

## **COMPONENTS OF FITNESS**

### **1. What is Physical Fitness?**

**Physical Fitness** – the ability to work with vigor and alertness without undue fatigue with energy left for enjoying leisure activities and for meeting unforeseen emergencies.

### **2. The Primary Components of Fitness- necessary for improved physical health.**

**i) Cardiovascular Ability/Capacity-** the body's ability to take in oxygen (respiration), deliver it to the cells (circulation) and then use it at the cellular level to create energy (bioenergetics) for physical work (activity). The spectrum of the capacity for the cardiovascular system includes *aerobic endurance* (how long), *aerobic strength* (how hard) and *aerobic power* (how fast).

**ii) Muscular Ability/Capacity-** this is an analysis of the spectrum of muscular capability. *Muscular endurance* (the ability to apply force from a muscle over a long period of time or the ability to complete repeated muscle contractions), *muscular strength* (the ability to generate force or the maximum amount of force that each muscle in the body can exert in a single contraction, also described as 1 repetition maximum or 1 RM), and *muscular power* (the ability to generate power very quickly in an explosive way).

**iii) Flexibility** – the range or amount of motion that each joint in the body is capable of performing (each joint has a different amount of flexibility).

**iv) Body Composition-** this is the proportion of fat-free mass (muscle, bone, blood, organs and fluids) to fat mass (adipose tissue deposited under the skin and around organs).

### **3. Secondary Components of Fitness-** are involved in all physical activity and are necessary for daily functioning.

**i) Balance:** the ability to maintain a specific body position in either a stationary or dynamic (movement) situation.

**ii) Coordination:** the ability to use all body parts together to produce a smooth and fluid motion.

**iii) Agility:** the ability to change direction very quickly.

**iv) Reaction Time:** the time required to respond to a specific stimulus.

**v) Speed:** the ability to move rapidly; also called velocity (the rate of motion).

**vi) Power:** the product of force and velocity exerted (the time rate of doing work); also known as explosive strength.

## **1. Principles of Exercise**

The keys to selecting the right kinds of exercises for developing and maintaining each of the basic components of fitness are found in these principles:

- i) Specificity** - pick the right kind of activities to affect each component. Strength training results in specific strength changes. Also, train for the specific activity you're interested in. For example, optimal swimming performance is best achieved when the muscles involved in swimming are trained for the movements required. It does not necessarily follow that a good runner is a good swimmer.
- ii) Overload** -work hard enough, at levels that are vigorous and long enough to overload your body above its resting level, to bring about improvement.
- iii) Regularity** -you can't hoard physical fitness. At least three balanced workouts a week are necessary to maintain a desirable level of fitness.
- iv) Progression** -increase the intensity, frequency and/or duration of activity over periods of time in order to improve.

Some activities can be used to fulfill more than one of your basic exercise requirements. For example, in addition to increasing cardio-respiratory endurance, running builds muscular endurance in the legs, and swimming develops the arm, shoulder and chest muscles. If you select the proper activities, it is possible to fit parts of your muscular endurance workout into your cardio-respiratory workout and save time.

## **2. Types of Exercise**

- i) Anaerobic Exercise:** Exercises lasting less than a minute. Such short-term efforts such as sprinting or weight lifting, scarcely need any oxygen. Anaerobic exercise ( without oxygen ) consumes fuel without the presence of oxygen and produces waste by-products ( lactic acid ) that accumulate in the muscles causing fatigue and sometimes pain.
- ii) Aerobic Exercises:** Aerobic ( with oxygen ) exercise begins when the heart rate is between 65% and 80% of maximum heart rate. In the aerobic training zone, the heart and lungs are able to supply enough oxygen to the muscles, minimizing fatigue causing waste by-products.



## UNIT 1: Introduction To Total Fitness TOPIC: Musculoskeletal Response to Training

### MUSCULAR ENDURANCE



### SLOW-TWITCH FIBERS



### MUSCULAR STRENGTH



### FAST-TWITCH FIBERS



## AEROBIC EXERCISE

### Slow-twitch Muscle Fibers

During aerobic exercise the energy delivery system *can function fast enough* to deliver all the required oxygen, fat and glucose. Resting (sitting, sleeping, etc.) and slowly contracting (walking, light household chores, etc.) muscles obtain the bulk of their energy from fat. Actively contracting muscles (cross-country skiing, boxercise workout, cycling, jogging, rowing, aerobic low impact workout, step workout, etc.) obtain the bulk of their energy from fat and glucose. During aerobic exercise, fat and glucose are broken down entirely, yielding water, carbon dioxide and large amounts of ATP (Adenosine triphosphate - molecules that store and release energy within the cells). The carbon dioxide released is absorbed by the blood and removed by the lungs.

### Low Resistance Exercise

Low resistance exercise calls for stressing a muscle against a relatively light weight for a high number of repetitions (at least 10 repetitions) over a prolonged period of time and tends to be aerobic.

- USES:** • slow-twitch fibers  
**BUILDS:** • muscle endurance  
• cardiovascular fitness

### Response to Training

- creation of extra glycogen
- increased ability to utilize stored fat
- muscles more efficient in utilizing oxygen and exchanging carbon dioxide
- resistance to fatigue
- greater muscle endurance

## ANAEROBIC EXERCISE

### Fast-twitch Muscle Fibers

During anaerobic exercise the energy delivery system *cannot function fast enough* to deliver all the required oxygen, fat and glucose. Vigorously contracting muscles (high jump, power lifting, golf swing, slap shot, tennis serve, gymnastics, football, swimming [100-m swim], short sprints [100 m dash], downhill skiing, longer sprints [200/400 m dash], etc.) obtain the bulk of their energy from glucose. During anaerobic exercise, glucose is converted into lactic acid, rather than carbon dioxide and water.

When a person exercises at near maximum aerobic and anaerobic levels, as in middle-distance running or swimming, or in sports such as basketball or field hockey, which require a blend of aerobic and anaerobic energy, both types of muscle fibers are activated.

### High Resistance Exercise

High resistance exercise calls for stressing a muscle against a heavy weight for one or two repetitions of maximum exertion over a short period of time and tends to be anaerobic.

- USES:** • fast-twitch fibers  
**BUILDS:** • muscular strength  
• muscle fiber resulting in larger muscle bulk

### Response to Training

- men - increase in muscle bulk
- women - increase in muscle mass or muscle tone
- explosive strength
- increased glycogen reserves
- increased muscle strength



#### INTRODUCTION

Total fitness is a complex concept. According to the United States President's Council on Total Fitness, it is "the ability to carry out daily tasks with vigor and alertness, without undue fatigue, with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies." There are four basic components of total fitness: (1) *cardiovascular fitness*, (2) *musculoskeletal fitness*, (3) *nutritional fitness* and (4) *psychological fitness*. Each can be measured, maintained and improved. The goal of this book is to provide a guide to a balanced lifestyle for total fitness. A proper balance of exercise, food and rest will allow the individual to achieve this goal. If a person goes too far in either direction- too little or too much exercise, food and rest - then his or her entire physical and psychological system becomes unbalanced. And where there is an imbalance, there is also a lack of total fitness. To be truly fit, one must develop all four components, not just one or two. Each component will be discussed and evaluated to allow the student to construct a Lifetime Fitness program. A brief introduction to the four components will provide an insight into Total Fitness.

#### TYPES OF EXERCISE

When a person begins to exercise, muscles first use the fuel within their own cells, which can be obtained without any increase in the body's supply of oxygen. The fuel reserves in an untrained individual will only last for two minutes. If the exercise lasts longer than a minute or two, the muscles must find another source of fuel.

Exercises lasting less than a minute are called anaerobic (without oxygen). Such short-term efforts such as sprinting or weight lifting - scarcely need any oxygen. Anaerobic exercise consumes fuel without the presence of oxygen and produces waste by-products that accumulate in the muscles causing fatigue and sometimes pain.

Aerobic (with oxygen) exercise begins when the heart rate is between 65 and 80 percent of maximum heart rate. In the aerobic training zone, the heart and lungs are able to supply enough oxygen to the muscles, minimizing fatigue causing waste by-products. Aerobic exercise increases muscle strength and raises the efficiency of the muscles ability to utilize oxygen to quickly clear away the by-products of exercise (lactic acid).

## COMPONENTS OF TOTAL FITNESS:

### (1) CARDIOVASCULAR FITNESS

The cardiovascular system serves to integrate the body as a unit and provides the muscles with a continuous supply of nutrients and oxygen so that a high energy output can be maintained for an extended time period.

Cardiovascular (cardio = heart, vascular = blood vessels ) fitness is the most vital component of Total Fitness. It may be defined as the sustained ability of (a) the heart, blood vessels and blood to carry oxygen to the cells, (b) the ability of the cells to process oxygen, and (c) the ability of the blood, in turn, to carry away waste products. Cardiovascular fitness is improved through activities that promote the body's ability to deliver even larger amounts of oxygen to working muscles.

Activities that improve cardiovascular fitness utilize the large muscle groups (such as those in the legs) and, most importantly, the exercise must be sustained for at least fifteen (15) minutes. Fifteen minutes of continual non-stop aerobic exercise (with the heart rate between 65 and 80 percent of maximum) will change the muscle chemistry so that the body will burn fat more efficiently.

Sustained exercise also means regular exercise, at least three to five times per week. Sustained exercise will improve the heart's ability to pump more blood, thus delivering more oxygen and nutrients to muscle cells. Regular aerobic exercise will also improve the muscles capacity to use oxygen. This improved oxygen capacity makes each physical movement more efficient, requiring less oxygen to perform the exercise.

The benefits of regular sustained aerobic exercise are as follows:

- reduces risk of heart disease
- can help prevent weight gain
- raises level of HDL ("good") cholesterol in the blood
- lower blood pressure
- psychological benefits such as; improved self-esteem, reduced anxiety, increased ability to cope with stress