Health Aspects of Endurance Training

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Health Aspects of Endurance Training

Volume Editors
O. Appenzeller and R. Atkinson, Albuquerque, New Mex.

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Contents

Advisory Board ....................................................... VII
Acknowledgement ..................................................... IX
Foreword ............................................................... X
Introduction .............................................................. XII

The Nervous System and Endurance Training

Jokl, E. (Lexington, Ky.): Sherrington on Movement ...................... 1
Appenzeller, O. and Atkinson, R. (Albuquerque, N. Mex.): Temperature Regulation and Marathon Running .............................................. 6
Carlow, T. J. and Appenzeller, O. (Albuquerque, N. Mex.): Endurance Training and the Nervous System .................................................. 18
Jokl, E. (Lexington, Ky.): Awakeness and Consciousness, Memory Traces, and the Upright Posture .................................................. 26
Worthen, D. M. (San Diego, Calif.): Effects of Exercise on the Visual System .... 38
Rockwell, E. (Spokane, Wash.): Epidemic Hyperpyrexia: Heat Stroke Affecting Distance Runners .......................................................... 47

The Heart, Blood Vessels, Nutrition and Endurance Training

Goss, J.E. (Albuquerque, New Mex.): Cardiovascular Adaptations to Endurance Training ................................................................. 56
Hooper, P.L. and Eaton, R.P. (Albuquerque, New Mex.): Exercise, High Density Lipoprotein and Coronary Artery Disease ................................. 72
Friedwald, V. (Honolulu, Hawaii): Echocardiographic Comparison before and after
Endurance Training................................................... 85

Contents VI

Bassler, T.J. (Inglewood, Calif.): Megavitamins and Megamiles: The Folklore of Marathoning........................................................................... 88
Costill, D.L. (Muncie, Ind.): Nutritional Requirements for Endurance Athletics ... 105

Behavior and Endurance Training

Kostrubala, T. (San Diego, Calif.): The Training of a Running Therapist....... 111
Jokl, V. (New Haven, Conn.): The Poetry of Running.............................. 116
Simonton, C. (Forth Worth, Tex.): Jogging and Cancer............................ 124
Pearson, L. (Forth Worth, Tex.): Jogging and Cancer.............................. 126

Locomotion and Endurance Training

Benas, D. and Jokl, P. (New Haven, Conn.): Shin Splints........................ 128
Mayfield, G. (Honolulu, Hawaii): Runner's Knee................................. 136
Parks, R.M. (Albuquerque, New Mex.): Injuries of the Endurance Athlete...... 140
Pagliano, J. (Long Beach, Calif.): Pathological Foot Types in Runners......... 155
Subotnick, S. (Hayward, Calif.): Biomechanics of Running...................... 169
Ullyot, J. (San Francisco, Calif.): Recent Progress of Women's Records........ 174
Fred, H.L. and Natelson, E.A. (Houston, Tex.): Grossly Bloody Urine of Runners 182

Subject Index.................................................................................. 189

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VIII

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Foreword

The publication of this volume marks the coming-of-age of American Sports Medicine. Its editor, Dr. Otto Appenzeller, Professor of Neurology and Medicine at the University of New Mexico School of Medicine, is singularly suited to the task: he is a physician of distinction, with special knowledge of clinical neurology; an expert on the normal and clinical physiology of the autonomic nervous system, on which he has written an authoritative monograph; and an outstanding athlete who has successfully participated in many marathon races.
Section I, devoted to The Nervous System and Endurance Training, deals with fundamental aspects of phenomenology; with a general discussion of 'Nervous System Function and Endurance Training'; with adaptation of thermoregulation to endurance training, including heat stroke affecting distance runners; and with two recently completed research studies on the effects of exercise on the visual system, with special reference to ophthalmological sequelae to hypoglycemia and postural hypotension.
Section II surveys recent advances in Exercise Cardiology and Nutrition. The concept of blood fats as coronary risk factors is currently undergoing a revision following the identification of the protective role of high-density lipoproteins (HDL). The discovery that plasma levels of HDL are elevated in endurance athletes represents an important contribution of clinical sports medicine to epidemiology. Likewise echocardiographic studies with marathon runners have significantly advanced knowledge on the normal and pathologic
physiology of the heart. The two concluding contributions in section II are concerned with nutritional aspects of endurance training, especially with its effect on water, carbohydrate, and fat metabolism. The controversial question whether large doses of vitamins aid athletic performances is raised by a pathologist with extensive personal experience of long-distance running. Section III, entitled Behavior and Endurance Training, opens with a description given by a well-known physician of the therapeutic value of long-distance running in psychiatric practice. An essay on 'Poetry of Running' serves as a much needed reminder of esthetic and cultural facets of athletics. Two articles – hypothetical and introspective – dwell upon thoughts on 'Jogging and Cancer'. Section IV contains contributions dealing with Locomotion and Endurance Training. It includes seven articles, four of them written by competent sports surgeons. Of considerable interest is a study of 'Shin Splints', a term whose diagnostic significance had not before been understood. A valuable other study is the cause of 'Grossly Bloody Urine of Runners'. Further reports in section IV are written by podiatrists with special knowledge of marathon running. The book corroborates the validity of the thesis that all adaptations to exercise and training are of a physiologic nature. Nonphysiologic situations, if encountered in endurance athletes, must be assessed and evaluated by the physician. Only thus can the question be answered whether – and to what extent – physiologic adaptations are of relevance in the prophylaxis and therapy of diseases.

Ernst Jokl

Introduction

Health is synonymous with cure of disease in the minds of physicians and lay persons when they become sick. The major advances in medicine, however, have not come from the ability to cure disease but from preventive measures which benefit large numbers of people by helping them avoid illness. Since the first heart transplant some 10 years ago, the prevailing emphasis on cure rather than prevention of disease has fortunately changed. Heart transplantation is clearly a superb technical feat but the expensive installation of preowned organs has focused attention upon the costs to society and to patients of such heroic surgical feats, and has pointed to better ways of health by preventing illness. At present, $ 120 billion is spent in the United States on
health per year. This compares with $10 billion in 1950. Predictions are that the bill for health care will rise to 55% of the gross national product before the end of the century. If this happens, practically no one will be able to afford to eat. All of us are now, and will be more so in the future, obsessed with health, but this obsession focuses upon cure rather than prevention of disease. Technology and scientific achievements have made cure of illness ‘possible in many instances’ but the cost to individuals and society is so great that soon no one will be able to afford this.

The overall death rate during the past 50 years has not changed greatly but the causes of death have changed and this can be attributed almost entirely to preventive rather than curative medicine. It is no longer common to die from smallpox, pneumonia, tuberculosis or other infections, but new diseases have taken their place. Heart disease, cancer, stroke and accidents make up about 85% of all deaths. Though, overall, the expectancy of life at birth has increased some 25 years since the early 1900s, it has increased only 7 years since that time for people over the age of 20. Though health expenditure has risen tremendously, life expectancy for children 1 year of age has changed very little since the early 1950s. Whether this small change is due to the horrendous expenditure on health is not clear. The great success of immunization against infection and protection of water supplies was not achieved by large financial outlays, but, on the contrary, by relatively modest expenditures. Even the advent of antibiotics, which are more expensive, has had little effect upon life expectancy of the young. Unfortunately, there is no vaccination or simple cure for the major causes of death including heart disease, cancer, stroke and accidents. Many, if not all, deaths due to these diseases can, however, be prevented, not by expensive medical manipulations but by comparatively simple measures. These major causes of death are largely due to poor dietary selection, physical inactivity, excessive alcohol intake and tobacco consumption.

Movement in the right direction is, however, clearly in the offing. Active participation in sports has spread to a section of the population which was previously totally inactive or content with sideline participation. Interest in dietary modifications has spawned advertising campaigns, sometimes not fully supported by scientific evidence, touting the healthfulness of organic ‘natural’ foods, and stores selling exclusively such dietary panaceas have multiplied across the country. More importantly, labeling of processed foods has enabled intelligent buyers to make choices in their diets and thus modify what they eat. The reduced intake in calories, salt and refined sugar has led to controversy between businesses whose interests lay in the consumption of these foods and consumers. Activists have taken up the cause of environmental
pollution and the release of dangerous agents into air, food and water. Contamination control of manufactured products by toxins and the demonstration that aerosol cans are not indispensible for survival has suggested that we might expect more success in avoiding diseases which are, to a large extent, caused by environmental pollutants.

We are becoming more demanding of doctors and health care facilities. We want a greater role in decisions. We want to be informed about our bodies but are still reluctant to accept more responsibility for our own health. Nevertheless, increased awareness of the need for health to assure a successful, fulfilling life has led to encouraging signs. Responsibility for well–being is now increasingly accepted by individuals rather than shifted entirely on professional health care.

Most people exposed to television and newspapers are realizing that weight reduction, alteration of cholesterol levels, and cessation of smoking are helpful in increasing life expectancy and improving health. But what is the evidence that these goals so intensely pursued by increasing numbers are worthwhile? Are they associated with improved well-being and longer life or are they merely a passing fashion? Scientific evidence for a relationship of changes in diet, lifestyle, and cessation of smoking to improved health is now coming in. The signs are there for those who care, but they are only beginning. For example, until 1964 the death rate from heart attacks was continuously increasing. The report on smoking and health issued in the same year and the advice of the American Heart Association to reduce saturated fats in the diet had some effect. The death rate from heart disease began to decline. Tobacco and animal fats consumed decreased also with reduction of deaths from heart disease. In 1975, for the first time, less than 1 million Americans died from cardiovascular disorders; a further drop was reported again in 1976. There is scientific evidence that cigarette smoking is the major cause of cancer of the lung and that chronic bronchitis and emphysema are about 18 times more frequent in those who smoke. Smoking, in conjunction with hypertension and elevated blood cholesterol, further increase risk for cardiovascular disease and stroke. The evidence for altering one's lifestyle in other ways, however, to avoid the common modern killers is not at hand. Do we need to wait for scientific evidence before using the available pointers to improve our health and take responsibility for our own well-being? We clearly need now to persuade everyone of his important role in determining the quality of his own life and its length. The choice should be made now. This book may, with scientific evidence and anecdotal accounts convince readers of the usefulness of exercise in the struggle for healthful survival.
We consider ourselves fit because of athletic competition in school, participation as spectators in television sports, exposure to Little League and other activities. As adults we, perhaps, think of exercise as involving weight lifting, muscle building, or an occasional game of tennis. These activities tend to place great demands on the cardiovascular system and in the untrained may be dangerous.

A variety of reasons often compel us to take up exercise. It does provide companionship. It is becoming increasingly fashionable. It is said to be good for your health. It makes you feel better and perhaps also helps reduce weight. Unfortunately, very few people take up exercise to stay fit, but this is what the body is designed to do. It is clear that muscles including the heart muscle have the unique capacity to improve function with use. This is notably different from mechanical contraptions with which we are surrounded and which deteriorate with use. Continuous muscle activity is necessary for stronger and more efficient muscular work. Anyone who has spent a few days in bed knows the fatigue and weakness present on trying normal activities again. Most

Introduction XV

muscles after even a short period of rest atrophy and their performance deteriorates. We are made to move; our bodies have not changed in design or purpose but what we do has. We no longer walk or run to make a living, we do not exert ourselves to provide food or shelter but sit at desks or in cars. We amuse ourselves while sitting or watch a few hardy individuals exert themselves while we are motionless in our easy chairs. Even household chores have become so mechanized that the only thing burnt up is not human calories but energy. In the 1920s the description of an American city and its citizens was given in the following words: 'The citizen gets about the city by bicycle, 15-minute street car service, regular bus service and interurban lines.' Now the description of the same city will probably show that its citizens have no alternatives to sitting motionless in their personal automobiles. Even in more recent times, Los Angeles, for example, was said to have had one of the best mass transit systems in the world. Now, to cite experts, 'Los Angeles has become an undifferentiated mass of houses walled off into sectors by many-laned expressways. More than a third of Los Angeles is consumed by grotesque transportation facilities; two-thirds of central Los Angeles is occupied by streets, freeways, parking facilities, garages. This is space eating with a vengeance'. We pour billions of dollars into highway systems where the automobile reigns supreme and pedestrians or bicycles are barred. All this leads to atrophy of our most extensive tissue, namely our muscles which should be used instead for locomotion. This persistent immobility which now extends from the cradle to the grave has led to extreme unfitness which has extracted a heavy toll in
health and well-being. If you care to look critically you will see on the streets, in offices, factories, wherever human beings aggregate and perhaps even in solitude in the mirror, examples of grotesque unfitness. Those with obesity, back pain because of flabby abdominal and back muscles, those who are chronically tired, who become breathless on exertion when climbing even one flight of stairs, all those have failed to take care of the tissue which forms the greatest mass of the human body. They become victims of heart attacks early. They compound their immobility by exposing themselves to the ravaging effects of tobacco, alcohol and pollution. Many agree that physical inactivity and reliance upon the automobile rather than human power for locomotion is responsible for the general ill health which is so widespread at the present time in the Western World.

There is, nevertheless, considerable controversy about the role of physical fitness in the genesis of heart disease. Studies since the early 1950s have shown that in large populations who are physically active, exercise or physical work is one of the main heart disease prevention factors. Those who engage in

Introduction XVI

regular aerobic or endurance type of activity seem to live longer, have fewer illnesses and function better. The sedentary lifestyle is increasingly recognized as a major risk factor which can easily be modified. Moreover, those that engage in regular aerobic activity are more likely to abandon habits detrimental to physical well-being such as smoking, overeating and excessive alcohol intake. Exercise seems to be beneficial but it is a complex set of activities which needs to be prescribed for the individual. Exercise must be approached in a safe way to make it rewarding for participants and it is clear that physicians and other health professionals have a great deal to offer to make the choice easy and to promote fitness. Many would-be participants are often misled by well-meaning 'experts' into excessive strenuous initial exertion which tends to do nothing else but persuade them of the difficulties in attaining eventual fitness through aerobic activities. It is the purpose of the present book, therefore, to bring together authorities in various fields of medicine and podiatry to discuss ways and means of achieving physical fitness without injury and to help persuade those still sitting on the fence of inactivity to get moving. Many contributions are based on established scientific evidence, others are anecdotal. Nevertheless, one need not wait for incontrovertible truth to delay training, for in those approaching middle age such delay may be fatal. Most contributors are naturally physical fitness enthusiasts and marathoni-
is used to convince friends and acquaintances of the righteousness of such activities. Many long-distance runners also show withdrawal symptoms and guilt if they miss training. It is not the purpose of this book to convert everybody to the 'addiction of long-distance running'. On the contrary, the book is intended to help avoid injury for those who are prepared to maintain fitness by a little effort. It should give insight into the benefits of aerobic training and contribute to the prevention rather than cure of many 'degenerative' diseases. The convert is often exposed to ridicule by those who sit, eat, and make merry, but it is pretty much the case of the man who laughs being the one who has not heard the bad news.

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Albuquerque, New Mexico
April 1978