmonary toxicity ²	Increased respiration, feeling cold, increased heart rate	Avoid high-intensity exercise ¹
Ataxia, dizziness, or peripheral sensory neuropathy ¹	At higher risk for falls If sudden onset, stop exercise immediately	Confusion, memory loss, seizures, loss of sensation, blurred vision, foot drop, muscle weakness, balance problems ²	Avoid activities requiring significant balance/coordination ¹ Work on balance while keeping safety a priority Keep exercise instructions clear and simple
Severe cachexia (loss of >35% of pre-morbid weight) ¹			Limit exercise to mild intensity, depending on degree of cachexia ¹
Dyspnea ¹	May indicate pulmonary toxicity ²	Investigate the cause	Exercise to tolerance ¹
Bone Pain ¹			Avoid activities that increase risk of fracture ¹ (e.g. contact sports, high impact exercises, spine flexion & end ROM)
Severe nausea ¹	Changes in intestinal mucosa, may lead to changes in intestinal absorption Malnutrition Low exercise capacity	Nausea, vomiting, loss of appetite, diarrhea, loss of sense of taste, dehydration ² Investigate cause	Exercise to tolerance ¹ Contact supportive care nurse
Extreme fatigue and/or muscle weakness ¹			Exercise to tolerance ¹

Modified from:

¹ Courneya K. S., Mackey J. R., Jones L. W. (2000). Coping with cancer: Can exercise help? *The Physician and Sports Medicine*, 28(5), 49-59

² Schneider C. M., Dennehy C. A., Carter S. D. (2003). *Exercise and Cancer Recovery*. Champaign, IL: Human Kinetics Publishers, Inc.

Lymphedema



♡ Lymphedema is an accumulation of lymphatic fluid in the interstitial tissue that causes swelling, most often in the arm(s) and/or leg(s), and occasionally in other parts of the body".²⁵ It can develop after surgery or radiation when lymph nodes are removed or when vessels are damaged when treating breast cancer.

♡ Cardiovascular and resistance exercise have shown to be safe for individuals with lymphedema^{18,22} as well as for those at risk for developing lymphedema.^{15,19}

The National Lymphedema Network Medical Advisory Committee suggests the following special considerations with regards to exercise and lymphedema²⁶:

♡ Individuals with lymphedema can safely perform aerobic and resistance exercises using the affected body part provided that:

- ☆ Compression garments are worn
- ☆ The affected body part is not exercised to fatigue
- ☆ Appropriate modifications are adopted to prevent trauma and overuse.

♡ Individuals at risk for developing lymphedema can safely perform aerobic and resistance exercises using the "at risk" body part when exercises are:

- ☆ Initiated at a low intensity
- ☆ Increased gradually

Best Clinical Practice

Peripherally Inserted Central Catheter - PICC Lines

- ♡ Take a fairly conservative approach and limit repetitive movement and avoid any heavy lifting with PICC line arm
- ♡ Limit elbow movement entirely but allow some shoulder movement provided the elbow is fixed
- ♡ If participant has had previous infections or problems with PICC line (bleeding at entry point), avoid training that limb altogether until PICC removed

Port-a-caths

- ♡ Allow sufficient healing of incision if put in or removed during participation in program prior to resuming any upper body resistance training
- ♡ Avoid direct pressure over port-a-cath (e.g. Lat pull down ROM stopped just above chest instead of touching bar to chest)

Range of Motion (ROM) limitations

- ♡ often following breast cancer surgery and radiation treatment, arm ROM is restricted
- ♡ focus on increasing ROM so participant does not develop frozen shoulder or permanent decrease in ROM
- ♡ encourage proper posture during all exercises
- ♡ avoid certain exercises if participant cannot perform with proper technique due to limited ROM

Dermatological Concerns

- ♡ Chemotherapy drugs destroy hair cells causing hair loss
- ♡ Wigs are often too uncomfortable to wear during exercise because they are hot and can lead to head dermatitis/skin infections. Encourage the participants to feel free to exercise without their wigs
- ♡ Radiation affects skin causing lesions/burns around site of radiation
- ♡ Participants may find it too uncomfortable to wear a bra or tight fitting clothing due to radiation burns or may not be able to wear HR monitor strap pending location of radiation
- ♡ Very important to ensure the program is a non-judgemental environment

Metastasis

- ♡ Secondary growth of a malignancy in a new location arising from the primary growth
- ♡ Additional medical clearance is required depending on the extent of the metastasis.
- ♡ If bone metastases are present, must be more cautious with amount of resistance used and low impact activity only due to bones becoming more brittle
- ♡ Avoid spine flexion/extension if metastases to spine and educate on importance of neutral spine posture in daily activities (lifting, bending, squatting)

“Chemo brain”

- ♡ Common term used to describe thinking and memory problems that cancer patients experience during and after chemotherapy treatment
- ♡ Important to keep in mind when teaching exercises to cancer patients because they will often need reminding on how to do exercises.
- ♡ Use simple visual and verbal cuing
- ♡ For this reason, be patient and understanding when an exercise instruction needs to be repeated often



Special Considerations for the Older Adult

Cancer is primarily a disease of the older adult, so along with special considerations for cancer patients, concurrent health problems should be anticipated. Revised recommendations for physical activity and public health in older adults were recently released from the American College of Sports Medicine and the American Heart Association.²⁷ The recommendation applies to all adults aged 65+ years, and to adults aged 50-64 with clinically significant chronic conditions or functional limitations that affect movement ability, fitness, or physical activity. Certain differences are noted compared to the average adult population.

The adult recommendation defines aerobic intensity in absolute terms (i.e. Moderate intensity comprising of 3-6 METs). Performing 3-6 MET activities for an older individual either requires relatively vigorous effort or is impossible to carry out. A different definition of aerobic intensity is appropriate for older adults because fitness levels can be low. Therefore, aerobic intensity is defined relative to fitness; in the manner of an exercise prescription.⁷ The target intensity for aerobic exercise for the older adult is 50-85% of oxygen uptake reserve which is considered moderate to vigorous. However, as stated earlier, it is important that cancer patients exercise at a low to moderate intensity, and avoid vigorous exercise.⁷

For resistance training, moderate intensity is appropriate. ACSM recommends performing 1 set of 8-10 exercises that focus on major muscle groups on 2-3 non-consecutive days of the week and perform 10-15 repetitions.²⁷ Flexibility is recommended to maintain range of motion necessary for daily activities.

Immune system integrity, optimal exercise dosage and susceptibility to disease are of greater importance when working with older adults with cancer. They tend to be more debilitated and seem to benefit most from an exercise prescription that initially poses minimal demands on the cardiovascular system which has likely been subjected to associated deconditioning and disuse atrophy.³²



Monitoring Participants during Exercise

All participants are required to wear a heart rate monitor during exercise. This practice allows participants to self-monitor their exertion level and also informs the exercise professional about the patient's exercise intensity. Based on the initial cardiovascular assessment, an appropriate heart rate range is determined along with a corresponding rate of perceived exertion (RPE) value. This is based on the individual's heart rate and blood pressure response, as well as RPE during the test. This ensures that the patient is exercising at a safe intensity. Participants who are flagged as having high blood pressure during their initial assessment are routinely monitored before and during exercise and may need to be referred back to their family physician for follow up. All exercise data is recorded in a log book to help track progress.

RPE scales are another tool used to monitor an individual's exercise intensity. They allow the exerciser to subjectively rate his/her feelings during exercise, taking into account personal fitness level, environmental conditions and general fatigue levels. RPE scales are particularly useful when working with individuals taking beta-blockers or other medications that may alter HR response to exercise. It is important to teach the patients how to use the RPE scale correctly.

There are two types of RPE Scales; the original Category scale developed by Borg, and a modified Category-Ratio scale.

Category (Borg) Scale		Category-Ratio Scale	
6		0	Nothing at all
7	Very very light	0.3	
8		0.5	Extremely weak
9	Very light	0.7	
10		1.0	Very weak
11	Fairly light	1.5	
12		2.0	Weak
13	Somewhat hard	2.5	
14		3.0	Moderate
15	Hard	4.0	
16		5.0	Strong
17	Very hard	6.0	
18		7.0	Very strong
19	Very, very hard	8.0	
20		9.0	
		10	Extremely strong

Modified from G. Borg. (1998). *Borg's perceived exertion and pain scales*. Champaign, IL: Human Kinetics.



The following section offers suggestions for those working with older cancer patients. These guidelines are not evidenced-based, but have been suggested as best-clinical practice through UW WELL-FIT.

Cardiovascular Training

- ♡ Start patient walking on a treadmill or cycling on recumbent bike. If the participant has not used a treadmill before, give instruction on proper walking technique (encourage long strides, heel strike with straight leg, look ahead not down)
- ♡ It may be appropriate to start on the bike if the participant has difficulty on the treadmill as this will lead to elevated heart rate and a higher RPE than usual
- ♡ Have bikes which increase resistance in very small increments (i.e. 5 watts)
- ♡ Use quick start/manual settings rather than pre-set programs so participant and instructors can change intensity as tolerated and avoid rapid changes in intensity
- ♡ Use HR in conjunction with RPE (don't exceed 13) to gauge intensity, rather than HR alone
- ♡ Look for visible signs of over-exertion (difficulty talking while exercising, facial color) and decrease intensity if indicated

Resistance Training

- ♡ Perform 1 set of each exercise in the program. Those participants who have experienced significant muscle wasting may gradually be progressed to multiple sets per exercise



- ♡ Choose appropriate resistance such that 10-20 repetitions can be performed with good technique
- ♡ Increase resistance used once participants can exceed 20 repetitions
- ♡ Do not perform exercise to momentary muscle fatigue
- ♡ Amount lifted may be less on one limb or only unilateral depending on limitations
 - ☆ surgery side may be weaker
 - ☆ lymphedema
 - ☆ Presence of PICC line in one arm
- ♡ Resistance programs are changed every six weeks for variety and progression
- ♡ Try to keep many of the exercises functional to help with ADL's
- ♡ Never sacrifice technique for added resistance

STAFF REQUIREMENTS

There are various staff who will be involved in different parts of the program:

Medical Oncologist and Supportive Care Nurses

Medical oncologists and the supportive care nurses are involved at the very beginning of the program, prior to the initial assessment. Their role is to educate patients about the importance of physical activity during cancer treatment and to make them aware of the program. The oncologist is responsible for signing the consent form that will clear the patient for exercise.

Exercise Professionals

The exercise program is staffed by exercise professionals. The number of staff depends on the size of the program and the facility. It is suggested that for every 4 patients, there should be one exercise professional. This allows for the monitoring of patients during exercise and proper supervision. Their role is to schedule and administer the initial assessments, design the exercise programs and monitor the exercise classes. It is important that the staff be competent to work with cancer patients and the elderly, and be aware of the special considerations/barriers faced by this population. Three types of certifications would be considered acceptable for working with this population:

- ♡ A Certified Exercise Physiologist trained through the Canadian Society of Exercise Physiology (CSEP-CEP)
- ♡ An Exercise Specialist certified by the American College of Sports Medicine (ACSM)
- ♡ A Certified Kinesiologist with significant work experience in exercise assessment and prescription with chronic disease.

Volunteers

For every 7 patients, along with the exercise professional, there should be two volunteers. In general, volunteers tend to be University students in the field of kinesiology. The benefits of this volunteer arrangement are two-fold; it provides students with valuable hands-on experience working with a special population while increasing the amount of one-on-one attention received by the exercise participants. Volunteers are asked to be committed, enthusiastic, compassionate and energetic when helping exercise participants. Volunteers should be provided with an orientation session to familiarize them with the facility, the exercise programs and responsibilities. Background on cancer treatment, related symptoms, side effects and special considerations should also be provided with enough discussion and interaction to feel confident that these volunteers will "do no harm". Making a contact at a local university (if the program is not already affiliated with a University) in the kinesiology department is suggested in order to recruit volunteers to the program.

The role of the volunteers is to:

- ♡ Help patients put heart rate monitors on
- ♡ Provide instruction on technique and correct when necessary
- ♡ Monitor exercise intensity and alter intensity if appropriate
- ♡ Socialize, lend an ear, provide humour, and make the program enjoyable for all participants

- ♡ Help recording in exercise log books
- ♡ Clean equipment when needed
- ♡ Clean heart rate monitors after sessions finish (The importance of cleanliness needs to be stressed with all staff and volunteers. This will be appreciated fully when all support staff recognize that these participants have compromised immune systems and are much more susceptible to colds and infections).

FACILITIES AND EQUIPMENT

Gym

A safe space suitable for exercise is one of the first requirements for starting an exercise program. Some considerations when choosing such a space include lighting, room temperature and floor surface. Mirrors located around the room are great for providing visual feedback on form to exercisers.

Exercise Equipment

A combination of stationary bikes, recumbent bikes and treadmills allow participants to not only vary their cardiovascular exercise, but to tailor it to their skill and fitness level as well. An important consideration when purchasing equipment for older adults is the increments by which intensity can be increased. Ideally, a machine that can be changed by smaller units of resistance should be chosen. Alternatively, a walking program could be prescribed if no equipment is available, pending weather conditions throughout the year or availability of an indoor track. If equipment is limited, creative and beneficial exercises can still be tailored to the individual.

Muscular strength and endurance programs can involve a combination of free weights and machines. Suggested equipment includes:

- ♡ Single or double adjustable cable columns with various attachments
- ♡ Free weights ranging from 1-25 lbs



- ♡ Barbells & body bars ranging from 10-40lbs
- ♡ Stability balls of various sizes
- ♡ Tubing of varying resistance (very light-hard)
- ♡ Adjustable aerobic step
- ♡ Bosu ball
- ♡ Balance discs
- ♡ Portable floor mats

Safe exercise for an older population can be enhanced by equipping a gym with lighter weights, using machines that increase resistance in small increments and providing mirrors and stable equipment or railings that can be used for balance. Callisthenic exercises using only body weight (squats, lunges, modified pushups) are also a great way to improve the strength and endurance of people of all exercise abilities. In many cases, therabands or tubing are very useful.

SAFETY

The following are some safety measures to be included at all stages of program implementation.

Staff Requirements

The staff-to-participant ratio should be small with 1 staff member for every 4-7 patients. The exercise classes should only be carried out when all mandatory staff are present.

Documentation

Documentation is required at every step of the program including the referral process, the assessment, specific prescriptions, right up to discharge. Each participant should have a folder with the following information:

- ♡ Referral script from oncologist
- ♡ Informed consent from the participant
- ♡ Initial assessment package results
- ♡ Exercise prescription and log that tracks the progress of participant throughout program
- ♡ Medical updates
- ♡ Attendance

An effective documentation system should be in place that can provide the following:

- ♡ Information for evaluating outcomes
- ♡ Sufficient information on participant interventions to allow audit, staff education, and evaluation
- ♡ A legal record that can be used to protect involved parties
- ♡ An organized and up to date database for research

Emergency Procedures

All staff involved should be CPR certified and trained to use an automated external defibrillator (AED). The exercise facility should have a telephone with the emergency assistance numbers clearly posted on it. A first aid kit should be on site with all necessary supplies stocked up. Exercise equipment should have maintenance inspections to ensure safety.

Sanitization

Maintaining a clean environment is extremely important when working with cancer patients, particularly older adults. Cancer patients often have compromised immune systems due to the nature of their cancer or cancer treatment, and are therefore more susceptible to infections. Equipment should be cleaned/disinfected after each use and hand sanitization should always be implemented prior to entering the exercise facility. All staff, volunteers and participants are restricted from the program if they are sick or are contagious.

Facility

The exercise facility should be appropriate for older adults. This includes easy access from parking lots or transit. Two examples of this are: having machines that have very small increments in weight and having hand rails available for balance.

COSTS AND FUNDING

The following is an example of a budget including both start up costs and annual costs. This is just an example, so prices may vary.

Item Description	Quantity	Item Cost	Start Up Cost	Annual Cost
Personnel				
Exercise Physiologist	1	salary		50,000.00
Facility				
	Variable cost			N/A
Equipment				
Treadmill: Precore 9.31	2	3,488.00	6,976.00	
Iviva Sport op B100 Recumbent Cycle Ergometer	1	888.00	888.00	
Diamondback 1190 Step Through Cycle Ergometer	1	1,588.00	1,588.00	
Electrocardiogram	1	2,000.00	2,000.00	
Polar heart rate monitor	6	68.88	413.28	
Free weights	100	5.00	500.00	
8 All pro ankle weights (2x2.5lbs)	2	34.00	68.00	
8 All pro ankle weights (2x5lbs)	2	48.00	96.00	
Free weight bench	1	288.00	288.00	
Thera-band/tubing	6	19.88	119.28	
Weight Machine Northern Lights Functional Trainer	1	1,788.00	1,788.00	
Mats	6	49.88	299.28	
Thera-balls	2	19.99	39.98	
Blood pressure cuff	2	140.00	280.00	
Stethoscope	1	80.00	80.00	
Service contract	1			
Weight Scale	1	40.00	40.00	
Tape Measure	2	2.00	4.00	
Calipers	1	700.00	700.00	
Computer	1	2,000.00	2,000.00	
Automatic External Defibrillator	1	2,000.00	2,000.00	
First Aid Kit	1	200.00	200.00	
Supplies				
Computer Supplies	1	200.00	200.00	200.00
Hand Gel	5	7.50	37.50	37.50
Cydex	1	48.50	48.50	48.50
Paper Towel	10	14.70	147.00	147.00
Kimwipes	10	3.00	30.00	30.00
Electrodes	10	11.85	118.50	118.50
ECG Paper	10	5.00	50.00	50.00
Total Direct Costs			20,999.32	50,631.50

EDUCATION

Education about the exercise program will take many forms, from formal presentations to brochures, posters, video, television clips and word of mouth. The results from the survey on older adults indicated that most treatment/disease-related barriers (fatigue, difficulty on treatment days, pain/aching), non-treatment/disease-related barriers (lack of motivation, unaware of the program, and time management), and age-related barriers (age itself, lack of strength, fear of falling, and hurting/straining) could be reduced through proper education. Repeatedly emphasizing the benefits and safety of exercise to cancer patients is important in reducing most of the barriers identified and influencing the older adults with cancer to participate in an exercise program while in treatment.

Fatigue was the number one reported barrier in the survey (N=43) preventing older adults from participating in physical activity. This is anticipated since cancer-related fatigue (CRF) is the most common side effect associated with treatment, affecting 70-100% of patients.²³ Previously, the preferred recommendation for treatment of CRF was rest; conserving energy for activities of higher priority. However, physical inactivity leads to muscle wasting and loss of cardiorespiratory fitness, such that activity levels that were previously well-tolerated may be perceived as being excessively fatiguing resulting in even further fatigue.³⁷ Exercise has now been proposed as a viable intervention to help in the management of CRF; there is strong evidence that exercise is effective in preventing and/or reducing cancer-related fatigue.³⁹ It is necessary to provide this information to the patient so that he/she clearly understands that fatigue is reduced with exercise and not exacerbated.

Two other highly cited barriers were individual perceptions that they lacked the strength for exercise or that their age prevented them from exercise. The exercise program is tailored to the individual and the prescription will match his/her abilities in terms of cardiorespiratory fitness, strength and coordination. Resistance training studies demonstrate significant improvements in upper and lower body muscular strength in patients treated for prostate cancer³⁵ and also for women treated for breast cancer.⁹ Similar benefits are seen in studies on older adults; resistance exercise improves the ability to perform tasks associated with strength, such as climbing stairs, rising from a chair or from the floor.³⁶

Lack of motivation is a frequent barrier to exercise that can also be resolved through education. Knowledge of and belief in the health benefits from exercise are helpful in motivating initial involvement in an exercise program.³⁴ Older adults in particular may have lived through a time period when exercise was not valued or deemed necessary; lack of knowledge and understanding of the relationship between moderate exercise and health is an especially relevant barrier.³⁴ Considering 47% of older adults surveyed felt that "if their health were better they would be more active" indicates this lack of knowledge. Knowing the benefits of exercise during cancer treatment and into survivorship can motivate patients to incorporate exercise into their lifestyle. The exercise program provides an excellent social support network; the encouragement received from the exercise professionals and strong friendships formed with other participants helps promote adherence to the program. Participants feel accountable, knowing that instructors and their peers are expecting their presence.

Results from the survey indicated that 31% (N=27) of individuals surveyed had not heard about the UW WELL-FIT program. This lack of awareness is a barrier all in itself. Not only do older cancer patients need to be informed about the benefits of physical

activity during treatment, but they need to know that these programs exist! Forms of advertisement and education should be available in locations that would target the appropriate population; having brochures and education sheets available in cancer centers and community support centers for the elderly is necessary. Brochures and websites should emphasize that the program is appropriate for individuals of all ages and all levels of fitness. Video content will include similar information in addition to highlighting personal cancer survivor stories about how physical activity helped them during treatment.

All levels of program contacts must be properly informed on the benefits of exercise and the safety of the exercise program in order to provide support and promotion of the program. Speaking at local hospital grand rounds, patient support groups, or community education forums may be the best way to recruit patients for the exercise program. The actual content and method of education is critical and will have an impact on recruitment and retention. Education is needed at several levels of contact and should be repeated at regular intervals:

- ♡ Provide the oncologists and supportive care nurses with information on 1) the benefits of physical activity during treatment, 2) the program structure and content 3) the inclusion criterion and details of the referral process. Older adults in general demonstrate great respect for their physicians and are greatly influenced by their advice.³⁴ It is the endorsement of the program and referral of the oncologist with encouragement from the supportive care nurses that will determine if a patient participates.
- ♡ Create awareness of the program for the patients and educate them about the importance of physical activity during treatment, stressing the benefits, the safety, the inclusion of age and disease appropriate exercise, the social and psychological support of the exercise group, the accessibility of the facility, the cost, transportation and/or parking considerations, issues related to privacy, qualification of exercise personal, support of medical oncologists, success stories and testimonials. Provide highlights of personal cancer survivor stories about how physical activity during treatment helped them
- ♡ Educate community partners about the program. This can include cancer support centers and senior community programs.

Education processes should be sensitive to cultural, gender and age differences. Factors affecting communication should be considered. For example, written, audiovisual or computer resources should match the participant's literacy levels. Fonts should be large enough for older adults to read and if visuals are present, they should include older adults, so they feel that the program is appropriate for them.

Forms of Education

- ♡ Seminar Presentations to:
 - ☆ Supportive care
 - ☆ Patients
 - ☆ Oncologists
 - ☆ Hospital volunteers
 - ☆ Community support groups

♡ Information sheets

- ☆ For patients - to be put in cancer center orientation packages, on web page
- ☆ For oncologists – to be mailed to offices
- ☆ For potential fundraising

♡ Brochures

- ☆ To be displayed in cancer centres, physicians office and community support centres, on web page

♡ Educational Video

- ☆ To be shown to patients at orientation sessions, on web page, or mailed directly
- ☆ Local news stories
- ☆ Promotion for fund-raising activities or provided for potential funders to demonstrate what the program is about and how patients will benefit

See Appendix L for a Sample Presentation to be shown to patients at an orientation session. See Appendix M for a Sample Patient Information Sheet.

See Appendix N for a Sample Brochure

See Appendix O for the Educational Video

COMMUNITY SUPPORT GROUPS

Centers outside of the referring hospital can disseminate information on programs available to patients. These programs provide support, awareness, and mentoring. Within many communities, there are support programs for cancer and for the older adult; both of which have potential to support the exercise program in several ways.

HopeSpring is a Cancer Support Center in both Waterloo and Cambridge, Ontario designed to assist people to move beyond the fear, confusion, and frustrations surrounding a cancer diagnosis and treatment.¹⁷ They offer a variety of programs and services, all designed to create a greater sense of confidence and control and providing personal and group support, a free wig boutique, and an excellent resource centre. "Many people in our community have found inspiration, information, and empowerment at the HopeSpring Cancer Support Centre".¹⁷ All of their programs and services are confidential and free of charge. Contacts made and relationships developed with programs like HopeSpring provide:

- ♡ Opportunity to present information on your cancer exercise program
- ♡ A place to advertise
- ♡ Inform potential clients about the benefits of exercise while in treatment, the benefits of exercise for the older adult with specific emphasis on type of exercise and safety
- ♡ Provides mentoring for clients who currently exercise (testimonials)

Community Support Connections⁵ was developed in April 2007 as a merger of four smaller not-for-profit agencies each with a long history of helping improve the quality of life of seniors in Waterloo Region. The four agencies include: Kitchener-Waterloo Friendship Group for Seniors, Meals on Wheels of Kitchener-Waterloo, Meals on Wheels

and Community Home Support (Cambridge), RAISE Home Support for the Elderly. This essential connection to a program in your community provides resources directed at the older adult (with or without cancer), that has the opportunity to provide support for your exercise program for older adults with cancer. Community Support Connections provide many opportunities to seniors in our community. Specific opportunities to link with the exercise program include:

Transportation

Dependable volunteers provide transportation services to and from medical appointments, banking and other personal needs. Volunteers provide this service utilizing their own vehicles. A fee related to distance is required for this service.

Caregiver Relief

This program provides a weekly visitor to a person who lives with a family member or caregiver. Visitors provide companionship to relieve family and friends from their care giving role and help relieve stress placed on family relationships. Visitors might chat, play games or take their friend out to the mall or for coffee. Visits take place weekly at a mutually arranged time.

Care Coordination

A Care Coordinator assesses the needs of prospective clients referred to the agency, establishes and manages the provision of all agency services tailored to individual client needs and coordinates the delivery of appropriate services both within the agency and externally with other providers



SUMMARY

The beneficial effects of exercise are now recognized as an important adjunct to cancer treatment. Several studies have examined the relationship between exercise rehabilitation and quality of life in cancer patients. To that end, UW WELL-FIT was initiated and designed to provide patients undergoing cancer treatment an opportunity to exercise within a safe environment. It became evident during the past 6 years of delivery of this program that less than 12% of clients participating in the program were over the age of 60. The estimates for 2008 indicate that 69% of new cases and 82% of cancer deaths will occur in Canadians 60 years of age or older. The Public Health Agency of Canada identified this as a gap in service and provided funding to The Active Living Coalition of Older Adults (ALCOA) to identify the barriers which discourage older adults from participating in supervised exercise. It was deemed efficient to build on the strengths of UW WELL-FIT, a well-established exercise program at the University of Waterloo for cancer patients undergoing treatment. The Manual presented here is an extension of the existing UW WELL-FIT program that provides a framework that will enable Health Professionals to develop and implement a similar program. The research project identified the barriers and implemented strategies in an attempt overcome these barriers. Preliminary results indicate an increase in the number of older adults in the UW WELL-FIT program. Please visit the websites listed for more information on the UW WELL-FIT program (www.uwfitness.uwaterloo.ca) and the Grand River Regional Cancer Center (www.grrcc.on.ca).

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UW Fitness Exercise and Wellness Program
REFERRAL SCRIPT

NAME OF CLIENT _____ Phone _____

Date of Referral _____ Referred By _____

Cancer/Medical Information

Type of cancer _____ Date of diagnosis _____

Type of surgery and date _____

Treatment and protocol

	Chemotherapy	Radiation
Drug		
Frequency		
Start date		
Length of treatment		

Additional Medical concerns (cardiovascular, metabolic, musculoskeletal)

Physical Activity Referral

- no physical activity
- progressive physical activity with avoidance of: _____
- progressive physical activity with inclusion of: _____
- unrestricted physical activity (start slowly and build up gradually)

Call for an appointment

UW Well-Fit
University of Waterloo
519-888-4567 Ext. 36841
Fax: 519-888-4033

Further information:
<input type="checkbox"/> attached
<input type="checkbox"/> to be forwarded
<input type="checkbox"/> available on request

Physician Signature: _____

INFORMATION AND CONSENT FORM

UW FITNESS
 APPLIED HEALTH SCIENCES RESEARCH UNITS
 UNIVERSITY OF WATERLOO

GENERAL OUTLINE

UW Fitness is part of the Applied Health Sciences Research Units at the University of Waterloo. UW Fitness will provide comprehensive fitness assessments and exercise management for individuals who have been diagnosed with cancer and are currently undergoing treatment. As a participant, you will be asked about your medical condition and physical activity history, as well as your goals related to exercise. Tests will be conducted that will evaluate cardio-respiratory endurance (aerobic capacity), body composition, flexibility, muscular strength, and muscular endurance. You will be asked to complete a questionnaire that asks about your day to day life. One or a combination of exercise tests will be used to determine your baseline exercise level. The results of these tests will assist us in determining the type and amount of physical activity most appropriate for you. Once your activity program has been planned, you will join a one hour exercise program. You will have the opportunity to attend twice per week for 12 weeks. The cost of the fitness assessment and exercise program will be covered by UW Fitness.

PROCEDURES, BENEFITS AND RISKS AND CONSENTConsent of Participant

I, the undersigned, do hereby acknowledge:

* **My consent to perform a fitness test consisting of a combination of tests selected from the list below:**

- **Body Composition:** This will be measured using tape measure and skinfold callipers. Skinfold calliper is used to measure the thickness of the skin and the underlying fat and a measuring tape is used to measure the girth. These measurements will be taken on the arms, legs, chest, and abdomen. Measurements of standing height and weight will also be taken.
- **Cardiovascular Function:** You will be asked to walk on a treadmill or pedal a modified stationary bicycle at a workload that is considered to be moderate. This level of exercise will be determined and monitored using heart rate and blood pressure. Heart rate will be measured each minute using an electrocardiogram. Blood pressure will be measured at rest and **at every stage of exercise** using a blood pressure cuff around the upper arm. This exercise test will last between 4 and 10 minutes depending on your current fitness level.
- **Muscular Strength:** Muscular strength will be assessed using a linear variable differential force transducer (LVDT) for both arm flexion and leg extension. You will exert maximal force against the force transducer.

- **Flexibility:** Shoulder range of motion will be measured using a flexometer placed on the upper arm while performing various shoulder movements including flexion, extension and abduction.

* The results of these tests will assist in determining the type and amount of physical activity most appropriate for my level of fitness and to monitor changes in fitness variables.

* **My consent to complete the SF-36 Quality-of-life Survey.**

- Using the SF-36 quality-of-life survey you will be asked to complete this both before and after the 12-week exercise session. This will require approximately 10 minutes each time. You may, at any time, choose not to answer some or all of the questions. The following is a sample from the questionnaire.

1

- i) In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- ii) Compared to one year ago, how would you rate your health in general now?
- iii) How much body pain have you had in the past 4 week?

* **My consent to participate in a supervised exercise program.**

Exercise Training Session: You will be involved in one **12** week exercise session that will be conducted twice per week for one hour each. The exercise will be based on your individual assessment and hence each person will be working independently. There will be up to 5 people per session. A Kinesiologist who is a certified health professional will supervise the exercise session. The Canadian Society for Exercise Physiology provides the Professional Fitness and Lifestyle Consultant Certification and the American College of Sports Medicine provides the Exercise Specialist Certification for all staff. Continuation in the program after the initial 12 week session is available as fee for service.

The exercise session will begin with a sign-in procedure consisting of resting heart rate and resting blood pressure (if required). Each exercise session will include cardiovascular exercise with a progressive warm up and gradual cool down performed on various machines. Target heart rate will be determined from the results of your exercise test, and heart rate monitors will be worn during each exercise session. Cardiovascular exercise will be 15-30 minutes of walking, cycling, stepping, rowing or running. Muscular strength and endurance will be included, using a combination of free weights, machines, callisthenics and exercise balls. A 5-10 minute cool-down including stretching exercises will be done to gradually return your body to a pre-exercise level. All exercise components will be adjusted on a day to day basis to keep you at a safe and comfortable level.

- * My consent to record any physical activity in an activity log book provided.
- * My understanding that there are modest potential risks; i.e. possible episodes of transient light-headedness, fainting, abnormal blood pressure, chest discomfort,

leg cramps and nausea, and that I understand those risks;

- * My obligation to immediately inform the Kinesiologist of any pain, discomfort, fatigue or any other symptoms that I may suffer during and immediately after the testing or exercise session;
- * My understanding that I may stop or delay any further exercise testing or exercise if I so desire and that the exercise may be stopped by the Kinesiologist upon observation of any symptoms of distress or abnormal response;
- * My understanding that I may ask any questions or request further explanation or information about the procedures at any time before, during, and after the testing and exercise sessions;

Further, I acknowledge the following:

1. I have consulted my oncologist relative to my participation and have been informed by him/her as to the potential risks. I have been cleared for the exercise medically, and have obtained written permission to perform the routines in this program.
2. I agree to limit my participation to the level of activity that is tolerable to my physical condition and medical situation at that time.
3. I, as a participant, may withdraw my agreement to participate at anytime during the study without reprisal or compromise to my medical treatment.

Information Consent Form

The information obtained in this study will be identified only through a numerical code. I give my full consent for analysis, publication and presentation of this data, in any form. I understand that I will receive no compensation for my efforts. If requested, I will receive the results of the survey when they are completed. I understand that I will receive the results of any exercise testing prior to starting the exercise session.

This project Exercise and Wellness Program for People with Cancer has been reviewed and received ethics clearance through the Joint Research Ethics Committee of St. Mary=s General Hospital/ Grand River Hospital and The University of Waterloo Office of Research Ethics (Needles Hall). The participants who have concerns or questions about their involvement in the project may contact the Chair of the Joint Research Ethics Committee 519-749-4300 ext. 37187 or Office of Research Ethics, University of Waterloo at 519-885-1211 ext.36005.

With full knowledge of all foregoing I agree, of my own free will, to participate.

Name

Signature

Dated at Waterloo, Ontario

Witness

FACT-G (Version 4)

Below is a list of statements that other people with your illness have said are important. **By circling one (1) number per line, please indicate how true each statement has been for you during the past 7 days.**

PHYSICAL WELL-BEING

		Not at all	A little bit	Some-what	Quite a bit	Very much
GP1	I have a lack of energy.....	0	1	2	3	4
GP2	I have nausea.....	0	1	2	3	4
GP3	Because of my physical condition, I have trouble meeting the needs of my family.....	0	1	2	3	4
GP4	I have pain.....	0	1	2	3	4
GP5	I am bothered by side effects of treatment.....	0	1	2	3	4
GP6	I feel ill.....	0	1	2	3	4
GP7	I am forced to spend time in bed	0	1	2	3	4

SOCIAL/FAMILY WELL-BEING

		Not at all	A little bit	Some-what	Quite a bit	Very much
GS1	I feel close to my friends	0	1	2	3	4
GS2	I get emotional support from my family.....	0	1	2	3	4
GS3	I get support from my friends	0	1	2	3	4
GS4	My family has accepted my illness.....	0	1	2	3	4
GS5	I am satisfied with family communication about my illness	0	1	2	3	4
GS6	I feel close to my partner (or the person who is my main support).....	0	1	2	3	4
Q1	<i>Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please check this box <input type="checkbox"/> and go to the next section.</i>					
GS7	I am satisfied with my sex life.....	0	1	2	3	4

FACT-G (Version 4)

By circling one (1) number per line, please indicate how true each statement has been for you during the past 7 days.

EMOTIONAL WELL-BEING

		Not at all	A little bit	Some- what	Quite a bit	Very much
GE1	I feel sad.....	0	1	2	3	4
GE2	I am satisfied with how I am coping with my illness	0	1	2	3	4
GE3	I am losing hope in the fight against my illness	0	1	2	3	4
GE4	I feel nervous	0	1	2	3	4
GE5	I worry about dying	0	1	2	3	4
GE6	I worry that my condition will get worse.....	0	1	2	3	4

FUNCTIONAL WELL-BEING

		Not at all	A little bit	Some- what	Quite a bit	Very much
GF1	I am able to work (include work at home).....	0	1	2	3	4
GF2	My work (include work at home) is fulfilling	0	1	2	3	4
GF3	I am able to enjoy life	0	1	2	3	4
GF4	I have accepted my illness	0	1	2	3	4
GF5	I am sleeping well.....	0	1	2	3	4
GF6	I am enjoying the things I usually do for fun.....	0	1	2	3	4
GF7	I am content with the quality of my life right now	0	1	2	3	4

The following are sample questions from the SF-36 Survey. For the full survey, please visit the link below.

1.

i) In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ii) Compared to one year ago, how would you rate your health in general now?

iii) How much body pain have you had in the past 4 week?

https://www.amihealthy.com/Surveys/SF36/SF36_Standard_1.asp?hidSurveyID=100&hidSiteID=52907&hidSessionType=1

FACIT-F (Version 4)

Below is a list of statements that other people with your illness have said are important. **By circling one (1) number per line, please indicate how true each statement has been for you during the past 7 days.**

<u>PHYSICAL WELL-BEING</u>		Not at all	A little bit	Some-what	Quite a bit	Very much
GP1	I have a lack of energy.....	0	1	2	3	4
GP2	I have nausea.....	0	1	2	3	4
GP3	Because of my physical condition, I have trouble meeting the needs of my family.....	0	1	2	3	4
GP4	I have pain.....	0	1	2	3	4
GP5	I am bothered by side effects of treatment.....	0	1	2	3	4
GP6	I feel ill.....	0	1	2	3	4
GP7	I am forced to spend time in bed.....	0	1	2	3	4

<u>SOCIAL/FAMILY WELL-BEING</u>		Not at all	A little bit	Some-what	Quite a bit	Very much
GS1	I feel close to my friends.....	0	1	2	3	4
GS2	I get emotional support from my family.....	0	1	2	3	4
GS3	I get support from my friends.....	0	1	2	3	4
GS4	My family has accepted my illness.....	0	1	2	3	4
GS5	I am satisfied with family communication about my illness.....	0	1	2	3	4
GS6	I feel close to my partner (or the person who is my main support).....	0	1	2	3	4
Q1	<i>Regardless of your current level of sexual activity, please answer the following question. If you prefer not to answer it, please check this box <input type="checkbox"/> and go to the next section.</i>					
GS7	I am satisfied with my sex life.....	0	1	2	3	4

By circling one (1) number per line, please indicate how true each statement has been for you during the past 7 days.

EMOTIONAL WELL-BEING

		Not at all	A little bit	Some-what	Quite a bit	Very much
GE1	I feel sad.....	0	1	2	3	4
GE2	I am satisfied with how I am coping with my illness	0	1	2	3	4
GE3	I am losing hope in the fight against my illness	0	1	2	3	4
GE4	I feel nervous	0	1	2	3	4
GE5	I worry about dying	0	1	2	3	4
GE6	I worry that my condition will get worse.....	0	1	2	3	4

FUNCTIONAL WELL-BEING

		Not at all	A little bit	Some-what	Quite a bit	Very much
GF1	I am able to work (include work at home).....	0	1	2	3	4
GF2	My work (include work at home) is fulfilling	0	1	2	3	4
GF3	I am able to enjoy life	0	1	2	3	4
GF4	I have accepted my illness	0	1	2	3	4
GF5	I am sleeping well.....	0	1	2	3	4
GF6	I am enjoying the things I usually do for fun.....	0	1	2	3	4
GF7	I am content with the quality of my life right now	0	1	2	3	4

By circling one (1) number per line, please indicate how true each statement has been for you during the past 7 days.

ADDITIONAL CONCERNS

Not at all A little bit Some-what Quite a bit Very much

HI7	I feel fatigued.....	0	1	2	3	4
HI12	I feel weak all over	0	1	2	3	4
An1	I feel listless (“washed out”)	0	1	2	3	4
An2	I feel tired.....	0	1	2	3	4
An3	I have trouble <u>starting</u> things because I am tired	0	1	2	3	4
An4	I have trouble <u>finishing</u> things because I am tired.....	0	1	2	3	4
An5	I have energy.....	0	1	2	3	4
An7	I am able to do my usual activities	0	1	2	3	4
An8	I need to sleep during the day	0	1	2	3	4
An12	I am too tired to eat.....	0	1	2	3	4
An14	I need help doing my usual activities	0	1	2	3	4
An15	I am frustrated by being too tired to do the things I want to do	0	1	2	3	4
An16	I have to limit my social activity because I am tired	0	1	2	3	4

Revised Piper Fatigue Scale

Directions: For each of the following questions circle the number that best describes the fatigue you are experiencing now. Please make every effort to answer each question to the best of your ability. Thank you very much.

1. How long have you been feeling fatigued? (*check one response only*)

- a. Minutes _____
- b. Hours _____
- c. Days _____
- d. Weeks _____
- e. Months _____
- f. Other (*please describe*) _____

2. To what degree is the fatigue you are feeling now causing you distress?

No Distress 0 1 2 3 4 5 6 7 8 9 **A great deal of distress**
10

3. To what degree is the fatigue you are feeling now interfering with your ability to complete your work or school activities?

None 0 1 2 3 4 5 6 7 8 9 **A great deal**
10

4. To what degree is the fatigue you are feeling now interfering with your ability to visit or socialize with your friends?

None 0 1 2 3 4 5 6 7 8 9 **A great deal**
10

5. To what degree is the fatigue you are feeling now interfering with your ability to engage in sexual activity?

None 0 1 2 3 4 5 6 7 8 9 **A great deal**
10

6. Overall, how much is the fatigue, which you are experiencing now, interfering with your ability to engage in the kind of activities you enjoy doing?

None 0 1 2 3 4 5 6 7 8 9 **A great deal**
10

7. How would you describe the degree of intensity or severity of the fatigue which you are experiencing now?

Mild 0 1 2 3 4 5 6 7 8 9 **Severe**
10

To what degree would you describe the fatigue which you are experiencing now as being:

8. **Pleasant** 0 1 2 3 4 5 6 7 8 9 **Unpleasant**
10

9. **Agreeable** 0 1 2 3 4 5 6 7 8 9 **Disagreeable**
10

10. **Protective** 0 1 2 3 4 5 6 7 8 9 **Destructive**
10

11. **Positive** 0 1 2 3 4 5 6 7 8 9 **Negative**
10

12. **Normal** 0 1 2 3 4 5 6 7 8 9 **Abnormal**
10

13. To what degree are you now feeling:
Strong 0 1 2 3 4 5 6 7 8 9 **Weak**
10

14. To what degree are you now feeling:
Awake 0 1 2 3 4 5 6 7 8 9 **Sleepy**
10

Revised Piper Fatigue Scale (continued)

15. To what degree are you now feeling:

Lively 0 1 2 3 4 5 6 7 8 9 **Listless**
10

16. To what degree are you now feeling:

Refreshed 0 1 2 3 4 5 6 7 8 9 **Tired**
10

17. To what degree are you now feeling:

Energetic 0 1 2 3 4 5 6 7 8 9 **Unenergetic**
10

18. To what degree are you now feeling:

Patient 0 1 2 3 4 5 6 7 8 9 **Impatient**
10

19. To what degree are you now feeling:

Relaxed 0 1 2 3 4 5 6 7 8 9 **Tense**
10

20. To what degree are you now feeling:

Exhilarated 0 1 2 3 4 5 6 7 8 9 **Depressed**
10

21. To what degree are you now feeling:

Able to concentrate 0 1 2 3 4 5 6 7 8 9 **Unable to concentrate**
10

22. To what degree are you now feeling:

Able to remember 0 1 2 3 4 5 6 7 8 9 **Unable to remember**
10

23. To what degree are you now feeling:

Able to think clearly 0 1 2 3 4 5 6 7 8 9 **Unable to think clearly**
10

24. Overall, what do you believe is most directly contributing to or causing your fatigue? _____

25. Overall, the best thing you have found to relieve your fatigue is: _____

26. Is there anything else you would like to add that would describe your fatigue better to us? _____

27. Overall, what do you believe is most directly contributing to or causing your fatigue?

NO

Yes Please describe _____

PFS current format and scoring instructions: The PFS in its current form is composed of 22 numerically scaled, "0" to "10" items that measure four dimensions of subjective fatigue: behavioral/severity (6 items; #2-7); affective meaning (5 items; #8-12); sensory (5 items; #13-17); and cognitive/mood (6 items; #18-23). These 22 items are used to calculate the four subscale/dimensional scores and the total fatigue scores. Five additional items (#1 and #24-27) are not used to calculate subscale or total fatigue scores but are recommended to be kept on the scale as these items furnish rich, qualitative data. Item #1, in particular gives a categorical way in which to assess the duration of the respondent's fatigue. To score the PFS, add the items contained on each specific subscale together and divide by the number of items on that subscale. This will give you a subscale score that remains on the same "0" to "10" numeric scale. Should you have missing item data, and the respondent has answered at least 75-80% of the remaining items on that particular subscale, calculate the subscale mean score based on the number of items answered, and substitute that mean value for the missing item score (mean-item substitution). Recalculate the subscale score. To calculate the total fatigue score, add the 22-item scores together and divide by 22 in order to keep the score on the same numeric "0" to "10" scale.

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CLIENT INFORMATION

Date: _____

Client Name: _____ Birth Date : _____ Age: _____

Address: _____

Phone: H) _____ W) _____

Email: _____

Emergency Contact : _____ Phone: _____

How did you hear about UW WELL-FIT? _____

GOAL(S)

1. What would you like to accomplish with this program? Be as specific as possible (e.g. lose weight, increase strength, train for a specific sport, etc.)

-
-
-
-

CURRENT ACTIVITY (and past experience)

2. Do you currently participate in some sort of physical activity (structured or otherwise) on a daily/weekly basis (i.e. lifting weights, cardiovascular activity, recreational or other unstructured physical activities that are part of your daily life/job)?

YES If “yes”, please give details about your physical activity regarding type of activities, frequency (times per week), intensity (# of sets and repetitions of weights, or low/moderate/high for cardio), duration of activity, or any other pertinent details.

-
-
-
-

NO If “no”, have you exercised in the past? How long ago and give brief details regarding activity.

-
-
-

SMOKING HABITS

- Have you ever smoked cigarettes, cigars or a pipe? Yes No
- Do you smoke presently? Yes No
 Cigarettes _____ a day
- At what age did you start smoking? _____ years
- If you have quit smoking, when did you quit? _____

CHECKLIST FOR SIGNS AND SYMPTOMS OF DISEASE

Condition	Yes	No	Comments
CARDIOVASCULAR			
Hypertension	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hypercholesterolemia	<input type="checkbox"/>	<input type="checkbox"/>	_____
Myocardial infarction	<input type="checkbox"/>	<input type="checkbox"/>	_____
Fainting/dizziness	<input type="checkbox"/>	<input type="checkbox"/>	_____
Cramping in lower limbs	<input type="checkbox"/>	<input type="checkbox"/>	_____
Chest pain	<input type="checkbox"/>	<input type="checkbox"/>	_____
PULMONARY			
Asthma	<input type="checkbox"/>	<input type="checkbox"/>	_____
Bronchitis	<input type="checkbox"/>	<input type="checkbox"/>	_____
Emphysema	<input type="checkbox"/>	<input type="checkbox"/>	_____
Exercise-induced asthma	<input type="checkbox"/>	<input type="checkbox"/>	_____
METABOLIC			
Diabetes	<input type="checkbox"/>	<input type="checkbox"/>	_____
Obesity	<input type="checkbox"/>	<input type="checkbox"/>	_____
Glucose intolerance	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hypoglycemia	<input type="checkbox"/>	<input type="checkbox"/>	_____
Thyroid disease	<input type="checkbox"/>	<input type="checkbox"/>	_____
MUSCULOSKELETAL			
Osteoporosis	<input type="checkbox"/>	<input type="checkbox"/>	_____
Osteoarthritis	<input type="checkbox"/>	<input type="checkbox"/>	_____
Low back pain	<input type="checkbox"/>	<input type="checkbox"/>	_____
Swollen joints	<input type="checkbox"/>	<input type="checkbox"/>	_____
Orthopedic pain	<input type="checkbox"/>	<input type="checkbox"/>	_____
Artificial joints	<input type="checkbox"/>	<input type="checkbox"/>	_____
OTHER			
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____

PRESENT MEDICATIONS (name, dose, frequency: i.e. Aspirin/325 mg/ 1 daily)

Name	Dose	Frequency	Name	Dose	Frequency

UW Well-Fit Medical Clearance

Client:

Date:

Standard graded exercise tests are used in the Well-Fit assessment protocol to assess the client’s ability to tolerate increasing intensities of exercise. Electrocardiograph (ECG), blood pressure and symptomatic responses are monitored. This is a useful tool to determine functional capacity and exercise prescription.

There are certain individuals for whom the risks of exercise outweigh the potential benefits. For these clients, it is important to carefully assess the risk versus the benefits. The following table outlines absolute and relative contraindications to exercise. Exercise tests should not be performed by clients **with absolute contraindications** until those conditions are stabilized or adequately treated. Clients with **relative contraindications** may be tested only after careful evaluation of the risk/benefit ratio by a Cardiologist.

SAMPLE

Physician or Cardiologist Report (Clearance, Restrictions and Guidelines)

Physician/Cardiologist’s Name:

Signature:

Date:

Contraindications to Exercise (Testing/Training)¹

Absolute

- A recent significant change in resting ECG suggesting significant ischemia, recent myocardial infarction (within 2 days) or other acute cardiac event.
- Unstable angina
- Uncontrolled cardiac arrhythmias causing symptoms or hemodynamic compromise
- Severe symptomatic aortic stenosis
- Uncontrolled symptomatic heart failure
- Acute pulmonary embolus or pulmonary infarction
- Acute myocarditis
- Suspected or known dissecting aneurysm
- Acute infection

Relative *

- Left main coronary stenosis
- Moderate stenotic valvular heart disease
- Electrolyte abnormalities (hypokalemic, hypomagnesium)
- Severe arterial hypertension (systolic BP>200 mmHg or diastolic>110 mmHg)
- Tachyarrhythmias or bradyarrhythmias
- Hypertrophic cardiomyopathy and other forms of outflow tract obstruction
- Neuromuscular, musculoskeletal or rheumatoid disorders that are exacerbated by exercise
- High-degree AV Block
- Uncontrolled metabolic disease (diabetes, thyrotoxicosis, or myxedema)
- Chronic infectious disease (mononucleosis, hepatitis, AIDS)

* **Relative contraindications can be superseded if benefits outweigh risks. In some instances, these individuals can be exercised with caution and/or using low-level endpoints, especially if they are asymptomatic at rest.**

(American College of Sports Medicine. ACSM'S Guidelines for Exercise Testing and Prescription, Sixth Edition. Lippincott Williams & Wilkins. Philadelphia. 2000. Pg.50.)

UW Fitness requires evaluation and clearance for:

- Resting heart rate > 110-120 bpm,
- Systolic blood pressure > 150 mmHg
- Diastolic blood pressure > 95 mmHg
- Arrhythmias

APPENDIX J – SAMPLE ASSESSMENT FORM

WELL-FIT ASSESSMENT PROTOCOL

Name: _____ Date: _____ Age: _____ Gender: M or F

Assessed by: _____

RHR (bpm): _____
RBP (mmHg): _____

Ht (m): _____
Wt (kg): _____

Circumference Measurements:

Site	Right Girth (cm)	Left Girth (cm)
Upper arm (half way between tip of acromiom and olecranon process, arm hanging)		
Waist		
Proximal Thigh (~1cm below gluteal fold in standing)		

Skinfold Measurements: (only take if less than 40 mm thickness)

Site	Trial 1 (mm)	Trial 2 (mm)	Trial 3 (mm)	Value (mm)
Triceps (females)				
Suprailiac (females)				
Thigh (females & males)				
Chest (males)				
Abdomen (males)				

% Body Fat (Jackson-Pollock 3 site for men or women): _____

Cardiovascular Endurance: (2-3 min stage submax progressive bike protocol; terminate test at 15 RPE)

MINUTE	WORK RATE (Watts)	HEART RATE (beats/min)	BP (mmHg)	Comments	RPE (6-20)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
REC 1					
REC 2					
REC 3					
REC 4					
REC 5					
REC 6					
REC 7					
REC 8					

Muscular Strength: LVDT maximal voluntary contraction

Movement	Moment arm (m)	Force (N)	Moment of Force (N/m)
Leg extension –Right			
Leg extension – Left			
Forearm flexion – Right			
Forearm flexion - Left			

Flexibility: leighton flexometer

Joint and Movement	Right ROM (degrees)	Left ROM (degrees)
Shoulder flexion		
Shoulder extension		
Shoulder abduction		

Additional medical information and comments:

Type of cancer: _____

UW WELL– FIT Client Satisfaction Survey

Please take a few moments to complete this survey. We value your honest opinion – please feel free to add any comments below any of the following questions.

1. Overall I have enjoyed coming to the UW WELL-FIT program.

Strongly Agree Agree Undecided Disagree Strongly Disagree

2. Participating in the UW WELL-FIT program has improved my ability to perform tasks of daily living (e.g. carrying groceries, walking up stairs, etc.)

Strongly Agree Agree Undecided Disagree Strongly Disagree

3. I enjoyed my exercises.

Strongly Agree Agree Undecided Disagree Strongly Disagree

4. I felt that my exercises were challenging, but achievable.

Strongly Agree Agree Undecided Disagree Strongly Disagree

5. I felt safe while performing the exercises.

Strongly Agree Agree Undecided Disagree Strongly Disagree

6. The equipment was suitable for my exercise program.

Strongly Agree Agree Undecided Disagree Strongly Disagree

7. The facilities were clean (e.g. change rooms, equipment).
 Strongly Agree Agree Undecided Disagree Strongly Disagree

8. The staff were attentive to my needs and concerns.
 Strongly Agree Agree Undecided Disagree Strongly Disagree

9. The staff were knowledgeable and able to answer my questions.
 Strongly Agree Agree Undecided Disagree Strongly Disagree

10. The volunteers were able to provide assistance as needed.
 Strongly Agree Agree Undecided Disagree Strongly Disagree

11. The UW WELL-FIT atmosphere was supportive and encouraging.
 Strongly Agree Agree Undecided Disagree Strongly Disagree

12. I have met my goals that were set out in the original interview.
 Strongly Agree Agree Undecided Disagree Strongly Disagree

13. I have seen improvements in my energy levels.
 Strongly Agree Agree Undecided Disagree Strongly Disagree

14. I have seen improvements in my cardiovascular endurance.

Strongly Agree Agree Undecided Disagree Strongly Disagree

15. I have seen improvements in my strength.

Strongly Agree Agree Undecided Disagree Strongly Disagree

16. I have seen improvements in my flexibility.

Strongly Agree Agree Undecided Disagree Strongly Disagree

17. I have seen a decrease in my overall fatigue.

Strongly Agree Agree Undecided Disagree Strongly Disagree

18. Is there anything else we can do to improve the UW WELL-FIT program?

Thank you for your time in completing this survey. Your feedback is appreciated!

Sincerely,

UW Fitness

UW WELL-FIT

- A unique 12 week, group exercise program
- For individuals of **ALL AGES** undergoing treatment for various cancers
- Located at the University of Waterloo
- **NO** fee, **FREE** program



BENEFITS OF EXERCISING DURING TREATMENT

- **MINIMIZES** the negative side effects of cancer treatments
- **IMPROVES**
 - Strength & endurance
 - Heart and lung function
 - Immune function
 - Range of motion of joints
 - Bone density
 - Mood & motivation!



BENEFITS OF EXERCISING DURING TREATMENT

- Helps to maintain functional independence for people of **ALL AGES**
- Improves quality of life for cancer patients



WHY JOIN UW WELL-FIT?

- Supervised by certified exercise professionals
- Individualized exercise programs
- Safe, private, small group environment
- Positive social support network
- Flexible class times



HOW DO I JOIN?

- **STEP 1-** Ask your oncologist if this program is recommended for you. All participants need a Referral Script signed to join UW WELL-FIT.
- **STEP 2-** Your oncologist or supportive care nurse will fax a completed Referral Script to UW WELL-FIT.
- **STEP 3-** Call UW WELL-FIT at (519) 888-4567 Ext. 36841 to set up an appointment to start.

<http://uwfitness.uwaterloo.ca/wellfit/>

Join Now!

- Exercise will help during treatment!
- #1 side effect reported during treatment is... EXERCISE ENERGIZES and helps stop the cycle of fatigue!



UW WELL-FIT



A unique exercise program for individuals with cancer.

WHAT IS UW WELL-FIT?

UW WELL-FIT is a unique 12 week, **free** group exercise program for individuals of all ages undergoing treatment for all cancers.

WHY EXERCISE DURING TREATMENT?

- **MINIMIZES** the negative side effects of treatment
- **IMPROVES**
 - Heart and lung function
 - Strength and endurance
 - Immune function
 - Range of motion of joints
 - Bone density
 - Mood & motivation!

*****Exercise ENERGINIZES and counteracts fatigue caused by cancer treatments!*****

WHY JOIN UW WELL-FIT?

- **Supervised** by certified exercise professionals
- **Individualized** exercise programs
- Safe, **private**, small group environment
- Positive **social support network** with others undergoing similar cancer treatment
- **Flexible** class times

HOW DO I JOIN?

STEP 1- Talk to your oncologist to see if this program is recommended for you. All participants require this **medical clearance** prior to joining UW WELL-FIT.

**THIS PROGRAM IS FOR PARTICIPANTS CURRENTLY UNDERGOING
CANCER TREATMENT!**

STEP 2- Your oncologist or supportive care nurse will fax us a referral script.

STEP 3- Call UW WELL-FIT at (519) 888-4567 Ext. 36841 to set up an initial consultation and assessment.

FOR MORE INFO ON UW WELL-FIT

PHONE: (519) 888-4567 Ext. 36841

EMAIL: fitness@healthy.uwaterloo.ca

WEBSITE: www.uwfitness.uwaterloo.ca

HOW DO I GET THERE?

UW WELL-FIT is located at the University of Waterloo in Room 1606 of the Lyle Hallman Institute for Health Promotion and the Manulife Wellness Center.



FOR MORE INFO ON UW WELL-FIT

PHONE: (519) 888-4567 Ext. 36841
EMAIL: fitness@healthy.uwaterloo.ca
WEBSITE: www.uwfitness.uwaterloo.ca

TESTIMONIALS

*"...the program has helped to keep up my morale and motivation during this physically and emotionally challenging time...I am able to cope with the challenges of chemotherapy treatment and I believe that my fitness level and the physical exercise in my life are a big part of the reason."
~ Brenda*

*"...I am very grateful to have been introduced to the program. I have achieved goals both physically, emotionally and mentally that I know I would not have achieved without the dedicated, caring and persistent staff at WELL-FIT. During the most difficult time of treatment I still felt like I was moving forward mentally, emotionally, spiritually and physically.
~ Bonnie*

UW WELL-FIT is currently funded jointly by UW Fitness, Grand River Regional Cancer Center and charitable donations.

UW WELL-FIT

University of
Waterloo



A unique exercise program for individuals with cancer.



WHAT IS UW WELL-FIT?

UW WELL-FIT is a unique 12 week, **free** group exercise program for individuals **of all ages** undergoing chemotherapy, radiation and hormonal therapy treatment for various cancers. The main objectives of the UW WELL-FIT exercise program are to minimize the negative side effects that individuals experience with cancer treatments, as well as to improve quality of life for cancer patients.

WHY EXERCISE DURING TREATMENT?

- **Reduce the severity of symptoms** such as fatigue, muscle weakness, nausea, depression, lymphedema, decreased immune system function, weight gain or loss, and decreased aerobic capacity
- Maintain **functional independence**

WHY JOIN UW WELL-FIT?

- **Supervised** by certified exercise professionals
- **Individualized** exercise programs aimed at maintaining or improving cardiovascular fitness, muscular endurance and strength, and range of motion
- Safe, **private**, small group environment
- Positive **social support network** with others undergoing similar cancer treatment
- **Flexible** class times

HOW DO I JOIN?

STEP 1- Talk to your oncologist to see if this program is recommended for you. All participants require this medical clearance prior to joining UW WELL-FIT.

*This program is for participants *currently* in cancer treatment.

STEP 2- Your oncologist or supportive care nurse will fax us a referral script.

STEP 3- Call UW WELL-FIT at (519) 888-4567 Ext. 36841 to set up an initial consultation and assessment.

UW WELL-FIT STAFF



Caryl Russell, Program Director
MSc. Kin, Exercise Specialist



Lori Kraemer
BSc Kin, CEP



Erin Smith
BSc Kin, CEP



Madeleine Noble
MSc Kin, CEP

Educational Video

The intent of this video is to provide a visual aid of the program. It can be shown at patient orientation sessions at the cancer center, on websites or on television for promotional purposes. Content consists of the benefits of physical activity, highlighting personal cancer survivor stories about how physical activity helped them during treatment.

University of
Waterloo



**Faculty of
Applied Health
Sciences**

**University of
Waterloo
Waterloo, Ontario**

UW WELL-FIT

**Active Living
Coalition for
Older Adults**

