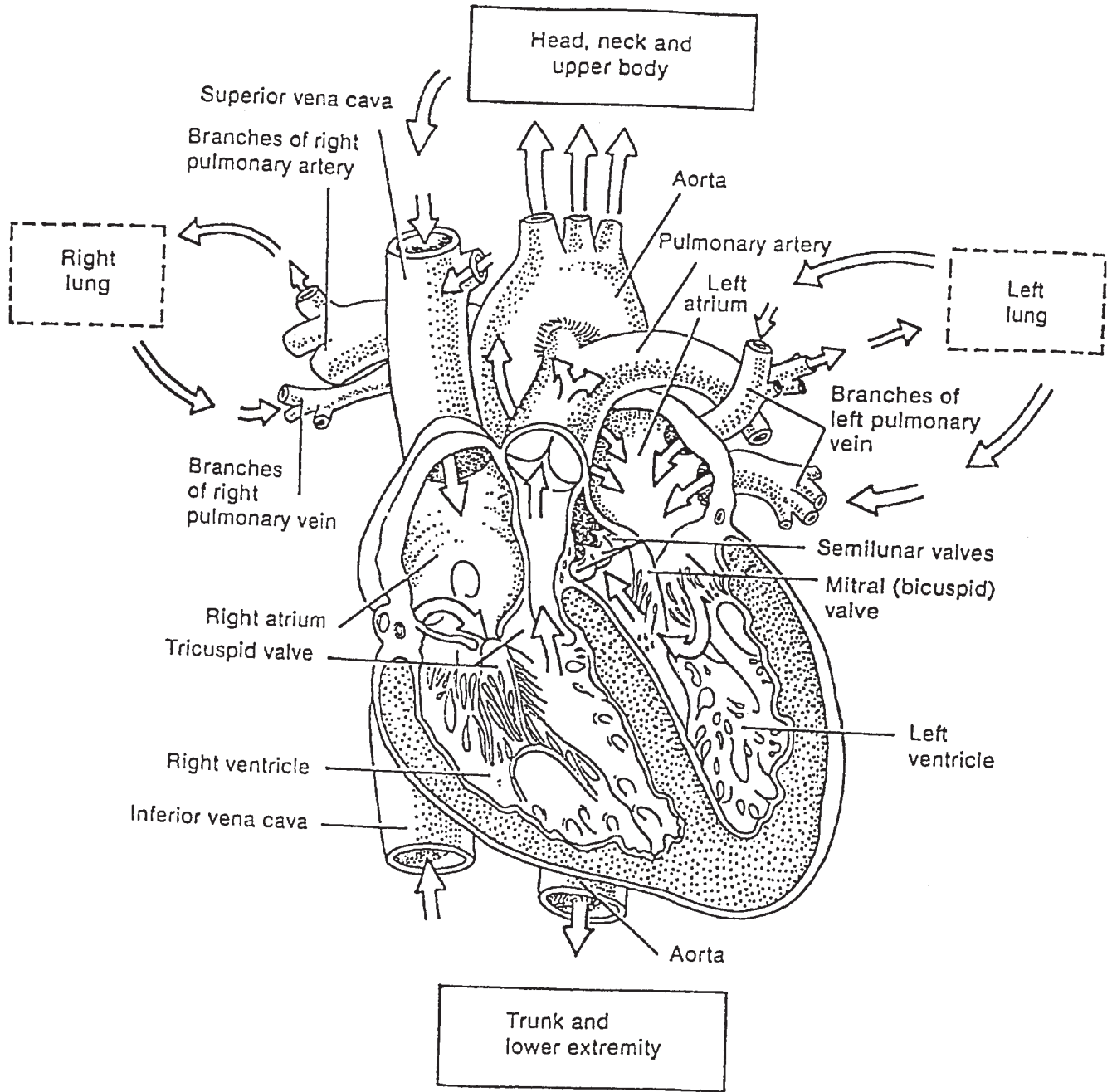
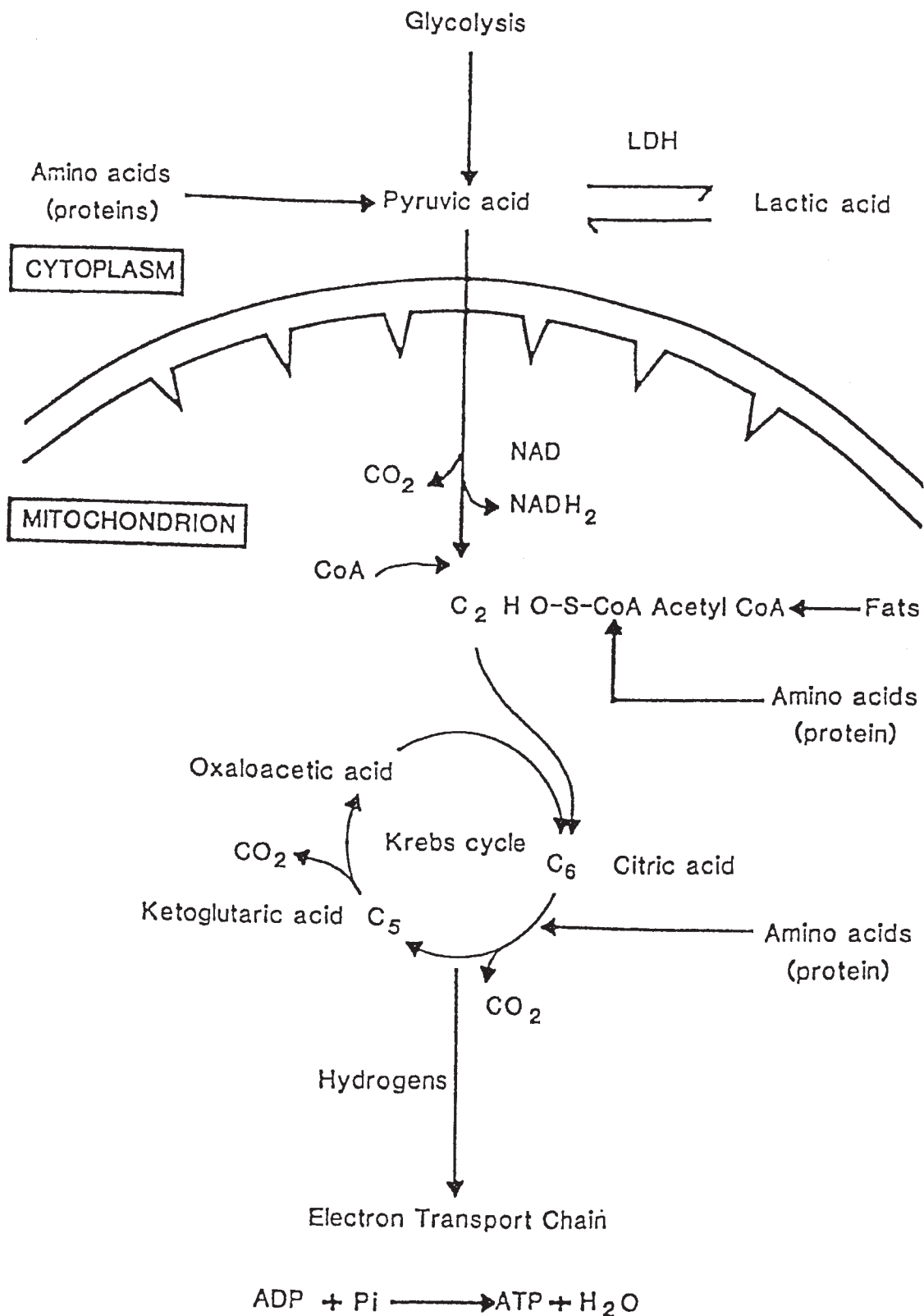


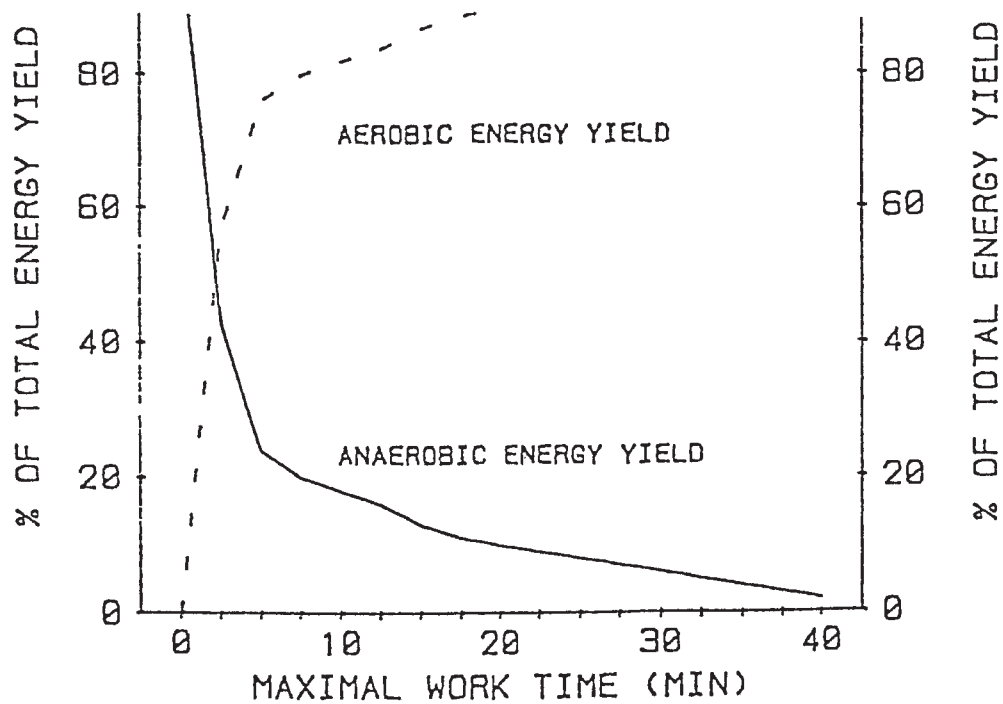
APPENDIX A

HEART

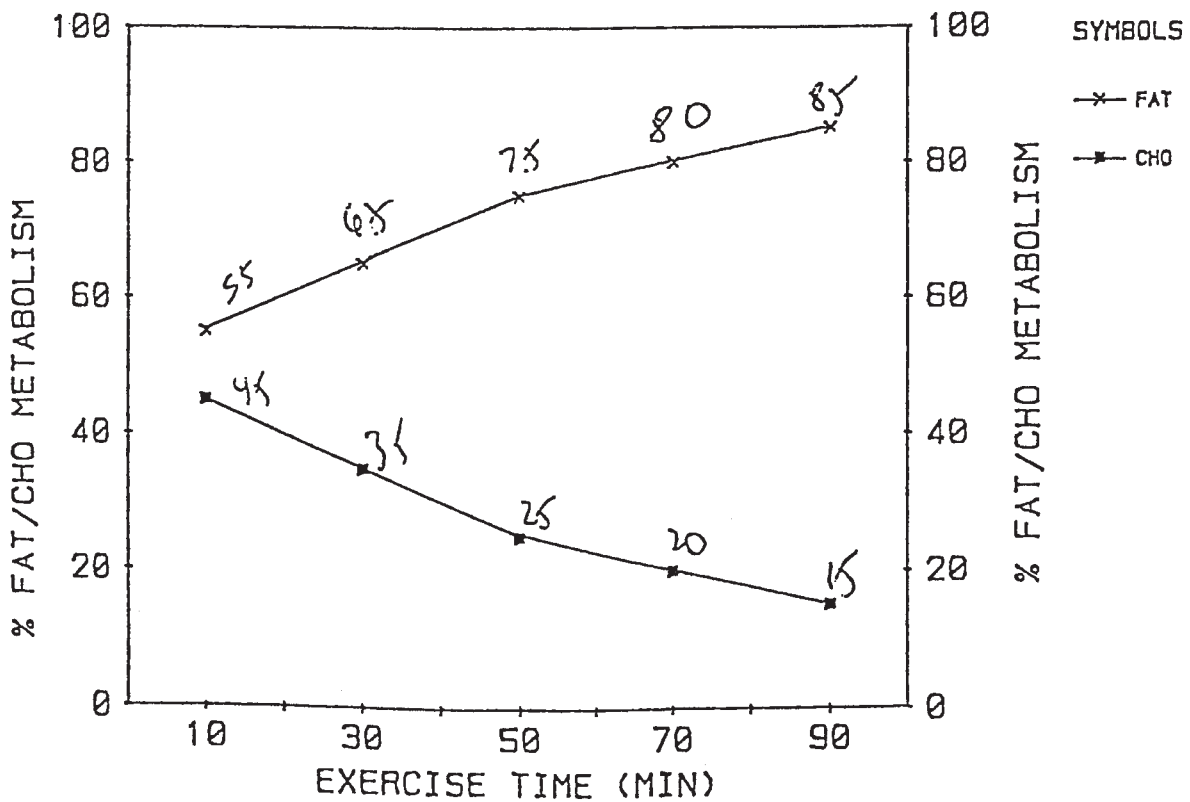


RELATIONSHIP BETWEEN GLYCOLYSIS, THE KREBS CYCLE AND THE ELECTRON TRANSPORT CHAIN



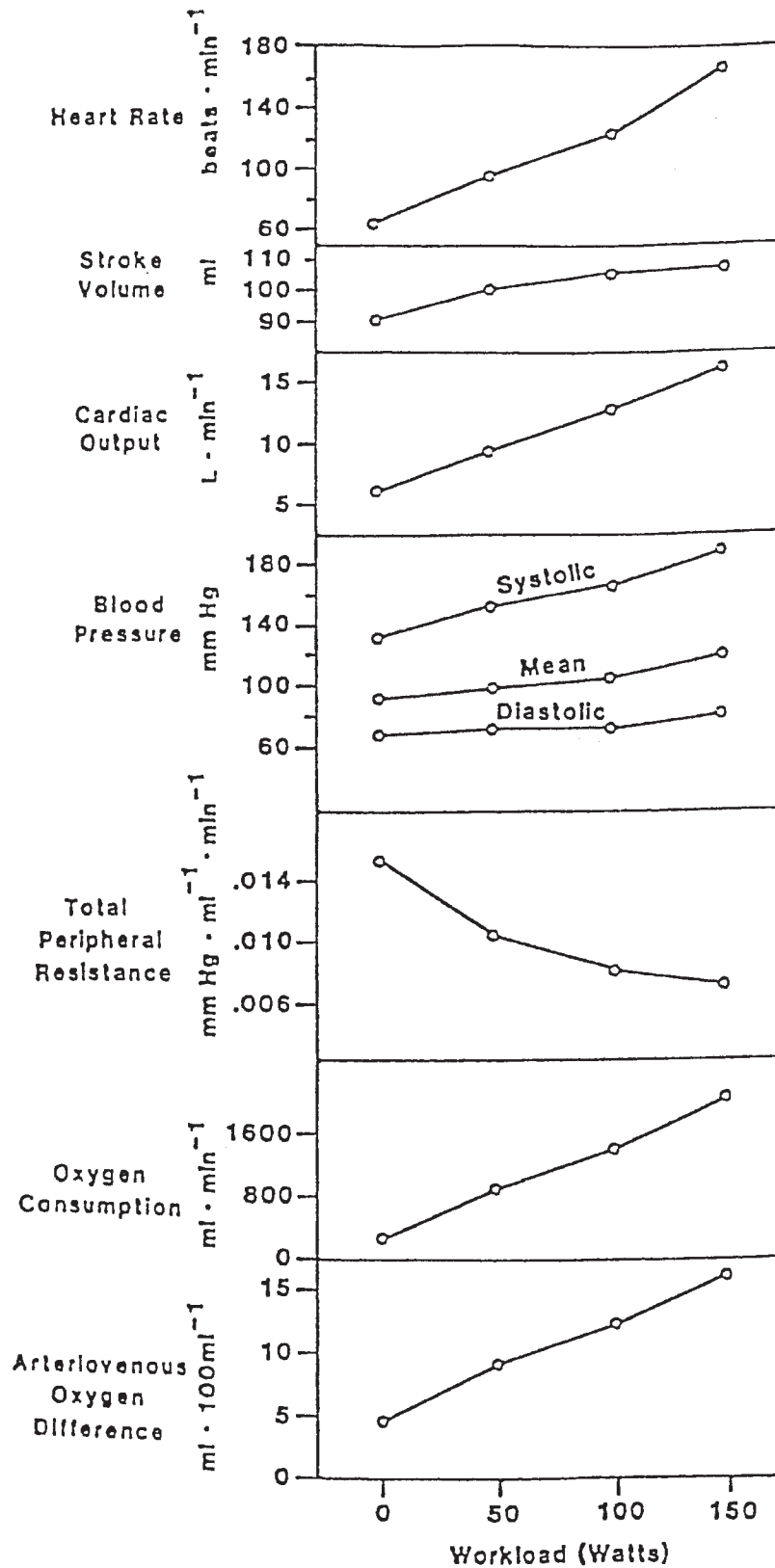


Interaction between anaerobic and aerobic metabolism during exercise. Note energy to perform short-term high-intensity exercise comes primarily from anaerobic sources whereas energy for muscular contraction during prolonged work comes from aerobic metabolism. (Redrawn from McArdie W, Katch F, Katch V: Exercise Physiology. Philadelphia: Lea & Febiger, 1981.)

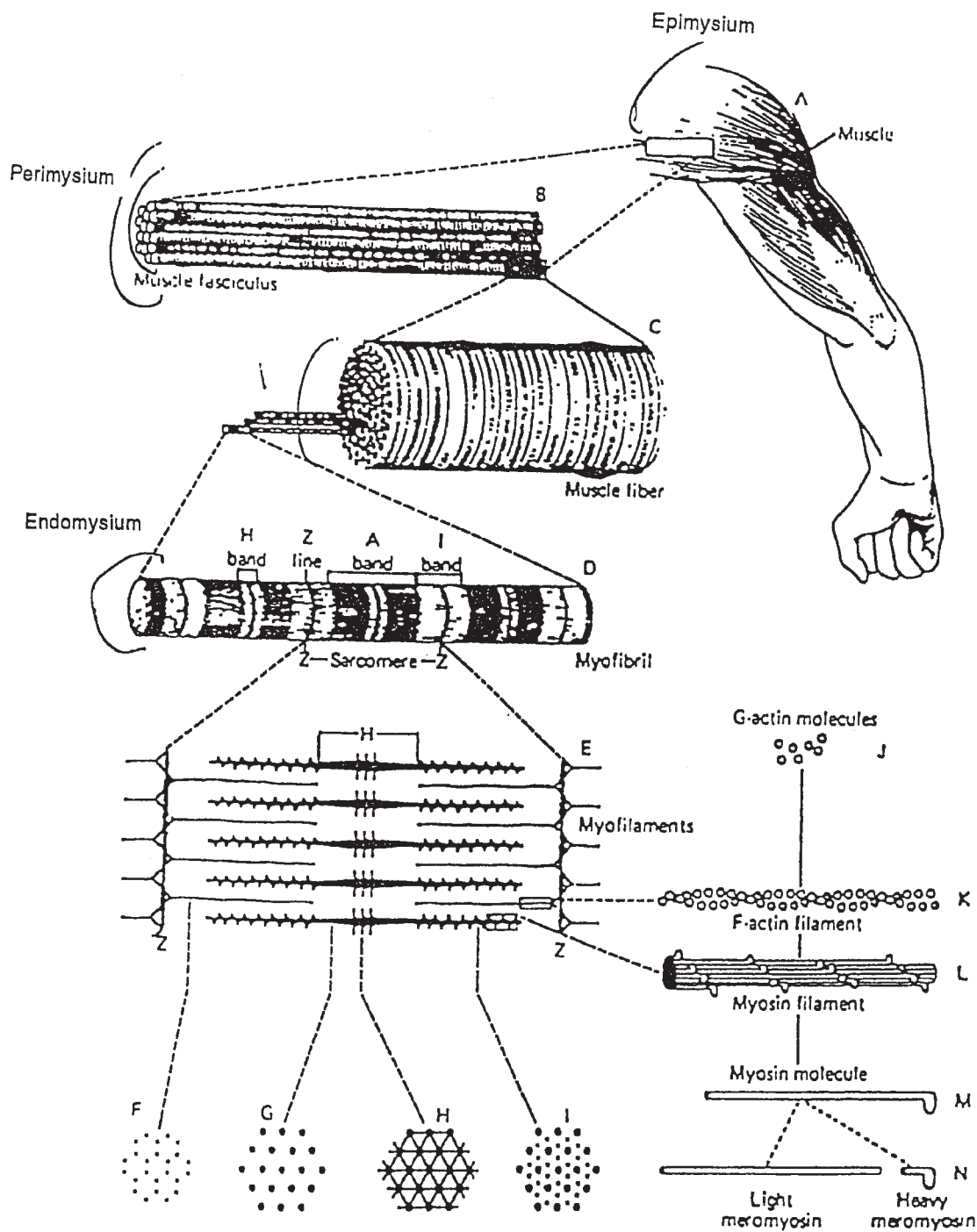


Alterations in substrate utilization during prolonged submaximal exercise. CHO, carbohydrate. (Data from Powers S., Riley W., Howley E: Comparison of fat metabolism between trained men and women)

CARDIOVASCULAR RESPONSES TO GRADED EXERCISE

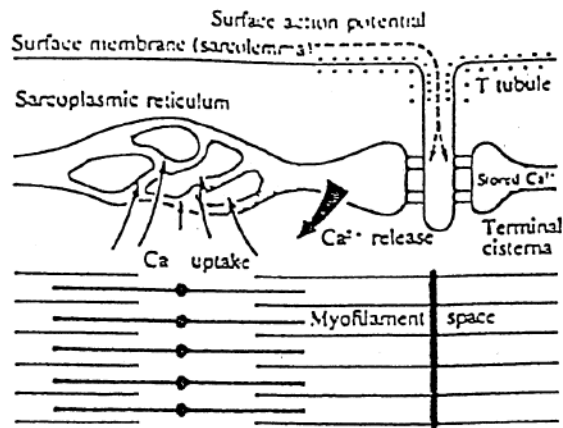


EXERCISE PHYSIOLOGY CARDIOVASCULAR RESPONSES TO GRADED EXERCISE

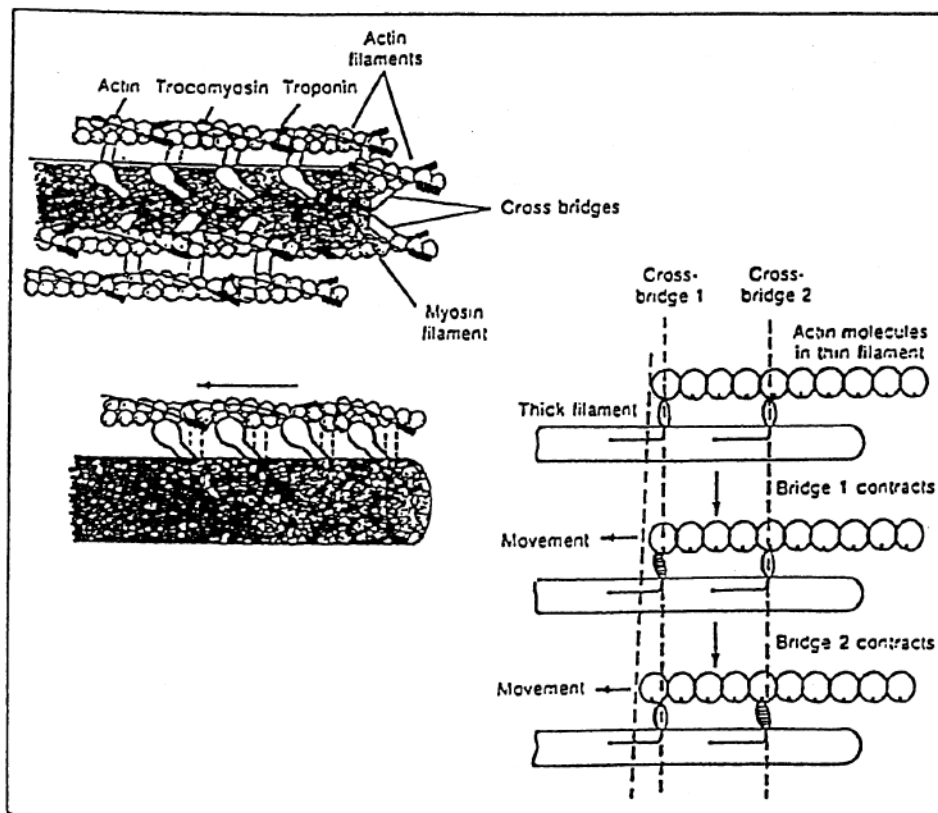


Macroscopic and microscopic structure of human skeletal muscle. Individual muscle cells (myofibers) are mechanically linked through endomysium (encompasses individual myofibers), perimysium (surrounds groups of myofibers or fasciculi), and epimysium encapsulates entire muscle). Striated appearance of skeletal muscle is due to overlapping myofilaments of actin and myosin within basic contractile unit, the sarcomere. (Drawing by Sylvia Colard Keen. From Bloom's *A Textbook of Histology*. Edited by DW Fawcett. Philadelphia: W.B. Saunders, 1975)

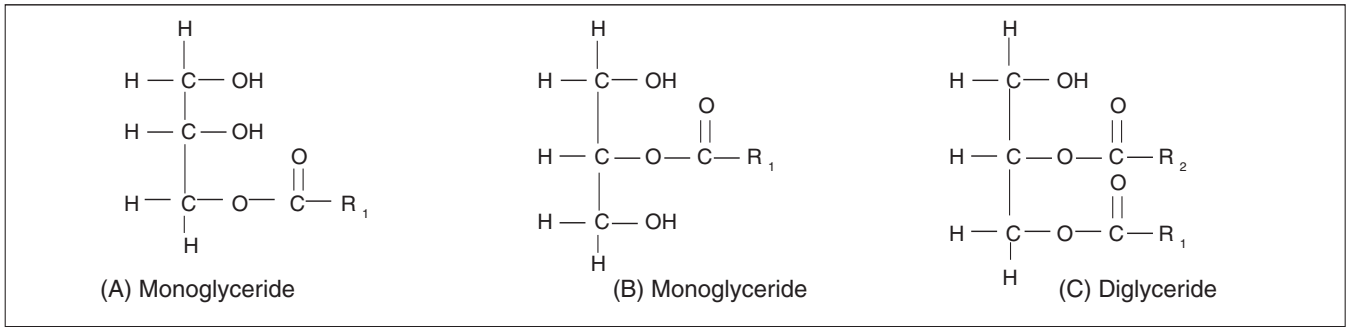
ADAPTATIONS OF SKELETAL MUSCLE TO TRAINING



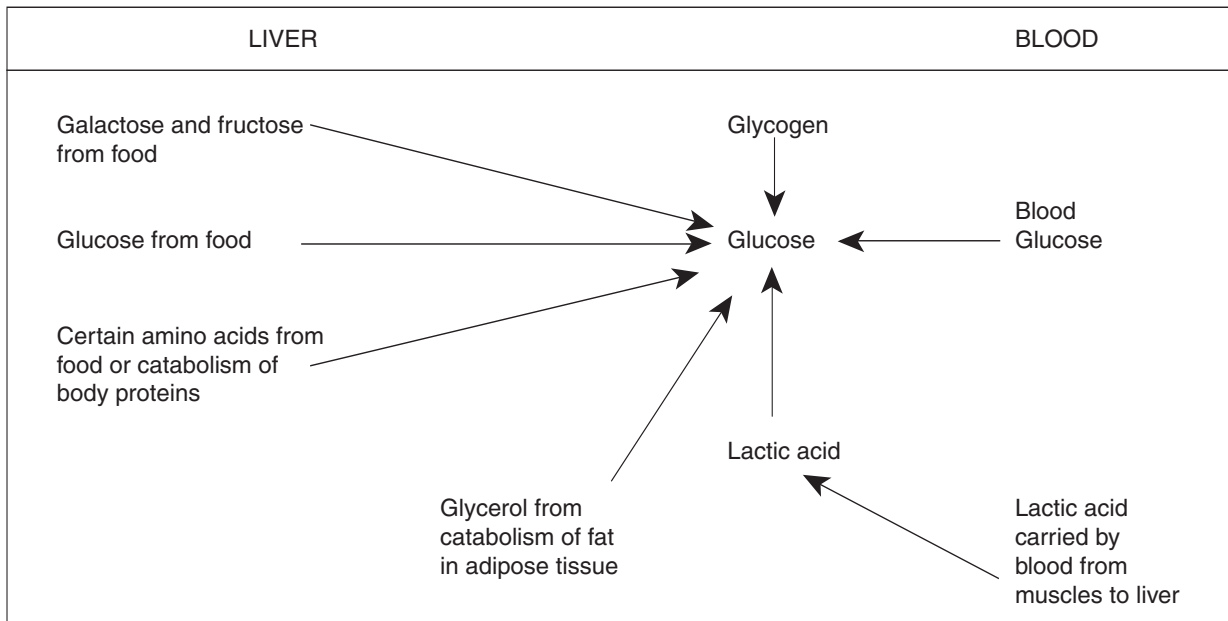
Skeletal muscle subcellular structure. Depolarization of sarcolemma in T-tubule region induces Ca²⁺ release from sarcoplasmic reticulum (SR), which causes muscle shortening. Ca²⁺ is resequestered by SR during relaxation. (From Selkurt EE: Basic Physiology for the Health Sciences. Boston: Little, Brown and Co. 1982.)



Molecular components of skeletal muscle thick (myosin) and thin (actin) filaments. Interaction of myofilaments and conformational changes in crossbridge formation increases myofilament overlap and results in muscle shortening. (From McArdie WD Katch F, Katch V; Exercise Physiology. Philadelphia: Lea & Febiger, 1981.)



Mono and diglyceride. The fatty acid attached to the glycerol in a monoglyceride may be attached either to one of the end carbons (a) or to the middle carbon (b) In a diglyceride two fatty acids are attached to the glycerol molecule.



Source of blood glucose. The use of amino acids, glycerol and lactic acid to form glucose is called gluconeogenesis. The liver is able to obtain glucose from these many sources to maintain normal blood glucose.

DIGESTION OF CARBOHYDRATES			
<u>ORIGIN OF ENZYME</u>	<u>ENZYME</u>	<u>SUBSTRATE*</u>	<u>PRODUCTS FORMED</u>
Salivary glands in mouth	Salivary amylase	Starch	Mostly dextrans, and a little maltose
Pancreas	Pancreatic amylase	Starch and dextrans	
Small intestines	Maltase	Maltose	Glucose
Small intestines	Sucrase	Sucrose	Glucose and fructose
Small intestines	Lactase	Lactose	Glucose and galactose

*Substrate is the substance an enzyme acts upon.

Nearly all the digestion of carbohydrates occurs in the duodenum and jejunum. The bulk of starch digestion rests from the action of pancreatic, not salivary, amylase. The end products of digestion of a mixture of the commonly occurring carbohydrates in foods are glucose, fructose and galactose.

ESSENTIAL AND NONESSENTIAL AMINO ACIDS	
ESSENTIAL AMINO ACIDS	NONESSENTIAL AMINO ACIDS
Histidine Isoleucine Leucine Lysine Methionine* (a) Phenylalanine Threonine Tryptophan Valine	Alanine Arginine Asparagine Aspartic acid Cysteine* (and cystine* (a) (b)) Glutamic acid Glutamine Glycine Hydroxylysine Hydroxyproline Proline Serine Tyrosine *(c)

* (a) Methionine, cysteine, and cystine contain sulfur, and are frequently designated "the sulfur-containing amino acids"

(b) Cystine is made up of two cysteine molecules linked together.

(c) Tyrosine is synthesized in the body from phenylalanine.

CLASSIFICATION, CHEMICAL COMPOSITION AND FOOD SOURCES OF FATTY ACIDS IN FOODS				
CLASSIFICATION	COMMON NAME	NO. OF CARBON AND DOUBLE BONDS*	FORMULA*	FOOD SOURCES
Saturated	Butyric	4:0	$\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$	Butter
	Caproic	6:0	$\text{CH}_3(\text{CH}_2)_4\text{COOH}$	Butter
	Caprylic	8:0	$\text{CH}_3\text{CH}_2\text{CH}_6\text{COOH}$	Coconut oil, butter
	Capric	10:0	$\text{CH}_3(\text{CH}_2)_8\text{COOH}$	Palm oil, butter, coconut oil
	Lauric	12:0	$\text{CH}_3(\text{CH}_2)_{10}\text{COOH}$	Coconut oil, butter
	Myristic	14:0	$\text{CH}_3(\text{CH}_2)_{12}\text{COOH}$	Butter, coconut oil, nutmeg fat
	Palmitic	16:0	$\text{CH}_3(\text{CH}_2)_{14}\text{COOH}$	Beef, pork, and lamb; most vegetable fats
	Stearic	18:0	$\text{CH}_3(\text{CH}_2)_{16}\text{COOH}$	Beef, pork, and lamb; most vegetable fats
Monoun-Saturated	Arachidic	20:0	$\text{CH}_3(\text{CH}_2)_{18}\text{COOH}$	Peanut oil and lard
	Palmitoleic	16:1	$\text{CH}_3(\text{CH}_2)_5\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$	Butter and seed oils
Polyun-Saturated	Oleic	18:1	$\text{CH}_3(\text{CH}_2)_7\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$	Olive oil, meats, and most other fats and oils
	Linoleic	18:2	$\text{CH}_3(\text{CH}_2)_4\text{CH}=\text{CHCH}_2\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$	Corn, cottonseed, soybean, sunflower, safflower oils, poultry, walnuts
	Linolenic	18:3	$\text{CH}_3\text{CH}_2(\text{CH}=\text{CHCH}_2)_2\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$	Soybean oil, other vegetable oils, egg yolk
	Arachidonic	20:4	$\text{CH}_3(\text{CH}_2)_4(\text{CH}=\text{CHCH}_2)_4(\text{CH}_2)_2\text{COOH}$	Very little in foods

* First figure indicated number of carbons; figure after colon indicated number of double bonds.

** To save space. $(\text{CH}_2)_4$ for example, means the group $\begin{array}{c} \text{H} \\ | \\ \text{---C---} \\ | \\ \text{H} \end{array}$ occurs four times in the formula.

APPENDIX B

Learn to Read and Understand Food Labels

A generation ago, most people had no idea what sorts of ingredients could be found in the foods they were eating, much less the exact amount of each nutrient per serving. Today's new food labels, which are called nutrition facts, make smart eating almost fool proof. If you learn to understand and follow the label, you can't go wrong. There are a few basic elements to a food label that require a little explanation.

Be aware that everything on the food label will be relative to the serving size printed on that label. Not that you need to restrict yourself to the serving size specified, but be aware that when you double the serving size, you also double the amount of each nutrient and calorie in that serving.

The right-hand column contains the percentages of Daily Values of each of the nutrients listed. As your label clearly states below, these percentages are based on a 2000 calories per day diet in which 30% of all calories are from fat. The grams listed in the column on the left are far more meaningful.

Total Calories and Calories from Fat are the first number you'll read on the label that have real meaning. From these you can determine the percentage of this food or this ingredient that comes from fat. Simply divide fat calories by total calories to get that percentage number. As a rule of thumb, you should try to stay away from anything that derives more than one-third of its calories from fat.

The next major category is Total Carbohydrate. While this number may give you an idea of overall carbohydrate content, the more interesting number appears just below it. The higher the Dietary Fiber the better, and the lower the Sugars the better (since the remaining balance is likely to be the more desirable complex carbohydrate).

Next is Protein, expressed in grams. Try to keep a tab throughout the day of the total grams of protein you're consuming. A little protein with every meal helps even out energy levels by reducing the amount of insulin you produce as a response to the carbohydrate content of your meals.

Nutrition Facts

Serving Size 1 entree
Serving Per Container 1

Amount per serving
Calories 280

Calories from Fat 110

% Daily Value*

Total Fat 18%

Saturated Fat 5g 25%

Cholesterol 40mg 13%

Sodium 610 mg 25%

Total Carbohydrate 27g 9%

Dietary Fiber 4g 16%

Sugar 5g

Protein 16g

Vitamin 24%

Vitamin C 2%

Calcium 10%

Iron 20%

*Percent Daily Values are based on a 2000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories;	2000	2500
Total Fat	Less Than	65g	80g
Saturated Fat	Less Than	20g	25g
Cholesterol	Less Than	65g	80g
Sodium	Less Than	2400g	2400g
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

How to Read and Understand Food Labels

Nutrition Facts

Serving Size 1/2 cup (140g) Cooked a.
 Serving Per Container 1

Amount per serving b.
 Calories 280 Calories from Fat 110

% Daily Value* c.

Total Fat	3g		5%	d.
	Saturated Fat 5g		0%	
Cholesterol	0mg		0%	
Sodium	15mg		1%	e.
Total Carbohydrate 30g 10%				
Dietary Fiber 4g 16%				
Sugar 0g				
Protein 6g f.				

Vitamin A 0%	•	Vitamin C 0%		g.
Calcium 2%	•	Iron 8%		

*Percent Daily Values are based on a 2000 calorie diet.
 Your daily values may be higher or lower depending on
 your calorie needs:

	Calories:	2000	2500	
Total Fat	Less Than	65g	80g	
Saturated Fat	Less Than	20g	25g	
Cholesterol	Less Than	300g	300g	
Sodium	Less Than	2400g	2400g	h.
Total Carbohydrate		300g	375g	
Dietary Fiber		25g	30g	

Calories per gram
 Fat 9 • Carbohydrates 4 • Protein 4

INGREDIENTS: i.
 Whole Oats, Long Grain Brown Rice, Whole Hard Red Winter
 Wheat, Whole Tritocate, Whole Bunchwheat, Whole Barley,
 Sesame Seeds

How to Read and Understand Food Labels

- a. New labels have fairly realistic estimations of serving size. Keep in mind that the rest of the label contains information relative only to this listed serving size or portion, not necessarily the whole bag, box or can. If you intend to eat double or triple or half the listed serving size, be sure to double or triple or halve the other numbers on the label.
- b. Calories per serving should be self-explanatory. More important is calories from fat. To determine exactly how “fat-free: or fat-laden each serving is, divide “calories from fat”. If it is less than 30%, you should be OK, provided you are eating substantial amounts of complex carbohydrate-rich foods (which will, almost by definition, be very low in fat). And even if this particular product contains fat in an amount higher than 30%, your main goal number is still total fat grams per day.
- c. % daily value is a general reference guide based on an assumed daily calorie intake of 2,000 and the government’s recommendation that 30% of you calories come from fat and 60% carbs. Your number will probably be different, although not by much, so just note that all the numbers in this column express a percentage of that theoretical 2,000 calorie 60%-30%-10% diet.
- d. Obviously, the number everyone is concerned with is fat, and all labels get this news out of the way first. Total fat grams are what we are most interested in tracking, so pay close attention to this one. As for the saturated/unsaturated breakdown, as was mentioned before, if your total fat intake is under control and you are eating mostly unprocessed foods, you should be O.K.
- e. "Total carbohydrate" is the main number to seek out in this category. Higher dietary fiber is considered good, a low number for “sugar” is also considered good, since this refers to simple sugars. Assume that most of whatever is not sugar will be complex carbs. Remember that we are looking to get a handle on grams per day.
- f. Protein, expressed in grams per serving, ought to be self-explanatory, Remember, though, this won’t identify the amino acid breakdown of your protein, just total grams per day.
- g. Vitamin content is expressed only as a percent of the RDA. Note whether your foods are “nutritious” beyond just the three fuels.
- h. This area has nothing to do with what’s inside. It is a reference guide for the consumer to see what the government’s recommendations for an average 2,000 calories or 2,500 calories diet should be. By now, you already know about 1000% more than the average consumer, so disregard this.
- i. New labels are required to list ingredients more specifically than in the past. This may assist you in identifying foods that contain too many artificial ingredients, colorings, additives and preservatives - so you can avoid them, obviously.

Fat Burning Factors

CALORIES BURNED PER MINUTE						
<i>YOUR TOTAL WEIGHT IN POUNDS</i>						
EXERCISE	110	130	150	170	190	210
Basketball	6.9	8.1	9.4	10.6	11.9	13.1
Boxing	11.1	13.1	15.1	17.1	19.1	21.1
Cycling						
leisure: 5.5mph	3.2	3.8	4.4	4.9	5.5	6.1
leisure: 9.fmph	5.0	5.9	6.8	7.7	8.6	9.5
racing	8.5	10.0	11.5	13.0	14.5	16.1
Dancing						
aerobic, medium	5.2	6.1	7.0	7.9	8.9	9.8
aerobic, intense	6.7	7.9	9.2	10.4	11.6	12.8
Golf	4.3	5.0	5.8	6.5	7.3	8.1
Hill Climbers	7.0	8.3	9.5	10.8	12.0	13.3
Jumping Rope						
80 per min.	8.2	9.7	11.2	12.6	14.1	15.6
124 per min.	8.9	10.4	12.0	13.6	15.2	16.8
145 per min.	9.9	11.6	13.4	15.2	16.9	18.7
Racquetball	8.9	10.5	12.1	13.7	15.3	16.9
Running						
11.5 min. per mile	6.8	8.0	9.2	10.5	11.7	12.9
9 min. per mile	9.7	11.4	13.1	14.9	16.6	18.3
8 mon. per miles	10.8	12.5	14.2	16.0	17.7	19.4
7 min. per mile	12.2	13.9	15.6	17.4	19.1	20.8
6 min. per mile	13.9	15.6	17.3	19.1	20.8	22.5
5.5 min. per mile	14.5	17.1	19.7	22.3	24.9	27.5
Skiing, cross-country						
level, mod. speed	6.0	7.0	8.1	9.2	10.2	11.3

<i>YOUR TOTAL WEIGHT IN POUNDS</i>						
EXERCISE	110	130	150	170	190	210
Skiing, cross-country						
level, walding	7.2	8.4	9.7	11.0	12.3	13.6
uphill, max speed	13.7	16.2	18.6	21.1	23.6	26.0
Swimming						
crawl, slow	6.4	7.6	8.7	9.9	11.0	12.2
uphill, max speed	7.8	9.2	10.6	12.0	13.4	14.8
Tennis	5.5	6.4	7.4	8.4	9.4	10.4

This is how to use the information in the previous chart to calculate the calories you'll burn doing your aerobic exercise.

EXAMPLE: Jill weighs a total of 130 pounds. She attends aerobic dance classes at her local health club. The workouts last 45 minutes, after a brief warm-up, and are usually at a medium intensity. Referring to the chart, Jill would see that a 130-pound person burns 6.1 calories per minute doing aerobics at this level: 45 minutes multiplies by 6.1 = 275 calories per workout. The reason she uses her total weight and not just her Lean Body Mass to figure her calories per minute is because she is carrying around all her fat weight as well as her lean weight when she exercises.

Vitamin Interactions

Vitamin A

Fat	Enhances vitamin A absorption
Protein	Acute deficiency impairs vitamin A metabolism
Vitamin E	Enhances vitamin A absorption and stores spares when intake is marginal, excessive doses may deplete vitamin A levels.
Zinc	Deficiency reduces plasma vitamin A levels.
Alcohol	Impairs storage and synthesis of vitamin A in the liver; hypervitaminosis A may enhance hepatotoxicity
Oral Contraceptives	Increases serum and plasma vitamin A levels.
Antacids	Decreases absorption of vitamin A and fat soluble vitamin D, E, K

Vitamin B1- Thiamin

Carbonate and Citrates	Produces excessive muscle relation.
Alcohol	Reduces intestinal absorption of vitamin B1

Vitamin B2-Riboflavin

Alcohol	Prevents uptake and absorption of vitamin B2
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Vitamin B3-Niacin

Alcohol	May cause extremely low blood pressure.
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Biotin

Foods	Eating large quantities of raw egg whites may cause biotin deficiency.
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Vitamin D

Antacids	Decreases absorption
Calcium	High doses increase risk of hypercalcemia
Chronic Alcoholism	Depletes liver stores of vitamin D.

Vitamin E

Antacids	Decreases vitamin E absorption
Anti-Coagulants	Helps prevent coagulation
Iron	Decreases effect of iron supplement in people with iron-deficiency anemia. Decreases vitamin E effect in healthy people.
Vitamin A	Facilitates absorption, storage and utilization of vitamin A and with excessive vitamin E causes vitamin A depletion.
Alcohol	Depletes vitamin E stores in liver
Vitamin C	Megadoses may increase vitamin E requirements
Vitamin K	High levels of vitamin E reduce intestinal absorption of vitamin K.
Selenium	Functions synergistically
Oral Contraceptive	Increases vitamin E serum levels

Vitamins and Their Functions

Vitamin	Function	Sources	Daily adult requirement ^a	
			Men	Women
Thiamin (B-1)	Functions as part of a coenzyme to aid utilization of energy	Whole grains, nuts lean pork	1.5mg	1.1 mg
Riboflavin (B-2)	Involved in energy metabolism as part of a coenzyme	Milk , Yogurt, cheese	1,7 mg	1.3 mg
Niacin	Facilitates energy production in cells	Lean meat, fish, poultry, grains	19.0 mg	15.0 mg
Vitamin B-6	Absorbs and metabolizes protein; aids in red blood cell formation	Lean meat, vegetables, whole grains	2.0 mg	1.6 mg
Pantothenic acid	Aids in metabolism of carbohydrate, fat and protein	Whole-grain cereals, bread, dark green vegetables	4-7 mg	180µg
Folic acid	Functions as coenzyme in synthesis of nucleic acids and protein	Green vegetables, beans whole-wheat products	200 µg	2 µg
Vitamin B-12	Involved in synthesis of nucleic acids, red blood cell formation	Only in animal foods, not plant foods	2 µg	2 µg
Biotin	Coenzyme in synthesis of fatty acids and glycogen formation	Egg yolk, dark green vegetables	30-100 µg	30-100µg
C	Intracellular maintenance of bone, capillaries, and teeth	Citrus fruits, green peppers, tomatoes	10 mg	60 mg
A	Functions in visual processes; formation and maintenance of skin and mucous membranes	Carrots, sweet potatoes margarine, butter, liver	1000 µg	800µg ^c
D	Aids in growth and formation of bones and teeth; promotes calcium absorption	Eggs, tuna, liver, fortified milk	5µg	5µg
E	Protects polyunsaturated fats; prevents cell membrane damage	Vegetable oils, whole-grain cereal and bread, green leafy vegetables	10 gm	8 mg
K	Important in blood clotting	Green leafy vegetables	80µg	65 µg

Note: ^aValues are for adults 25 to 50 years of age. The requirements vary for children and pregnant or lactating women. See appendix D

^b mg - milligram, µg = microgram, IU - international unit.

^cµg vitamin A requirements are expressed in microgram of Retinol equivalents.

Reprinted from Franks and Howley 1989.

Mineral Interactors

Calcium

Iron	Decreases absorption
Oral Contraceptive	Increases calcium absorption
Potassium	Increase chance of heartbeat irregularity
Tetracycline	Decreases absorption of Tetracycline
Vitamin A	Stimulates bone loss with a megadose
Vitamin D	Increases absorption of calcium supplement
Alcohol	Decreases absorption
Tea and Coffee	Decreases absorption
Vitamin A, E, K	Decreases absorption of minerals

Chloride

Chlorine	Maintains normal acidbase balance in body
Potassium	Maintains normal acidbase balance in body
Sodium	Maintains normal acidbase balance in body

Chromium

Insulin	May decrease amount of insulin needed to treat diabetes
Sugar	Is partially destroyed by chromium

Copper

Fiber	Can interfere with copper absorption and utilization
Molybdenum	Maintains appropriate ratio of copper to molybdenum in the body
Oral Contraceptive	Increases copper level significantly unknown at present
Vitamin C	Decreases absorption of copper
Zinc	Can interfere with copper absorption
Calcium	Decreases absorption of fluoride
Milk	Decreases absorption of fluoride

Iron

Antacids	Causes poor iron absorption
Calcium	Combination necessary for efficient calcium absorption
Copper	Assists in copper absorption
Tetracycline	Decreases the effectiveness
Vitamin C	Increases iron effect
Vitamin E	Decreases iron effect
Zinc	Decreases iron absorption
Alcohol	Increases iron utilization. May cause organ damage
Milk	Decreases iron absorption
Tea & Coffee	Decreases iron absorption

Magnesium

Vitamins A, E, K	Decreases absorption of minerals
Tetracycline	Decreases absorption of tetracycline
Vitamin D	May raise magnesium level too high

Manganese

Calcium
Iron

Magnesium
Oral Contraceptives
Phosphate

May decrease manganese absorption when taken in large doses
Excess manganese interferes with iron absorption and can lead to iron deficiency anemia
May decrease manganese absorption when taken in large doses
Decreases manganese in blood
Taken in large doses may decrease manganese absorption

Molybdenum

Copper
Sulfur

Maintains appropriate ratio of molybdenum and copper in body
Increased sulfur intake causes decline in molybdenum concentration

Potassium

Calcium
Laxatives
B12

Alcohol
Coffee
Sugar

Increases possibility of heartbeat irregularities
May decrease potassium effect
Extended-release tablets may decrease B12 absorption and increase vitamin B12 requirement
Intensifies gastrointestinal symptoms
Decreases potassium absorption and intensifies gastrointestinal symptoms
Decreases potassium absorption

Selenium

Vitamin C
Vitamin E

May decrease selenium absorption if taken with an inorganic form of selenium
Prevents oxidation that might cause breakdown of body chemicals

Zinc

Calcium
Copper
Iron
Oral Contraceptives
Tetracycline
Vitamin A
Alcohol

Interferes with calcium absorption
Decreases absorption of copper
Decreases absorption of iron
Lowers zinc blood level
Decreases amount absorbed into bloodstream
Assistant in absorption of vitamin A
Even in moderate amounts, can increase the excretion of zinc in urine and can impair body's ability to combine zinc into its proper enzyme combinations in the liver

Minerals and Their Functions

Mineral	Function	Sources	Daily adult requirement*	
			Men	Women
<u>Major Minerals</u>				
Calcium	Bones, teeth, blood clotting, nerve and muscle function	Milk, sardines, dark green vegetables, nuts	800 mg	800 mg
Chloride	Nerve and muscle function, water balance (with sodium)	Table salt	750 mg	750 mg
Magnesium	Bone growth; nerve, muscle, and enzyme function	Nuts, seafood, whole grains, leafy green vegetables	350 gm	280 mg
Phosphorus	Bone, teeth, energy transfer	Meats, poultry, seafood, eggs, milk, beans	800 mg	800 mg
Potassium	Nerve and muscle function	Fresh vegetables, bananas	2000 mg	2000 mg ^c
Sodium	Nerve and muscle function	Table salt	500 mg	500 mg ^c
<u>Trace Minerals</u>				
Chromium	Glucose metabolism	Meats, liver, whole grains, dried beans	.05-.2 mg	05-.2 mg
Copper	Enzyme function, energy production	Meats, seafood, nuts, grains	1.5-3 mg	1.5-3 mg
Fluoride	Bone and teeth growth	Drinking water, fish, milk	1.5-4 mg	1.5-4mg
Iodine	Thyroid hormone formation	Iodized salt, seafood	150 µg	150 µg
Iron	O ₂ transport in red blood cells; enzyme function	Red meat, liver, eggs, beans, leafy vegetables, shellfish	10 mg	15 mg
Manganese	Enzyme function	Whole grains, nuts, fruits	2.5-5 mg	2.5-5 mg
Molybdenum	Energy metabolism in cells	Whole grains, organ meat, peas, beans	.0725-.25 mg	.0725-.25 mg
Selenium	Works with vitamin E	Meat, fish, whole grains, eggs	70 µg	55 µg
Zinc	Part of enzymes, growth	Meat, shellfish, yeast, whole grains	15 mg	12 mg

Note: *Values are for adults 25 to 50 years of age. The requirements vary for children and pregnant or lactating women. See appendix D

^b mg - milligram, µg = microgram, IU - international unit.

^cµg vitamin A requirements are expressed in microgram of Retinol equivalents.

Reprinted from Franks and Howley 1989.

Glycemic Index Chart

PASTA

Linguine.....	46
Macaroni	45
Spaghetti	41
Rice pasta.....	92

RICE

White, long grain	50
Brown	55
Uncle Ben's converted	38

STARCHES

Bran Muffins	60
Blueberry Muffins	59
Carrot Muffins	62
Waffles	76
Bagels	72
Oat bran bread	47
Pumpernickel bread	41
White flour wheat bread	70
Whole-meal flour wheat bread	69

SWEETS/SNACKS

Honey	73
Mars Bar	68
Nacho chips	73
Potato chips	54
Peanuts	14
Popcorn	55

VEGETABLES

Carrots	71
Corn (sweet).....	55
Potatoes	
Baked	85
Mashed	73
Sweet	54
White	56
Pumpkin	75
Tomato Soup	34
Yams	51

Table 1. GI of Some Common CHO Rich Foods (5)

Foods with High GI (>70)

Food	Serving Size	GI	CHO (g)	Fat (g)
Graham wafers	4 biscuits	74	22	3
Bagel	1	31	13	1
French baguette	30 g	42	22	1
Kaiser roll	1 roll, 50 g	33	22	1
White bread	1 slice, 35 g	38	18	1
Bran flakes	3/4 cup	74	24	1

Adapted from: Foster-Powel, K. & Brand Miller, J. 1995. International Tables of Glycemic Index. American Journal of Clinical Nutrition 62:871s-893s.

Table 1. (continued)

Foods with High GI (>70)

Food	Serving Size	GI	CHO (g)	Fat (g)
Cheerios	30 g	74	20	2
Corn flakes	1 cup, 30 g	84	26	0
Grape nuts	1/2 cup, 58 g	71	47	1
Rice krispies	1 cup, 30 g	82	27	0
Total cereal	30 g	76	22	0
Cupcakes w/ icing & cream filling	1	73	26	3
Scone	1, 38 g	92	90	2
Rice, instant, cooked	1 cup	87	38	0
Rice, long grain, steamed	1 cup, 180 g	109	39	0
Brown rice, boiled	1 cup, 180 g	76	57	2
Premium soda crackers	3 biscuits	74	17	4
Rice cakes	2 cakes , 25g	82	21	1
Water crackers	5 biscuits, 25 g	78	18	2
Jelly beans	5, 10 g	80	9	0
French fries	120 g	75	49	26
Pretzels	50 g	83	22	1
Potatoes, baked	1, 120 g	93	15	0
Watermelon	1 cup	72	8	0
Pineapple, fresh	2 slices	66	10	0
Gatorade	1 cup	78	15	0
Lucazade	300 ml	95	56	0
Waffles	25 g	76	9	3
Lebanese white bread	1 slice	75	57	2.5
Sourdough bread	1 slice	54	14	1
Wholemeal bread	1 slice	69	14	1
Just right, cereal	3/4 cup	62	38	1
Froot loops cereal	1 cup	69	27	1
Nutri-grain cereal	1 cup	66	20	0
Oat bran, raw 1	1 tbsp	55	7	1
Shredded wheat	1/3 cup	67	18	0
Sponge cake	1 slice, 60g	46	32	4
Carrots, peeled, boiled	1/2 cup	49	3	0

Table 1. (continued)

Foods with High GI (>70)

Food	Serving Size	GI	CHO (g)	Fat (g)
Chicken nuggets	100 g	46	17	16
Orange cordial, diluted	1 cup	66	20	0
Croissant	1	67	27	14
Ice cream	50 g	61	10	6
Fruit cocktail, canned/Natural juice	1/2 cup	55	15	0
Kiwi fruit	1	52	8	0
Mango	1	55	19	0
Orange juice	1 cup	46	21	0
Strawberry jam	1 tbsp	51	18	0
Grapes, green	1 cup	46	15	0
Honey	1 tbsp	58	16	0
Raisins	1/4 cup	64	28	0
Bran Muffin	1	60	34	8
Pasta, linguine, cooked	1 cup	46	56	1
Pasta, rice vermicelli, cooked	1 cup	58	58	0
Pasta, cheese and tomato	2 slices, 230 g	60	57	27
Popcorn, low fat, popped	2 cups	55	10	2
Power Bar, Performance, chocolate	65 g	58	47	5
VO ₂ max energy bar, chocolate	65 g	49	45	2
Sucrose	1 tbsp	65	5	0
Sweet corn	1/2 cup	55	18	1

Foods with High GI (<70, >45)

Food	Serving Size	GI	CHO (g)	Fat (g)
Angel food cake	1 slice, 30 g	67	17	Trace
Banana	1 medium	55	32	0
Baked beans in tomato sauce	1/2 cup	48	21	1
Digestives biscuits	2	59	21	6
Rich tea biscuits	2	55	16	3
Pita bread	1 piece	57	38	1
Light rye bread	1 slice	68	23	1
Apple juice, unsweetened	1 cup	40	33	0
Dried apricots	5-6 pcs, 30 g	31	13	0

Table 1. (continued)

Foods with High GI (<45)

Food	Serving Size	GI	CHO (g)	Fat (g)
All bran cereal	1/2 cup	42	22	1
Chickpeas, boiled	120 g	33	22	3
Apple	1 medium	38	18	0
Cherries	20 pcs	22	10	0
Grapefruit	1/2 medium	25	5	0
Orange	1 medium	44	10	0
Pear	1 medium	38	21	0
Skim milk	1 cup	32	13	0
Pasta, fettucine, cooked	1 cup	32	57	1
Spaghetti, cooked	1 cup	41	56	1
Peanuts, roasted, salted	1/2 cup	14	11	40
Rice noodles, fresh	1 cup	40	44	0
Snickers	59 g bar	41	35	14
So good Soy drink	1 cup	31	12	9
Pizza, super supreme	2 slices, 268 g	36	72	31
Soya beans, boiled	1/2 cup	18	10	7
Yogurt, extra-lite strawberry	200 g	28	33	2
Prunes, pitted	6,40 g	29	24.8	0
Plain white chocolate	29 g	42	17.9	8.8

APPENDIX C

STAGE TRAINING - Level 2

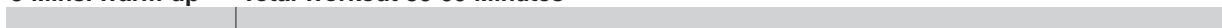
FAT BURNING ZONE-  Heart Rate _____

ANAEROBIC THRESHOLD-  Heart Rate _____

PEAK TRAINING-  Heart Rate _____

STAGE I 30-60 Minute workout.

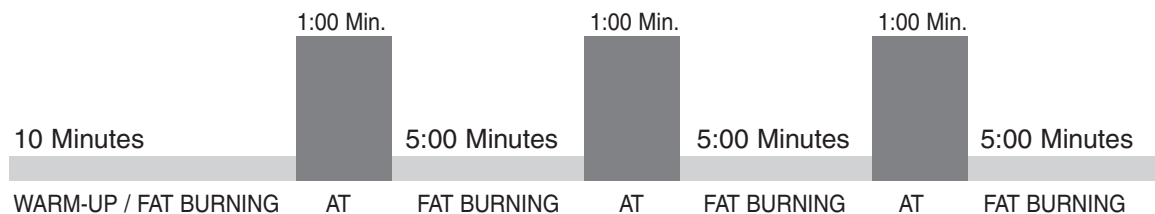
5 Mins. Warm-up Total Workout 30-60 Minutes



FAT BURNING / RECOVERY DAY

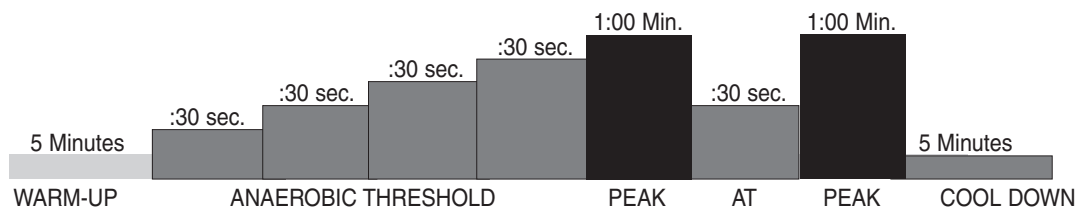
SPEED--	
INCLINE--	

STAGE II 28 Minute Interval. Repeat once per workout if needed.






SPEED--							
INCLINE--							

STAGE III 15 Minute Interval. Repeat 2, 3 or 4 times per workout.



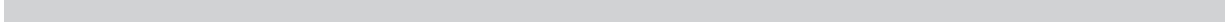
SPEED--							
INCLINE--							

Recovery Zone:  Heart Rate _____ Calories _____
 Anaerobic Threshold:  Heart Rate _____ Calories _____
 Peak Training:  Heart Rate _____ Calories _____

Low Intensity Day

30-60 minute workout.

5 min. Warm-up

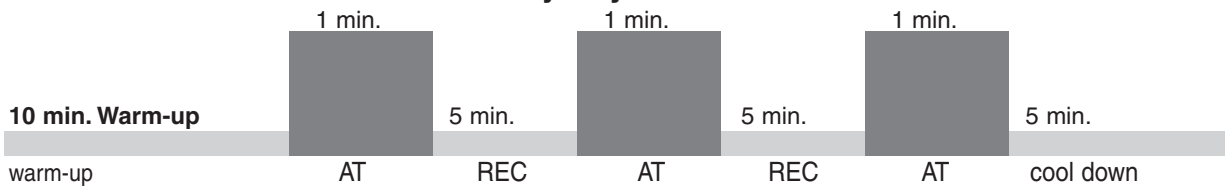


Recovery/Fat Burning day

WORKLOAD	
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Medium Intensity Day-A

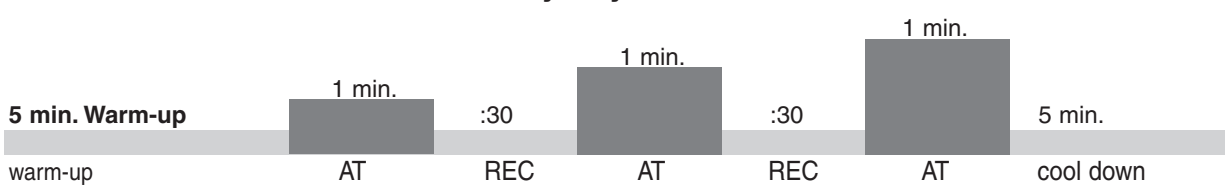
28 minute workout



WORKLOAD	
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Medium Intensity Day-B

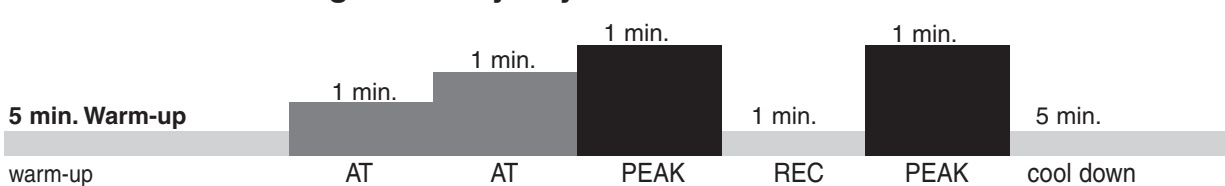
14 minutes



WORKLOAD	
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High Intensity Day-A

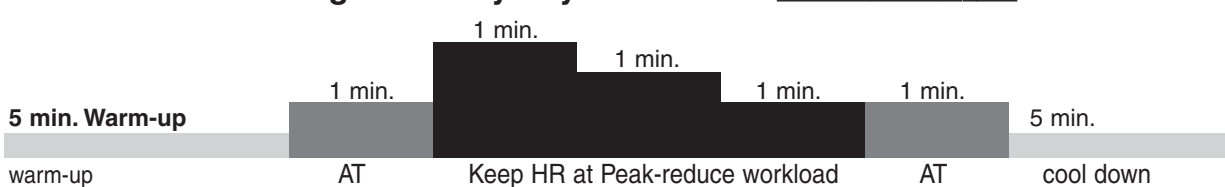
15 minute workout



WORKLOAD	
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High Intensity Day-B

15 minute workout



WORKLOAD	
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Recovery
AT
Peak

60 min. low intensity
recovery
cardio exercise
leg strength
fat burning

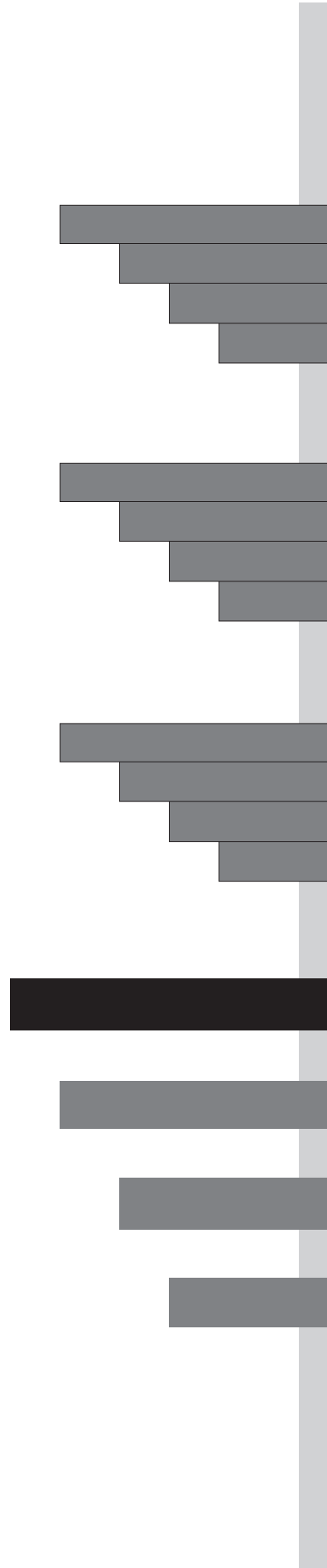


Time	10 min.	1m	1m	1m	10 min.	1m	1m	1m	1m	10 min.	1m	1m	1m	10 min.	1m	1m	1m	
Level																		
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Recovery
AT
Peak

60 min. med. intensity

recovery
fat burning
leg strength



Time	10 min.	:30	:30	:30	10 min.	:30	:30	:30	5 min.	:30	:30	:30	5 min.	:30	:30	:30	20 min.
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