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Whether you are looking to become a personal trainer or you're part of an institution, health club or group and want to get your staff ACE Certified, contact us today and a member of my team will assist you! Every team member is onsite, ACE Certified and excited to help you along your journey. Just call us at the number below!

Keep moving and hope to hear from you soon.

Sincerely,



Yvonne Moduno

ACE Program Expert Supervisor

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TABLE OF CONTENTS

REVIEWERS	vii
FOREWORD	xi
INTRODUCTION	xiii
STUDYING FOR THE ACE PERSONAL TRAINER EXAM	xv
PART I – Introduction	
CHAPTER 1 – Role and Scope of Practice for the Personal Trainer <i>Todd Galati</i>	2
PART II – Leadership and Implementation	
CHAPTER 2 – Principles of Motivation and Adherence <i>Tracie Rogers</i>	26
CHAPTER 3 – Communication and Teaching Techniques <i>Barbara A. Brehm</i>	42
CHAPTER 4 – Basics of Behavioral Change and Health Psychology <i>Tracie Rogers</i>	66
Part III – The ACE Integrated Fitness Training® Model	
CHAPTER 5 – Understanding the ACE Integrated Fitness Training® Model <i>Todd Galati</i>	88
CHAPTER 6 – Building Rapport and the Initial Investigation Stage <i>Kelly Spivey</i>	110
CHAPTER 7 – Functional Assessments: Posture, Movement, Core, Balance, and Flexibility <i>Fabio Comana</i>	150
CHAPTER 8 – Physiological Assessments <i>Kelly Spivey</i>	194
CHAPTER 9 – Functional Programming for Stability-Mobility and Movement <i>Fabio Comana</i>	262
CHAPTER 10 – Resistance Training: Programming and Progressions <i>Wayne Westcott</i>	326
CHAPTER 11 – Cardiorespiratory Training: Programming and Progressions <i>Carl Foster & John P. Porcari</i>	392
CHAPTER 12 – The ACE Integrated Fitness Training® Model in Practice <i>Pete McCall</i>	440
PART IV – Special Exercise Programming Topics	
CHAPTER 13 – Mind-body Exercise <i>Ralph La Forge</i>	480
CHAPTER 14 – Exercise and Special Populations <i>Brad A. Roy</i>	512
PART V – Injury Prevention and First Aid	
CHAPTER 15 – Common Musculoskeletal Injuries and Implications for Exercise <i>Scott Cheatham</i>	572
CHAPTER 16 – Emergency Procedures <i>Julia Valentour</i>	602
PART VI – Professional and Legal Responsibilities and Business Strategies	
CHAPTER 17 – Legal Guidelines and Professional Responsibilities <i>Mark S. Nagel</i>	638
CHAPTER 18 – Personal-training Business Fundamentals <i>Pete McCall</i>	672
APPENDIX A – ACE Code of Ethics	710
APPENDIX B – Exam Content Outline	718
APPENDIX C – ACE Position Statement on Nutrition Scope of Practice for Fitness Professionals	726
GLOSSARY	730
INDEX	756

CHAPTER 5

UNDERSTANDING THE ACE INTEGRATED FITNESS TRAINING® MODEL

TODD GALATI

IN THIS CHAPTER:

Function—Health—Fitness—
Performance Continuum

Introduction to the ACE
Integrated Fitness Training
Model

Rapport and Behavioral
Strategies

ACE IFT Model Training
Components and Phases

Functional Movement and
Resistance Training

Cardiorespiratory Training

Special Population Clientele

Summary



DURING THE PAST 25 YEARS, PERSONAL TRAINING HAS UNDERGONE AN important evolution, changing from a relatively straightforward profession focused largely on improving the fitness of primarily already fit clients to one that is playing a key role in the healthcare continuum by helping an aging and increasingly **overweight** population to improve function, health, fitness, and quality of life through exercise and health-behavior changes. Personal trainers now must be prepared to work with a varied clientele with increasingly long lists of special needs.

Fortunately, research in exercise science has kept pace with this increased demand, providing specialized evidence-based programming options that are safe and effective for a variety of health issues. Personal trainers can put these concepts into action by developing specialized programs to meet the individualized needs of clients to help them enhance function for **activities of daily living (ADL)**; lose weight to positively affect metabolic function; develop good movement patterns to avoid injury and improve postural fitness; enhance **cardiorespiratory fitness** to bolster heart health, endurance, and performance; and increase muscular development to build strength, speed, and power.

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KEY CONCEPT

Throughout this manual, “key concepts” have been highlighted to help individuals preparing for the ACE Personal Trainer Certification Exam to focus their study efforts. This entire chapter should be treated as a “key concept,” as it forms the foundation required to understand and implement the content presented in subsequent chapters.

At the same time, complementary research on health-behavior changes has resulted in knowledge, tools, and techniques that personal trainers can implement to help build client **self-efficacy**, fuel program **adherence**, and make the difference between regular participation and client attrition. This research has led to a shift that has advanced personal training from focusing primarily on traditional training concepts to a profession that incorporates multiple contemporary training parameters to produce a unique blend of assessments and programming that addresses each client’s individualized needs and goals (Table 5-1).

Table 5-1

Traditional Physiological Training Parameters versus Contemporary Physiological Training Parameters

Traditional Training Parameters	Contemporary Training Parameters	
Cardiorespiratory (aerobic) fitness	Health-behavior change	Metabolic markers (ventilatory thresholds)
Muscular endurance	Postural (kinetic chain) stability	Muscular endurance
Muscular strength	Kinetic chain mobility	Muscular strength
Flexibility	Movement efficiency	Flexibility
	Core conditioning	Agility, coordination, and reactivity
	Balance	Speed and power
	Cardiorespiratory fitness (aerobic and anaerobic)	

Both novice and veteran personal trainers are well aware of the positive benefits exercise can yield in improving health, fitness, mood, weight management, stress management, and other health-related parameters. The *2008 Physical Activity Guidelines for Americans* reinforce these positive benefits by acknowledging that regular exercise is a critical component of good health and that individuals can reduce their risk of developing **chronic disease** by staying physically active and participating in structured exercise on a regular basis (U.S. Department of Health & Human Services, 2008). The guidelines specifically state that regular exercise



will help *prevent* many common diseases, such as **type 2 diabetes, coronary artery disease, hypertension**, and the health risks associated with **obesity**. Michael Leavitt, the former Secretary of Health & Human Services, stated “There is strong evidence that physically active people have better health-related physical fitness and are at lower risk of developing many disabling medical conditions than inactive people.” The *2008 Physical Activity Guidelines for Americans* suggest that adults should participate in structured physical activity at a moderate intensity for at least 150 minutes per week or a vigorous intensity for at least 75 minutes per week to experience the health benefits associated with regular exercise (U.S. Department of Health & Human Services, 2008). While this document endorses exercise as a means to achieve good health, it does not provide specific instructions for *how* to exercise.

A summary of general exercise programming guidelines for apparently healthy adults can be found in Tables 5-2 and 5-3. These guidelines are based on sound research for providing safe and effective exercise for apparently healthy adults, but they are so broad that trainers require additional information on how to appropriately implement them for each individual client (see Chapters 9, 10, and 11).

Table 5-2

Aerobic (Cardiovascular Endurance) Exercise Evidence-based General Recommendations

FITT-VP	Evidence-based Recommendation
Frequency	≥5 days/week of moderate exercise, or ≥3 days/week of vigorous exercise, or a combination of moderate and vigorous exercise on ≥3–5 days/week is recommended
Intensity	Moderate and/or vigorous intensity is recommended for most adults. Light-to-moderate intensity exercise may be beneficial in deconditioned individuals.
Time	30–60 minutes/day of purposeful moderate exercise, or 20–60 minutes/day of vigorous exercise, or a combination of moderate and vigorous exercise per day is recommended for most adults. <20 minutes of exercise per day can be beneficial, especially in previously sedentary individuals.
Type	Regular, purposeful exercise that involves major muscle groups and is continuous and rhythmic in nature is recommended.
Volume	A target volume of ≥500–1,000 MET-minutes/week is recommended. Increasing pedometer step counts by ≥2,000 steps/day to reach a daily step count ≥7,000 steps/day is beneficial.* Exercising below these volumes may still be beneficial for individuals unable or unwilling to reach this amount of exercise.
Pattern	Exercise may be performed in one (continuous) session per day or in multiple sessions of ≥10 minutes to accumulate the desired duration and volume of exercise per day. Exercise bouts of <10 minutes may yield favorable adaptations in very deconditioned individuals.
Progression	A gradual progression of exercise volume by adjusting exercise duration, frequency, and/or intensity is reasonable until the desired exercise goal (maintenance) is attained. This approach may enhance adherence and reduce risks of musculoskeletal injury and adverse cardiac events.

*While many groups recommend 10,000 steps, the Centers for Disease Control and Prevention (CDC) recommends that adults engage in 150 minutes of moderate-intensity physical activity per week. To meet the CDC’s recommendation, the average person needs to walk approximately 7,000 steps per day.

Note: FITT-VP = frequency, intensity, time, type, volume, and pattern/progressions; MET-minutes = The product of metabolic equivalents (METs) and minutes of exercise (e.g., 5 METs x 30 minutes x 5 days = 750 MET-minutes)

Reprinted with permission from American College of Sports Medicine (2014). *ACSM’s Guidelines for Exercise Testing and Prescription* (9th ed.). Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins.

Table 5-3**Resistance Exercise Evidence-based General Recommendations**

FITT-VP	Evidence-based Recommendation
Frequency	Each major muscle group should be trained 2–3 days/week.
Intensity	<p>60–70% 1-RM (moderate-to-vigorous intensity) for novice to intermediate exercisers to improve strength</p> <p>≥80% 1-RM (vigorous-to-very vigorous intensity) for experienced strength trainers to improve strength</p> <p>40–50% 1-RM (very light-to-light intensity) for older individuals beginning exercise to improve strength</p> <p>40–50% 1-RM (very light-to-light intensity) may be beneficial for improving strength in sedentary individuals beginning a resistance-training program</p> <p><50% 1-RM (light-to-moderate intensity) to improve muscular endurance</p> <p>20–50% 1-RM in older adults to improve power</p>
Time	No specific duration of training has been identified for effectiveness.
Type	<p>Resistance exercises involving each major muscle group are recommended.</p> <p>Multijoint exercises affecting more than one muscle group and targeting agonist and antagonist muscle groups are recommended for all adults.</p> <p>Single-joint exercises targeting major muscle groups may also be included in a resistance-training program, typically after performing multijoint exercise(s) for that particular muscle group.</p> <p>A variety of exercise equipment and/or body weight can be used to perform these exercises.</p>
Repetitions	<p>8–12 repetitions are recommended to improve strength and power in most adults.</p> <p>10–15 repetitions are effective in improving strength in middle-aged and older individuals starting exercise.</p> <p>15–20 repetitions are recommended to improve muscular endurance.</p>
Sets	<p>2–4 sets are recommended for most adults to improve strength and power.</p> <p>A single set of resistance exercise can be effective, especially among older and novice exercisers.</p> <p>≤2 sets are effective in improving muscular endurance.</p>
Pattern	<p>Rest intervals of 2–3 minutes between each set of repetitions are effective.</p> <p>A rest of ≥48 hours between sessions for any single muscle group is recommended.</p>
Progression	A gradual progression of greater resistance, and/or more repetitions per set, and/or increasing frequency is recommended.

Note: FITT-VP = frequency, intensity, time, type, volume, and pattern/progressions; 1-RM = One-repetition maximum

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In addition, there are exercise guidelines for many specific groups, including youth, older adults, pre- and postpartum women, and people who have obesity, hypertension, **hyperlipidemia**, **osteoporosis**, and a variety of other special needs (see Chapter 14). These guidelines are based on medical and scientific research, are published by the governing body of practitioners for each respective special-needs group, and provide specific exercise guidelines to help these individuals improve their health and quality of life. So how does a personal trainer pull it all together? How does a novice or even an experienced personal trainer know

which assessments to perform, when to perform them, which guidelines are most important, when to address foundational imbalances in **posture** or movement, and how to progress or modify a program based on observed and reported feedback? To address these questions and more, the American Council on Exercise developed the ACE Integrated Fitness Training (ACE IFT®) Model to provide personal trainers with a systematic and comprehensive approach to exercise programming that integrates assessments and programming to facilitate behavioral change, while also improving posture, movement, **flexibility**, **balance**, core function, cardiorespiratory fitness, **muscular endurance**, and **muscular strength**. The ACE IFT Model provides tools for the personal trainer to help clients improve these parameters, whether the client's goal is to improve basic function or enhance high-level performance.

FUNCTION–HEALTH–FITNESS–PERFORMANCE CONTINUUM

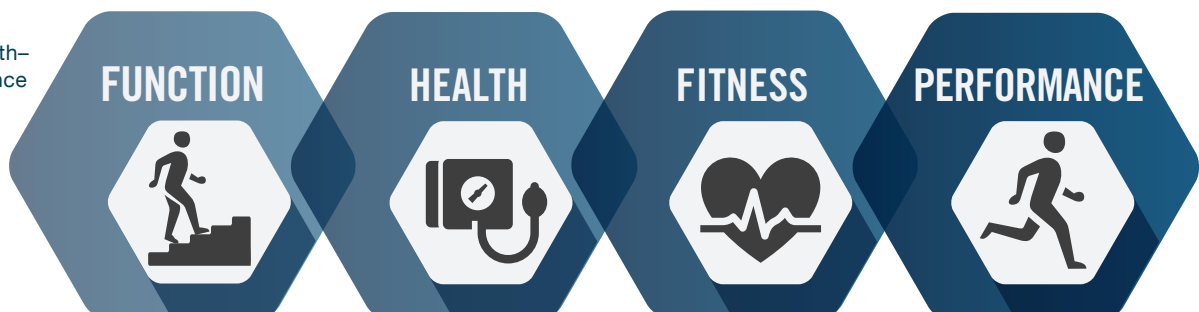
THE FUNCTION–HEALTH–FITNESS–PERFORMANCE CONTINUUM IS BASED

on the premise that exercise programs should follow a progression that first reestablishes proper function, then improves health, then develops and advances fitness, and finally enhances performance (Figure 5-1). Each client will have different needs based on his or her personal health, fitness, and goals. Therefore, each client will start his or her exercise program at a unique point along the continuum. The first component of this continuum, which includes individuals who need to focus on improving functional activities related to daily living before they can safely engage in moderate-intensity physical activities to improve overall health, includes activities such as stability/mobility and balance training, which might need to be addressed prior to engaging in routine physical activities or structured exercise programs. The second component of this model is exercise for improved health, which serves as a critical element of every exercise program, even if the client's ultimate goal is to achieve optimal athletic performance for a specific competition. For a client who has been **sedentary**, improved function and health should be a primary program goal. For clients who have progressed into the fitness or performance domains, their comprehensive training programs should still feature components that maintain or help improve health as well as address their specific fitness or athletic goals.

Throughout this continuum, programs should progress at a rate that is safe and effective, while taking into account the client's schedule or time availability, capacity for recovery, and outside stressors such as work, family, and travel. Clients who have been sedentary for many years will generally need to adhere to a regular exercise program focused on improved function and health for at least the initial conditioning stage—approximately four to six weeks—before focusing on exercise program variables such as frequency, intensity, and duration that move them into the fitness domain. This should seem fairly straightforward for a sedentary client, but what about the client who has focused primarily on resistance training for many years, or the long-time runner who runs at least five days per week but does not do

Figure 5-1

The function-health-fitness-performance continuum



any resistance training? Should a client fitting one of these profiles automatically train all components of fitness at intensity levels that fall into the fitness or performance domains? The answer to this question is different for each client based on his or her unique strengths, weaknesses, imbalances, and goals. Meeting each client's individualized needs can be a welcome challenge for an experienced personal trainer—and at the same time a potentially confusing and frustrating venture for a newly certified professional. While the function–health–fitness–performance continuum provides a suggested sequence for training clients from sedentary to performance, it does not address the individual components of fitness and how they fit together.



THINK IT THROUGH

All fitness professionals have seen new club members walk into the facility for the first time and immediately pick up some dumbbells, making up their workouts as they go. What are the potential risks of this type of “training”? How would you explain the dangers to these potential clients?

INTRODUCTION TO THE ACE INTEGRATED FITNESS TRAINING MODEL

THE ACE IFT MODEL IS A COMPREHENSIVE SYSTEM FOR EXERCISE PROGRAMMING that pulls together the multifaceted training parameters required to be a successful personal trainer. It organizes the latest exercise science research into a logical system that helps trainers determine appropriate assessments, exercises, and progressions for clients based on their unique health, fitness, needs, and goals. The foundation of the ACE IFT Model is built upon **rapport**. Successful personal trainers consistently demonstrate excellent communication skills and teaching techniques, while understanding the psychological, emotional, and physiological needs and concerns of their clients. Building rapport is a critical component of successful client–trainer relationships, as this process promotes open communication, develops trust, and fosters the client's desire to participate in an exercise program. Rapport should be developed early through open communication and initial positive experiences with exercise, and then enhanced through behavioral strategies that help build long-term adherence. The components of, and techniques for, open communication, rapport development, and the facilitation of program adherence are presented in Chapters 2 through 4, while effective strategies for implementing these techniques as the foundation for the ACE IFT Model are presented in Chapter 6.

After establishing initial rapport, the trainer should collect health-history information to determine if the client has any contraindications or requires a physician's evaluation prior to exercise. The collection of health-history information and other pre-exercise paperwork is covered in Chapter 6, along with health-related physiological measurements such as **resting heart rate** and blood pressure. This is a process to help ensure the safety of the client and provide an opportunity for the personal trainer to establish trust and create an open source of communication. The ACE IFT Model includes functional and physiological assessments that can be performed at specific phases to provide key information for exercise programming in that phase. Some assessments, such as those that focus on functional movement, balance, and **range of motion**, may be conducted within the first few sessions with a new client, while other assessments might not be conducted until the client has progressed from one phase to another. Ideally, the trainer should utilize a sequential approach to conducting client assessments that begins with reviewing the client's health history; discussing desires, preferences, and general goals; completing

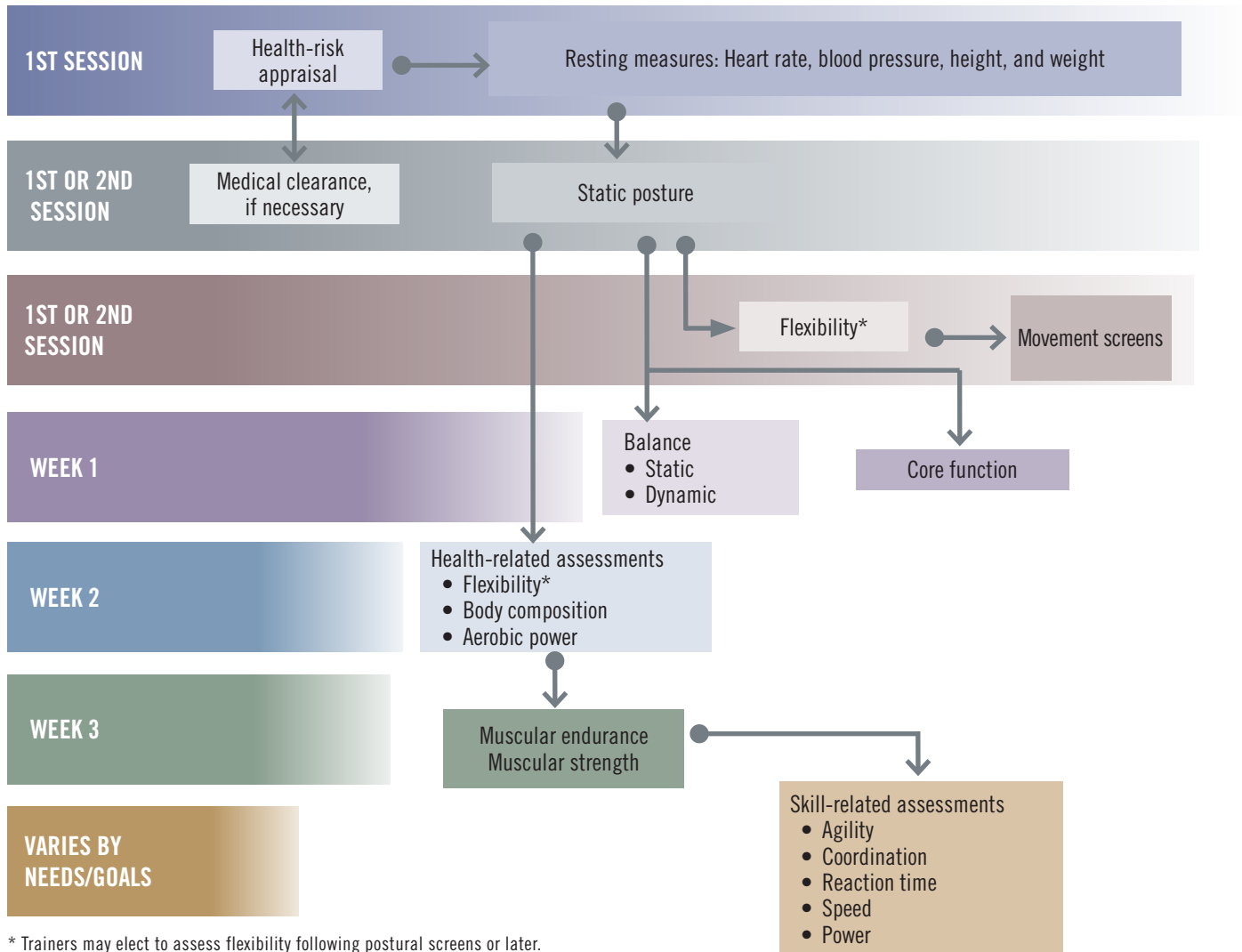


BUILDING RAPPORT IS A CRITICAL COMPONENT OF SUCCESSFUL CLIENT–TRAINER RELATIONSHIPS



additional questionnaires (e.g., exercise history and attitude questionnaire); and then determining which assessments are relevant and the timelines in which to conduct them (Figure 5-2). The various assessment protocols included in the ACE IFT Model are covered in Chapters 7 and 8, while the parameters for when to use many of these assessments and how to program based on the data collected are presented in Chapters 9 through 11.

Figure 5-2
Sample assessment
sequencing for the
general client



* Trainers may elect to assess flexibility following postural screens or later.

The ACE IFT Model has two principal training components:

- Functional movement and resistance training
- Cardiorespiratory training

Each of these components is composed of four phases that provide trainers with strategies to determine and implement the most appropriate assessments and exercise programs for clients at all levels of fitness. The training components are broken down into four phases, each with a title that is descriptive of the principal training focus during that specific phase (Table 5-4). Rapport is the foundation for success during all phases of the ACE IFT Model because it is essential to helping clients adopt healthful behaviors and adhere to their exercise programs, whether a trainer is working with highly motivated fitness enthusiasts or sedentary adults looking to adopt more healthful habits.

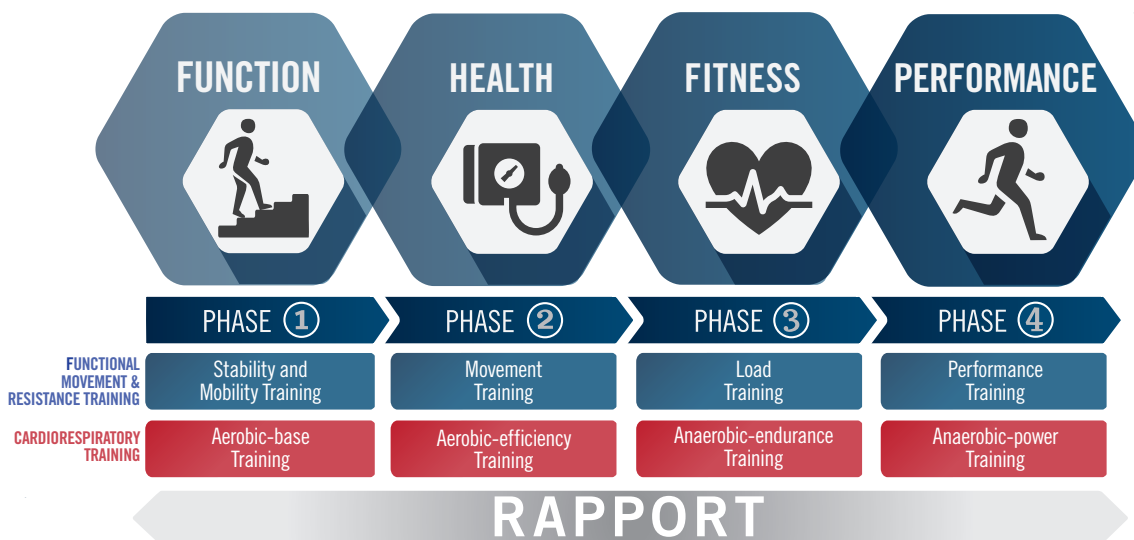
Table 5-4

ACE Integrated Fitness Training Model—Training Components and Phases

Training Component	Phase 1	Phase 2	Phase 3	Phase 4
Functional Movement & Resistance Training	Stability and Mobility Training	Movement Training	Load Training	Performance Training
Cardiorespiratory Training	Aerobic-base Training	Aerobic-efficiency Training	Anaerobic-endurance Training	Anaerobic-power Training

The four training phases run parallel to the function–health–fitness–performance training continuum that was presented in Figure 5-1 (Figure 5-3). In phase 1, the primary focus is on improving function and/or health by correcting imbalances through training to improve joint stability and mobility prior to training movement patterns and building an **aerobic** base to improve parameters of cardiorespiratory health. The primary focus of phase 2 is to progress clients toward improved fitness by introducing aerobic intervals to improve aerobic efficiency and training movement patterns prior to loading the movements. In phase 3, clients progress to higher levels of fitness through load training and the development of **anaerobic** endurance, with programming at the advanced stages of phase 3 moving into the performance area of the function–health–fitness–performance continuum. Phase 4 is focused entirely on improving performance through training for power, speed, agility, reactivity, and anaerobic power. Each client will progress from one phase to the next according to his or her unique needs, goals, and available time to commit to training. Many clients will be at different phases of the two training components based on their current health and fitness, and only clients with performance-oriented goals will reach phase 4.

Figure 5-3
ACE IFT Model phases
and the function–health–
fitness–performance
continuum



Note: The phases of the ACE IFT Model are not necessarily discrete in terms of their connection to the function–health–fitness–performance continuum. Progression principles should be followed when transitioning from one phase to the next for each training component.

RAPPORT AND BEHAVIORAL STRATEGIES

THE GREATEST IMPACT THAT PERSONAL TRAINERS CAN REGULARLY HAVE on the lives of their clients is to help them to change health-related habits and establish positive relationships with exercise. For this reason, rapport is the foundation of the ACE IFT Model. Exercise programming has traditionally had a primary focus on helping clients make physiological changes, placing early emphasis on fitness assessments

for program design and tracking progress. However, to the out-of-shape client, a complete battery of initial assessments can be detrimental to early program success by reinforcing his or her negative self-image and beliefs that he or she is hopelessly out of shape or overweight. The most important initial adaptations come from helping a client modify behavior to establish a habit of regular exercise. A personal trainer can have an immediate impact on a client's health by first creating a positive exercise experience that can lead to exercise adherence, and then gradually progressing the training plan by applying program-design strategies that produce results.



APPLY WHAT YOU KNOW

FACILITATING BEHAVIORAL CHANGE Successful personal trainers provide integrated training solutions to clients by helping them have positive experiences with exercise. Applying strategies for fitness-related behavioral change and exercise adherence, along with implementing comprehensive exercise programs that help clients reach their unique fitness and wellness goals, are two primary functions of personal trainers who want to help clients achieve meaningful results. Some of the key steps that facilitate fitness-related behavioral change include:

- Implementing strategies for developing and enhancing rapport
- Identifying each client's readiness to change behavior and stage of behavioral change (see Chapter 4)
- Fostering exercise adherence by creating positive exercise experiences and building self-efficacy
- Appropriately selecting and timing assessments and reassessments
- Designing programs, supervising workouts, and implementing progressions that match each client's current health and fitness status, needs, and goals
- Fostering a sense of self-reliance to enable clients to take ownership of their lifestyle changes
- Helping clients transition to the action and then maintenance stages of behavioral change
- Implementing relapse-prevention strategies
- Helping clients transition from extrinsic to intrinsic motivation
- Establishing realistic short- and long-term goals to prevent burnout, provide multiple opportunities for success, and promote adherence
- Providing extrinsic motivation and introducing visualization techniques during performance training
- Factoring a client's external stresses into total fatigue to avoid training plateaus and prevent overtraining
- Empowering clients by helping them gain the self-efficacy and knowledge to train on their own
- Helping clients make exercise a long-term habit

The first time that a trainer and client meet, it is important for the trainer to encourage the client and create an environment where he or she can feel successful. It is also important for the trainer to be mindful that many adults who are inactive might have been inactive since childhood. After two to four weeks of regular physical activity, clients will generally experience more stable positive moods due to:

- Changes in **hormone** and **neurotransmitter** levels (e.g., **endorphins**, **serotonin**, and **norepinephrine**)
- Increased self-efficacy with task and possibly short-term goal achievement
- Improved performance due to the positive neuromuscular adaptations to exercise that follow the initial **delayed-onset muscle soreness (DOMS)** and accompanying temporary decreases in strength

These positive factors will enhance adherence behaviors, but the client must make it through two to four weeks of regular exercise to reap these benefits. To help a client transition to the action stage of behavioral change, the trainer should make exercise fun and emphasize regular adherence to a program *first* before switching the primary focus toward any other specific goals such as weight loss or changes in **body composition**. By

providing regular positive experiences with exercise, personal trainers can help clients have continued success. Chapter 6 provides the tools and techniques for putting these behavioral strategies into action.

ACE IFT MODEL TRAINING COMPONENTS AND PHASES

THE ACE IFT MODEL PROVIDES A COMPREHENSIVE TRAINING MODEL FOR function, health, fitness, and performance that can be implemented with all apparently healthy clients. To effectively utilize the ACE IFT Model with a variety of clients, personal trainers must understand how to assess which phase a client is in for *each* training component, how to design exercise programs in each phase of each component, and how to integrate and progress clients through the phases of each component with comprehensive training solutions. Some clients will be at the same phase for cardiorespiratory training and functional movement and resistance training, while others will be at distinctly different phases for these two training components. Many clients, regardless of their current exercise frequency and fitness level, will have muscle imbalances, postural issues, and improper movement mechanics that should be addressed through early programming in the stability and mobility training phase (phase 1) before they progress to the movement-training phase (phase 2). It is important for personal trainers to understand the different phases and training components of the ACE IFT Model, in order to assess each client individually and determine which phase of training to apply to his or her specific training goals. By doing this, personal trainers will be able to design individualized programs that apply the appropriate training stimulus.

The phase descriptions that follow provide an overview of the objectives, assessments, and exercise programming and progressions within each training phase, and provide a guideline for how clients should progress from one phase to the next within each training component. Initial emphasis is placed on behavioral strategies as the foundation for the ACE IFT Model. Chapters 6 through 11 provide detailed descriptions of the tools and strategies necessary for trainers to determine which phase a client is in for each training component, which assessments are appropriate to conduct with the client, what to include in the client's initial exercise program, and appropriate progressions to help the client reach his or her goals. Chapter 12 will then help trainers synthesize all of this information by presenting case studies that take clients through programs that meet their unique needs.

FUNCTIONAL MOVEMENT AND RESISTANCE TRAINING

Functional movement and resistance training are often treated as two separate and unrelated types of training. However, at the core of human movement is posture. Individuals who have weak core muscles, muscle imbalances, and/or postural deviations are in poor postural health and at increased risk for injury when external loads are applied to movements. For that reason, the functional movement and resistance training component begins in phase 1 with assessments and training for postural and joint stability and mobility. Once a client gains or restores good postural integrity, he or she is ready to move on to phase 2, where assessments and exercise selection are focused on training the basic movement patterns of single-leg actions, squatting or bending, pushing, pulling, and rotating. Before loading these movement patterns with external resistance and/or progressing to phase 3, the client must first demonstrate proficiency with:

- Performing body-weight movement sequences with proper form
- Core stabilization
- Control of the **center of gravity (COG)**
- Control of the velocity of movement

Once movement training has been successfully completed, it is time to apply external resistances, or loads, to these functional movement patterns and progress to the next phase. Phase 3 applies the traditional resistance-training methodology for muscular endurance, **hypertrophy** (or strength-endurance), and strength to match the client's particular goals. Finally, those clients who have performance-oriented goals and have successfully progressed to advanced levels of training in phase 3 of resistance training can move on to training for performance in phase 4.

The four phases of the functional movement and resistance training component—stability and mobility, movement, load, and performance—are based on the principles of **specificity**, **overload**, and progression. For an exercise program to be successful, the selection of exercises needs to be specific to the client's individual needs and goals while providing the appropriate overload so that he or she can progressively improve his or her fitness level. Recognizing that all movement begins and ends from a position of posture, the focus of the first level of the functional movement and resistance training component is to apply the variables of exercise-program design to help clients improve posture.

Phase 1: Stability and Mobility Training

The training focus during phase 1 is on the introduction of low-intensity exercise programs to improve muscle balance, muscular endurance, core function, flexibility, and static and **dynamic balance** to improve the client's posture. Teaching a client how to find and hold a relatively neutral posture will create the foundation for the movement skills that will be introduced in the phases that follow. It is important to note that this neutral position will be unique for each client, so the personal trainer will want to assist each client in learning and practicing this position. Exercise selection in this phase will focus on core and balance exercises that improve the strength and function of the tonic muscles responsible for stabilizing the spine and COG during movement. Exercises will use primarily body weight or body-segment weight as resistance. No assessments of muscular strength or endurance are required prior to designing and implementing an exercise program during this phase. Assessments that should be conducted early in this phase include basic assessments of:

- Posture
- Balance
- Movement
- Range of motion of the ankle, hip, shoulder complex, and thoracic and lumbar spine

Based on the results of these assessments, the personal trainer should implement an exercise program that addresses the client's weaknesses and imbalances. Two to three weeks into this phase, personal trainers can consider assessing muscular endurance of the torso muscles based on the client's current level of postural stability and core muscle activation. Assessment protocols for posture, balance, movement screens, range of motion, and torso muscular endurance are covered in detail in Chapter 7.

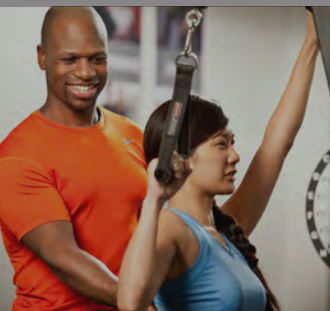
The principal goal of this phase of the training program will be to develop postural stability throughout the kinetic chain without compromising mobility at any point in the chain. Exercises should emphasize supported surfaces that offer stability against gravity (e.g., floor or backrests) and focus on restorative flexibility, **isometric** contractions, limited-ROM strengthening, static balance, core activation, spinal stabilization, and muscular endurance to promote stability. Exercise-programming tools and strategies for stability and mobility training are presented in Chapter 9.

Phase 2: Movement Training

The primary focus during phase 2 of the functional movement and resistance training component of the ACE IFT Model is on training movement patterns. Through



TEACHING A CLIENT
HOW TO FIND AND
HOLD A RELATIVELY
NEUTRAL POSTURE
WILL CREATE THE
FOUNDATION FOR THE
MOVEMENT SKILLS



programming that builds on the training completed during phase 1, trainers can help clients develop mobility within the kinetic chain without compromising stability. Movement training focuses on the five primary movements:

- *Bend-and-lift movements (e.g., squatting)*: Squatting movements are performed many times throughout the day as a person sits down, stands up, or squats down to lift an object off of the floor.
- *Single-leg movements (e.g., lunging)*: Single-leg balance and movements are a critical part of walking. In addition, lunging movements are performed when a person steps forward to reach down with one hand to pick something small up off the floor.
- *Pushing movements*: Pushing movements occur in four directions: forward (e.g., during a push-up exercise or when pushing open a door), overhead (e.g., during a shoulder press or when putting an item on a tall shelf), lateral (e.g., pushing open double sliding doors or lifting one's torso when getting up from a side-lying position), and downward (e.g., during dips or when pushing oneself up from an armchair or out of the side of a swimming pool).
- *Pulling movements*: Pulling movements occur during an exercise such as a bent-over row or pull-up, or when opening a car door or picking up a child.
- *Rotational (spiral) movements*: Rotation occurs during many common movements, such as the rotation of the thoracic spine during walking or when reaching across the body to pick up an object on the left side and placing it to the right side.



THINK IT THROUGH

Spend a day being mindful of how you move during your typical activities of daily living. Can you recognize these five primary movements in your normal behavior? This can be a valuable teaching tool when working with clients who question the need for this early-phase training.

Most pushing, pulling, and squatting motions can be performed either unilaterally or bilaterally, while lunges require alternating unilateral movements of the legs. Most everyday pushing, pulling, and squatting movements also have a rotational component that requires either rotational mobility to create the movement, or rotational stability to prevent motion in the **transverse plane** (Figure 5-4). Assessments that are recommended during this phase are covered in Chapter 7.

Exercise programs during this phase should emphasize the proper sequencing of movements and control of the body's COG throughout normal ROM during body-segment and full-body movements to develop efficient neural patterns. Exercises that promote dynamic balance and active flexibility should be introduced as part of a dynamic warm-up, or as part of the principal exercise program to facilitate proper movement patterns. Any resistance training performed during this phase should include exercises that build muscular endurance and promote mobility, with an emphasis on controlled motion and deceleration performed via controlled **eccentric** muscle actions.

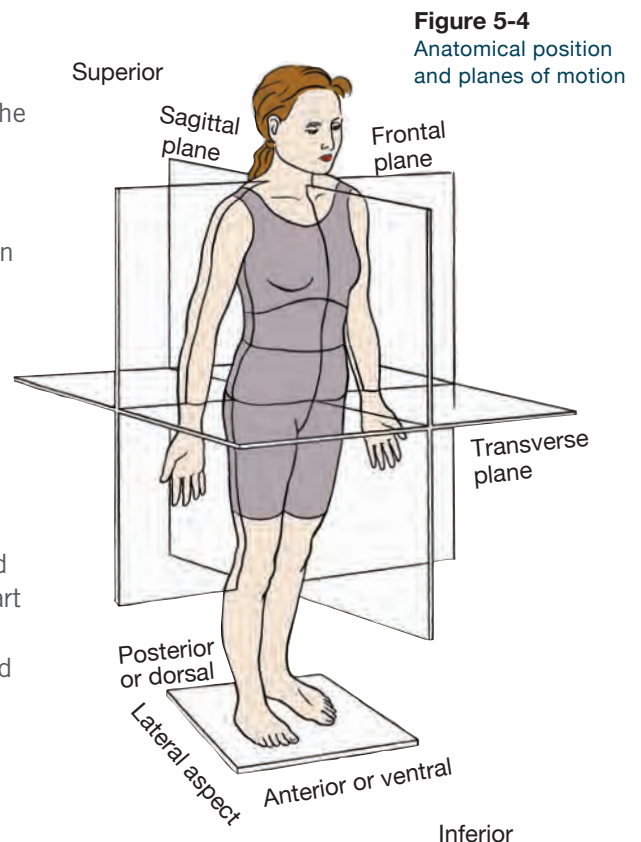


Figure 5-4
Anatomical position
and planes of motion

Whole-body movement patterns that utilize gravity as the source of external resistance should be emphasized until proper movement patterns are established. Once a client can perform the movement patterns effectively while maintaining stable neutral posture, COG, and movement speed, he or she can then progress to load training in phase 3. The general timeframe for movement training is two to eight weeks, depending on the level of movement corrections required. Personal trainers should keep in mind that every client is unique and will progress at his or her own rate based on ability and adherence to training. Detailed tools and strategies for training movement patterns can be found in Chapter 9.

Phase 3: Load Training

Training in phases 1 and 2 focuses on addressing postural imbalances and motor control to help clients develop the prerequisite postural stability and proper movement sequences to allow for external loads to be safely added during full-body movements. In phase 3, load training, the exercise program is advanced with the addition of an external force or increasing the external load, placing emphasis on muscle force production where the variables of training can be manipulated to address a variety of exercise goals. These goals may include positive changes in body composition, muscular strength, muscle hypertrophy, or muscular endurance, or simply looking more “toned.” It is during load training that personal trainers will apply the body of knowledge of exercise science related to resistance training to design and progress exercise programs to meet the diverse goals of their clients.

Traditional resistance-training programs for muscle hypertrophy, strength, or endurance all require external loads to facilitate increased muscular force production. Therefore, during load training, exercise program design variables are applied in a manner consistent with the standard FITT-VP model (frequency, intensity, time, type, volume, and progression) for increasing muscular hypertrophy, enhancing muscular endurance, or improving muscular strength (see Table 5-3). Exercise selection is consistent with traditional resistance-training exercises and is dictated by the client's specific goals and needs. Resistance, or loading, can be applied through a number of different options, including selectorized equipment, plate-loaded machines, barbells, dumbbells, kettlebells, medicine balls, elastic tubing, or even non-traditional strength-training equipment such as tires or water-filled containers. Regardless of the exercise selected or the type of load used, the focus during load training is on good exercise form and increasing the ability of muscles to generate force.

Personal trainers can play a crucial role in helping clients stay motivated by designing and modifying programs to introduce variety and work toward goal attainment. This can be accomplished through programs utilizing **linear** or **undulating periodization** models to progress the total training volume (see Chapter 10). Exercise selection may initially focus on isolated or single-joint movements, but should transition to integration of body segments and full-body movements. Programs can range from exercises for all major muscle groups performed two to three times per week, to circuit training or split routines, depending on the client's goals, available time for training, preferences, and motivation. Stability and mobility— and movement-training exercises should be maintained during phase 3 as part of a dynamic warm-up and to maintain flexibility during the cool-down. During phase 3, assessments of muscular strength and endurance are introduced to facilitate program design and quantify progress. Protocols for assessing muscular strength and endurance are detailed in Chapter 8, while exercise programming strategies for load training (phase 3) are presented in Chapter 10.

Each client's specific training goals will dictate the unique focus of his or her program within phase 3. Since phase 3 is focused on resistance training, many clients will stay in this phase for many years, especially those clients who have no interest in training for performance. If the client has a significant lapse during this phase of training,

the personal trainer should assess the client's stability, mobility, and movement patterns before reintroducing load training to determine if the client has developed or reestablished postural deviations, muscle imbalances, or movement errors. Before progressing to phase 4 (performance training), clients should develop the prerequisite strength necessary to move into training for power, speed, agility, and quickness.

If the client moves on to phase 4 before this base is developed, he or she will be at risk for injuries.

Phase 4: Performance Training

Phase 4 of the functional movement and resistance training component emphasizes specific training to improve speed, agility, quickness, reactivity, and power. Many clients will never progress to this stage of training, as they will not have athletic or performance-oriented goals. All clients who progress to the performance phase of training should continue to maintain good postural stability and proper movement patterns by incorporating the techniques of mobility and stability training (phase 1) and movement training (phase 2) as dynamic warm-ups.

Strength training performed during load training increases muscular force production, but it does not specifically address speed of force production. Power training enhances the velocity of force production by improving the ability of muscles to generate a large amount of force in a short period of time. Power is needed in all sports and activities that require repeated acceleration and deceleration. Power can be defined as both the velocity of force production and the rate of performing work.

Power Equations
$\text{Power} = \text{Force} \times \text{Velocity}$
<i>or</i>
$\text{Power} = \text{Work} / \text{Time}$
Where:
$\text{Force} = \text{Mass} \times \text{Acceleration}$
$\text{Velocity} = \text{Distance} / \text{Time}$
$\text{Work} = \text{Force} \times \text{Distance}$

These equations are provided to illustrate that power can be defined as the rate at which force is produced over a given distance. Personal trainers can use these equations to manipulate training to help clients increase their ability to produce power. During load training, clients will have actually created some increase in their power by increasing strength and the ability to produce muscular force. To advance power, clients must also work on the rate at which they produce force. By manipulating the time of force production through different loading techniques that involve quick accelerations and decelerations, clients can improve power. Speed, agility, quickness, and reactivity are the skill-related parameters that will directly benefit from enhanced power.

Exercise selection during performance training can include a variety of techniques, including **plyometric** jump training, medicine ball throws, kettlebell lifts, and traditional Olympic-style lifts. The FITT-VP components used during this phase are applied in a manner consistent with program design for power training and emphasize intensity and technique over repetitions. During load training (phase 3), the focus is on strength training to improve muscle **motor unit** recruitment, while the goal of power training is to increase **rate coding**, or the speed at which the motor units stimulate the muscles to contract and produce force. This is enhanced by placing emphasis on maximizing the **stretch reflex** by minimizing the transition time between the eccentric and **concentric** phases of muscle action. The faster a muscle can convert from the lengthening to shortening phases (i.e., eccentric to concentric muscle actions), the greater the amount



*POWER IS NEEDED
IN ALL SPORTS AND
ACTIVITIES THAT
REQUIRE REPEATED
ACCELERATION AND
DECELERATION*



of force generated by the muscle during the concentric, or shortening, phase where the desired movement (e.g., vertical jump) is performed.

In most sports, power originates at the body's point of contact with a stable surface, which is generally the ground or court surface, as seen in running, jumping, throwing, and striking/hitting skills. The power originates from the muscles of the legs and torso first loading eccentrically as the body gets closer to the ground. As the muscles transition from eccentric loading to concentric force production, the body recoils as the muscles quickly shorten through the combination of elastic rebound of the stretched connective tissues and quick force-production that transfers from the feet, through the legs and torso, and, in the case of throwing and striking, through the shoulders, arms, and hands. For this reason, power training is applied with integrated full-body exercises to improve power in the legs, hips, core, shoulder complex, and arms. Failure to involve the full body when training for power puts the client at an increased risk for injuries. Protocols for assessments for measuring power and speed, agility, and quickness are provided in Chapter 8. In addition, detailed descriptions for designing and progressing exercise programs for phase 4 can be found in Chapter 10.

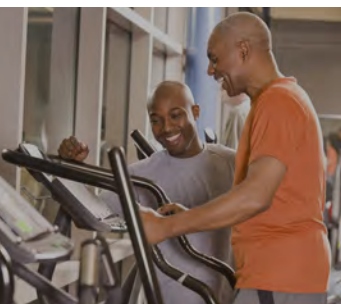
Power-based training can also be an effective strategy to help clients improve their body-composition levels, since this can be one of the most efficient methods of expending energy during a training session. Clients will have to develop the prerequisite stability, mobility, strength, and skills during the previous three phases prior to beginning phase 4 training methods. An additional benefit of training for power is the development of lean muscle, since **type II muscle fibers** are responsible for high-force, short-duration contractions, and the enhancement of muscle size and definition.

CARDIORESPIRATORY TRAINING

Cardiorespiratory-training programs have traditionally focused on **steady state** training to improve cardiorespiratory fitness, with progressions based on increased duration and intensity. Intervals have been loosely categorized and have primarily been focused on reducing boredom through higher- and lower-intensity segments, or training intervals at or near the **lactate threshold** to improve speed during endurance events. While these methods are effective, they have often been looked at as very different training programs for individuals trying to improve function, health, fitness, or performance. The ACE IFT Model provides a systematic approach to cardiorespiratory training that can take a client all the way from being sedentary to training for a personal record in a half-marathon. While this will not be the training goal of most sedentary individuals, having an organized system of training that can allow for a long-term progression is empowering for the personal trainer because it provides strategies for implementing cardiorespiratory programs for the entire spectrum of apparently healthy individuals—from the sedentary person to the competitive athlete. During each phase of the cardiorespiratory training component, the exercise mode, or type, should accommodate the level of exertion required during that phase, while also being appropriate for the client based on his or her preferences, health and fitness status, and contraindications. Recommended cardiorespiratory fitness assessment protocols are presented in Chapter 8, along with guidelines for which assessments to conduct during each phase. Exercise programming guidelines for each phase are presented in Chapter 11.

Phase 1: Aerobic-base Training

Phase 1 of the cardiorespiratory training component of the ACE IFT Model is focused on developing an initial aerobic base in clients who have been sedentary or near-sedentary. This should not be confused with the “aerobic-base training” that is performed by endurance athletes as the endurance-performance foundation of their offseason training. Instead, aerobic-base training during phase 1 of the ACE IFT Model's cardiorespiratory training component is focused on establishing



HAVING AN ORGANIZED SYSTEM OF TRAINING THAT CAN ALLOW FOR A LONG-TERM PROGRESSION IS EMPOWERING FOR THE PERSONAL TRAINER



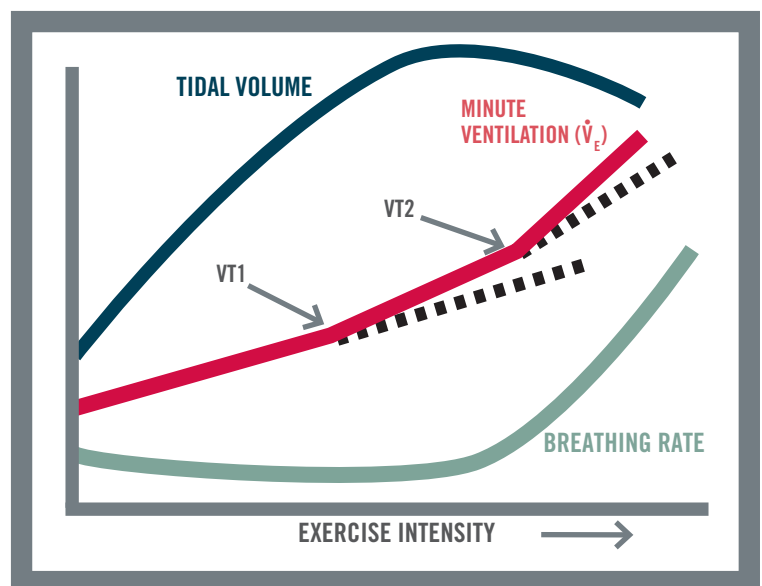
baseline aerobic fitness to improve health and to serve as a foundation for training for cardiorespiratory fitness in phase 2. The intent of this phase is to develop a stable aerobic base upon which the client can build improvements in health, endurance, energy, mood, and caloric expenditure.

How quickly a client progresses through phase 1 will depend on the client's goals, training volume, and initial fitness level. A client who has been fairly fit in the past and is in relatively good health will likely progress through this phase more quickly than a client who has led a mostly sedentary life and is currently obese. Exercise during this phase should be performed at steady-state intensities in the low-to-moderate range, which is in line with the lower portion of the range of the guidelines for cardiorespiratory exercise [American College of Sports Medicine (ACSM), 2014]. The easiest method for monitoring intensity with clients in this aerobic-base phase is to use the **talk test**. If the client can perform the exercise and talk comfortably in sentences that are more than a few words in length, he or she is likely below the **first ventilatory threshold (VT1)**. By exercising below or up to the talk-test threshold, clients should be exercising at a moderate intensity classified by **ratings of perceived exertion (RPE)** of 3 to 4 (0 to 10 scale).

The cardiorespiratory exercise performed by the client should initially be of an appropriate duration that the client can tolerate. For the sedentary client who is starting his or her cardiorespiratory exercise in this aerobic base phase, this duration could be as short as five minutes and up to 10 to 20 minutes. Regardless of the initial duration, the goal for all clients in this phase is to progress cardiorespiratory training by gradually increasing the duration and frequency until the client is performing cardiorespiratory exercise three to five days per week for a duration of 20 to 30 minutes at an RPE of 3 to 4. Clients who progress to this level of exercise will see improvements in health, endurance, and energy expenditure, and should notice decreased stress and improved function during ADL. As the primary focus during this phase is to establish an initial aerobic base for clients who have little to no base at the time of their first personal-training session, steady-state exercise is recommended. No assessments are recommended during the aerobic-base phase, since many of the clients who start in this phase will be unfit and may have difficulty completing an assessment of this nature.

Phase 2: Aerobic-efficiency Training

This second phase of cardiorespiratory training is dedicated to enhancing the client's aerobic efficiency by progressing the program through increased duration of sessions, increased frequency of sessions when possible, and the introduction of aerobic intervals. Aerobic intervals are introduced at a level that is at or just above VT1, or an RPE of 5 ("strong") on the 0 to 10 scale. The goal of these intervals will be to improve aerobic endurance by raising the intensity of exercise performed at VT1, and to improve the client's ability to utilize fat as a fuel source (Figure 5-5). The addition of these aerobic intervals will also allow the personal trainer to add variety to the client's cardiorespiratory exercise program by introducing sets of intervals that differ in number and length of work



Note: VT1 = First ventilatory threshold; VT2 = Second ventilatory threshold

Figure 5-5
Ventilatory effects during aerobic exercise

and rest intervals, as well as intervals that utilize different methods for increasing intensity, such as increased speed, incline, and resistance.

To enhance exercise program design, trainers can conduct the submaximal talk test to determine heart rate at VT1. A protocol for this assessment can be found in Chapter 8. The talk test can also be used to help clients gain a better understanding of RPE, as VT1 has been found to be approximately between an RPE of 4 and 5 (“somewhat strong” to “strong”) (Foster, 1998). This assessment tool requires little equipment and is easy to administer, providing a simple method for determining VT1 that can be used for exercise programming during phases 2 through 4 of cardiorespiratory training. The use of aerobic intervals will allow the personal trainer to introduce a more intense training stimulus to elicit the desired physiological adaptations.

The training goals for clients during this phase will vary greatly. Because there are aerobic intervals included in this phase, the training stimulus will be adequate for some clients to perform cardiorespiratory exercise in phase 2 for many years if they have no goals of improving speed or fitness beyond that gained in phase 2 training.

Phase 3: Anaerobic-endurance Training

During phase 3 of cardiorespiratory training, the primary focus is on designing training programs that help improve performance in endurance events or to train fitness enthusiasts for higher levels of cardiorespiratory fitness. This is accomplished through the introduction of higher-intensity intervals that load the cardiorespiratory system enough to develop anaerobic endurance, and balancing training time spent below VT1, between VT1 and the **second ventilatory threshold (VT2)**, and at or above VT2. This type of training is sometimes referred to as lactate threshold or tolerance training and is designed to increase the amount of sustained work that an individual can perform at or near VT2 (see Figure 5-5). In addition to improving cardiorespiratory capacity at or near VT2, this type of work will also help to increase the ability of the working muscles to produce force for an extended period. A protocol for determining heart rate at VT2 is presented in Chapter 8. This protocol provides a useful field test for determining estimated VT2 that can be performed with minimal equipment.

Depending on the individual, his or her available training time, and the dates of the client's goal event(s), a client may train three to seven days per week with sessions that are 20 minutes to multiple hours in length. Exercise at or near VT2 cannot be sustained for extended periods during multiple training sessions per week. For clients looking to improve speed and performance, research has shown that world-class endurance athletes in multiple sports spend approximately 70 to 80% of their training time at or below VT1 (RPE of 3 to 4), only brief periods (less than 10% of training time) between VT1 and VT2 (RPE of 5 to 6), and the remaining 10 to 20% of their training time at or above VT2 (RPE ≥ 7) (Esteve-Lanao et al., 2007). The ACE IFT Model utilizes a three-zone model for cardiorespiratory training (Table 5-5).

This will add great variety to the client's cardiorespiratory program, and it will also increase fatigue due to the increased interval intensity. Having the client perform a warm-up, cool-down, and active rest intervals at an intensity that falls below the talk-test level will allow him or her to better prepare for, and recover from, the intervals performed at or above VT2. This can be valuable information for a personal trainer who is trying to explain the importance of active recovery and rest to a client who believes that if a few intervals are good, more must be better. Exercise programming strategies for phase 3 cardiorespiratory training are presented in Chapter 11.

If the client begins showing signs of overtraining (e.g., increased resting heart rate, disturbed sleep, or decreased hunger on multiple days), the personal trainer should decrease the frequency and/or intensity of the client's intervals and focus more time on recovery. Also, if during an interval workout the client cannot reach the desired intensity (workload, duration, or training heart rate) during a training

Table 5-5**Phase 3 Training Zones**

	Percentage of Training Time	Training Focus
Zone 1 (below VT1)	70–80%	Focus on developing a solid base of exercise below the talk-test threshold or VT1 (RPE = 3 to 4) on several days per week Aerobic base enhanced through recovery workouts, warm-up, cool-down, and long-distance workouts
Zone 2 (from VT1 to just below VT2)	<10%	Aerobic intervals at or just above VT1 (RPE of 5) during one or two cardiorespiratory sessions per week Aerobic efficiency
Zone 3 (at or above VT2)	10–20%	Anaerobic intervals at or above VT2 (RPE = 7 to 8) during one or two cardiorespiratory sessions per week Anaerobic endurance

Note: VT1 = First ventilatory threshold; RPE = Ratings of perceived exertion; VT2 = Second ventilatory threshold

interval, or is unable to reach the desired recovery heart rate during a recovery interval, the session should be stopped and the client should recover with low-to-moderate cardiorespiratory exercise (an RPE of 3, and no more than 4) to prevent overtraining. Personal trainers should take time to explain to clients the crucial role that recovery plays in improving fitness and performance, and that it is more important to successfully perform, and fully recover from, a few intervals than it is to do all intervals and take the body to a point of fatigue where recovery before the next workout is less likely to occur. While situations of this nature may seem more common during the next phase (phase 4) of cardiorespiratory training, the intervals introduced in this phase, coupled with additional life stresses, can be enough to induce overtraining.

Phase 4: Anaerobic-power Training

Many clients will never reach this phase of cardiorespiratory training, as the challenges introduced during the anaerobic-endurance training phase (phase 3) will be at the highest level of work they will want or need to perform based on their goals and motivation. This is fine, as the primary focus in this phase is to build on the training done in the previous three phases, while also introducing new intervals that are designed to enhance anaerobic power. These new intervals are designed to develop peak power and aerobic power with intervals performed well above VT2, or an RPE of ≥ 9 (“very, very strong”). These intervals will overload the **fast glycolytic system** and challenge the **phosphagen system**, enhancing the client’s ability to perform high-intensity work for extended periods. These intervals are short-duration, high-intensity intervals that are very taxing; therefore, they require a great deal of intrinsic motivation to meet the physical and mental challenges of completing them.

Clients working in this phase of cardiorespiratory training will be training for competition and have specific goals that relate to short-duration, high-intensity efforts during longer endurance events, such as speeding up to stay with the pack in road cycling, or paddling vigorously for several minutes to navigate some difficult rapids while kayaking. Depending on the individual, his or her available training time, and the dates of the client’s goal event(s), clients will train three to seven days per week with sessions that are 20 minutes to several hours in length. The same principles of work intervals, recovery, and avoiding overtraining described in the anaerobic-endurance training phase (phase 3) apply to the anaerobic-power training phase as well. In addition, cardiorespiratory training time will be distributed according to the same percentages implemented in Phase 3. The difference will be that the zone 3 intervals will be performed at a higher intensity, for a shorter duration, and with longer recovery intervals between work intervals (Table 5-6).



PERSONAL TRAINERS SHOULD TAKE TIME TO EXPLAIN TO CLIENTS THE CRUCIAL ROLE THAT RECOVERY PLAYS IN IMPROVING FITNESS AND PERFORMANCE

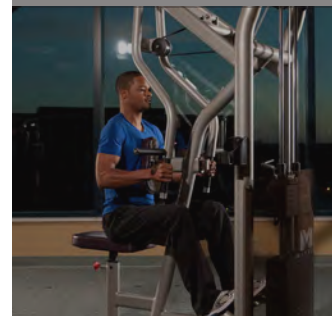


Table 5-6**Phase 4 Training Zones**

	Percentage of Training Time	Training Focus
Zone 1 (below VT1)	70–80%	Focus on developing a solid base of exercise below the talk-test threshold or VT1 (RPE = 3 to 4) on several days per week Aerobic base enhanced through recovery workouts, warm-up, cool-down, and long-distance workouts
Zone 2 (from VT1 to just below VT2)	<10%	Aerobic intervals at or just above VT1 (RPE of 5) during one or two cardiorespiratory sessions per week Aerobic efficiency
Zone 3 (at or above VT2)	10–20%	Anaerobic power intervals at near maximal efforts (RPE = 9 to 10) for very short duration with long recovery intervals, performed during one to two cardiorespiratory sessions per week Anaerobic power

Note: VT1 = First ventilatory threshold; RPE = Ratings of perceived exertion; VT2 = Second ventilatory threshold

The majority of the client's training time (70% to 80%) should be spent performing cardiorespiratory exercise below VT1 (RPE of 3 to 4), especially during the warm-up, cool-down, rest intervals, recovery workouts, and on days when the client is working on increasing maximal training time during his or her longest weekly workout sessions. Exercise-programming strategies for cardiorespiratory training phase 4 are presented in Chapter 11.

SPECIAL POPULATION CLIENTELE

PERSONAL TRAINERS IN MOST SETTINGS WILL WORK WITH CLIENTS WHO HAVE A variety of special needs. Once these clients have been cleared for exercise by their physicians, they can begin an exercise program based on specific guidelines provided by their physicians and the guidelines for their conditions as provided by the appropriate governing bodies for their conditions. Specific guidelines for a variety of special population groups are provided in Chapter 14. Personal trainers working with special-population clients should still utilize the integrated training process provided in the ACE IFT Model, being sure to adjust exercise selection, intensity, sets, repetitions, and duration to fit the special needs of each client. Many of these clients may never progress beyond the aerobic-efficiency phase of cardiorespiratory training (phase 2), and many of them will never progress beyond the loading phase of functional movement and resistance training (phase 3). An important and early goal with all clients is to provide them with initial positive experiences that promote adherence through easily achieved initial successes. Transitioning a special-population client into the action stage and then on to the maintenance stage of behavioral change will have a significant impact on that client's health and overall quality of life, and may even have a positive impact on the client's state of physical and mental well-being.



EXPAND YOUR KNOWLEDGE

ACE INTEGRATED FITNESS TRAINING (ACE IFT) MODEL ACROSS THE LIFECYCLE

Human development provides an additional framework for understanding the ACE IFT

Model's two principal training components: functional movement and resistance training and cardiorespiratory training. The phases of these training components are designed to provide health and fitness professionals with the knowledge and skills to appropriately provide assessments, programs, and progressions that help clients move from where they currently are to where they want to be. To gain a better understanding of the phases of each training component, it is helpful to take a closer look at how people gain and lose functional movement and cardiorespiratory fitness in the first place.

The foundational requirements for human movement include mobile joints, muscular function to initiate and control movements, and endurance for sustained efforts. Birth itself requires newborns to have highly mobile joints. This is facilitated by a developing skeleton that includes long bones with slightly pliable ends due to **epiphyses** made primarily of hyaline cartilage, irregular and flat bones that are in segments (e.g., the skull) with fibrous connections that will later become ossified, developing articular surfaces at the joints, and soft tissue that is highly elastic.

After birth, human movements are small and repeated, driven by genetic coding aimed at gaining the strength and neuromuscular control required to stabilize the skeleton. Early achievements celebrated by parents of infants include lifting and controlling the head from prone and upright positions, reaching and grasping objects, and pushing with the legs. These neuromuscular developments progress over the first 12 to 18 months of life to include rolling over, sitting up, getting into quadruped position (on all fours), crawling, standing, and eventually walking. Each new accomplishment builds on previous neuromuscular achievements. Over time, movement patterns are combined and muscular strength increases to meet the demands of moving and controlling a body that is in a state of rapid growth. As development continues, muscular and cardiovascular endurance must be developed to support and enhance sustained movements. It is during these early stages of development that humans first gain the function that should sustain them throughout life as the base for activities of daily living (ADL) and the platform upon which people build health and fitness.

Throughout childhood, muscular strength and endurance increase to meet the demands posed by the growing body and essential movements that include running, jumping, climbing, swinging, skipping, throwing, catching, and swimming. As children play, they develop the cardiorespiratory fitness to play longer and run faster. Human development is programmed to help highly mobile newborns gain the strength and stability necessary to progress to the movement patterns that are the foundation of phase 2 of the functional movement and resistance training component of the ACE IFT Model. Growth provides the early stimuli required to progressively increase the loads placed on the human body that are replicated by phase 3: load training.

Cardiorespiratory fitness is first gained by infants performing continual movements of increasing duration that require additional oxygen and nutrients to be delivered to the working muscles. This load increases little by little in order to build the aerobic base required for sustained human movement of moderate intensity. As children's games increase in duration and intensity, they begin performing and progressing aerobic intervals that are the key stimuli required to build fitness in phase 2: aerobic-efficiency training.

The development that occurs as children meet the expanding movement and cardiorespiratory challenges that are categorized in phase 2 of both ACE IFT Model training components give youth the foundation for healthy and active lives. Unfortunately, somewhere between adolescence and adulthood, many people spend too many hours in seated positions, leading to lost joint mobility, decreased joint stability, postural issues, and poor movement patterns. This is exacerbated by reductions in cardiorespiratory fitness, making it more difficult to sustain the physical work required to perform jobs, keep up with children, and participate in activities that were previously enjoyable.

It is important to keep all of this in mind when working with clients, as most of them once possessed much of the stability, mobility, movement, and cardiorespiratory fitness that they want and need to gain. For many clients, the initial goals will be to help them regain what has been lost so they can initiate and control movements (stability and mobility) with good posture and desired movement patterns, while also helping them to gain the aerobic base and then aerobic efficiency required of their goal activities. The hurdles faced by each client will be unique, just as when the client gained these neuromuscular

skills and cardiorespiratory fitness the first time. From there, movement, strength, and cardiorespiratory fitness can be progressed as the personal trainer helps the client make physical activity a regular part of his or her life.

Only clients who have competitive or performance-oriented goals will progress to advanced levels of programming in phases 3 and 4 of the ACE IFT Model's training components. This is similar for youth participating in organized physical activities of higher intensity and competitive sports. Over time, even people who have trained for years in phases 3 and 4 of both training components may begin to regress to phase 2 training as they age and no longer train for competitive performance.

It is always important to look at clients in each training component of the ACE IFT Model, as injuries (e.g., low-back or orthopedic), illness (e.g., coronary artery disease or arthritis), or years of specialized training (e.g., running or bodybuilding) can lead to imbalances in one component that require training in a lower phase than the other. It is also critical to assess each client's current phases and readiness for change, as that is the starting point (where they are today) and helps define what is possible for them in terms of short- and long-term goals. In addition, it is important to meet people where they are versus trying to move them to where a personal trainer believes they should go. This especially applies to people as they age or live with illness, as they may no longer have interest in focusing on fitness. They may instead want to improve their quality of life and function in ADL.

A key thing to remember is that cardiorespiratory fitness and functional movement are gained throughout the normal development process, and impaired or lost due to physical inactivity, injury, illness, and aging. Health and fitness professionals can apply the assessments, programming, and progressions in the ACE IFT Model to help clients regain fitness and function, and to achieve many physical and performance goals.

SUMMARY

THE ACE IFT MODEL OFFERS PERSONAL TRAINERS A SYSTEMATIC APPROACH TO providing integrated assessment and programming solutions for clients at various ages and levels of fitness. The phases of the model provide appropriate levels of programming to improve function, health, basic fitness, advanced fitness, and performance, while the training components—functional movement and resistance training, and cardiorespiratory training—allow the personal trainer to provide comprehensive training solutions that are appropriate for each client's current health, fitness, and goals in each area of training. The central focus of creating positive experiences that develop and enhance program adherence is crucial to success for all clients and will set a personal trainer apart from peers who are more focused on sets and repetitions. There are many personal-training tools that have been delivered through a variety of books, courses, and workshops, requiring personal trainers to spend years learning new material and figuring out how to convert that knowledge into practical programs. The ACE IFT Model provides personal trainers with a comprehensive solution that synthesizes all of these assessments and training components for easy application.

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