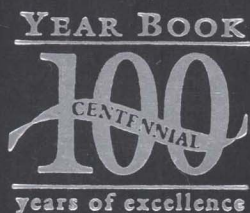


YEAR BOOK®

YEAR BOOK OF SPORTS MEDICINE® 2001



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The Year Book of SPORTS MEDICINE®

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Statement of Purpose

The YEAR BOOK Series

The YEAR BOOK series was devised in 1901 by health professionals who observed that the literature of medicine and related disciplines had become so voluminous that no one individual could read and place in perspective every potential advance in a major specialty. That has never been more true than it is today.

More than merely a series of books, YEAR BOOK volumes are the tangible results of a unique service designed to accomplish the following:

- to *survey* a wide range of journals
- to *select* from those journals papers representing significant advances and statements of important clinical principles
- to provide *abstracts* of those articles that are readable, convenient summaries of their key points
- to provide *informed commentary* about their relevance

These publications grow out of a unique process that draws on the talents of outstanding authorities in clinical and fundamental disciplines, trained literature specialists, and professional writers—all supported by the resources of Mosby, the world's preeminent publisher for the health professions.

The Literature Base

Mosby and its editors survey approximately 500 journals published worldwide, covering the full range of the health professions. On an annual basis, the publisher examines usage patterns and polls its expert authorities to add new journals to the literature base and to delete journals that are no longer useful as potential YEAR BOOK sources.

The Literature Survey

More than 250,000 peer-reviewed articles per year are scanned systematically—including title, text, illustrations, tables, and references—by the publisher's team of literature specialists. Each scan is compared, article by article, to the search strategies that the publisher has developed in consultation with the nearly 200 outside experts who form the pool of YEAR BOOK editors. A given article with broad scientific or clinical implications may be reviewed by any number of YEAR BOOK editors, from one to a dozen or more, regardless of the discipline for which the paper was originally published. In turn, each editor who receives the article reviews it to determine whether it should be included in his or her volume. This decision is based on the article's inherent quality, its relevance to readers of that YEAR BOOK, and the editor's goal to represent a comprehensive picture of a given field in each volume of the YEAR BOOK. In addition, the editor indicates when to include figures and tables from the article to help the YEAR BOOK reader better understand the information.

Of the quarter million articles scanned each year, only 5% are selected for publication within the YEAR BOOK series, thereby assuring readers of the high value of every selection.

The Abstract

The publisher's abstracting staff is headed by a seasoned medical editing professional and includes individuals with extensive experience in writing for the health professions. When an article is selected for inclusion in a YEAR BOOK, it is assigned to a member of the abstracting staff. The abstractor, guided in many cases by notations supplied by the physician editor, writes a structured, condensed summary designed to rapidly communicate to the reader the essential information contained in the article.

The Commentary

The YEAR BOOK editorial boards, sometimes assisted by guest contributors, write comments that place each article in perspective. This provides the reader with insights from authorities in each discipline that point out the value of the article and that often reflect the authority's thought processes in assessing the article.

Additional Editorial Features

The editorial boards of each YEAR BOOK organize the abstracts and comments to provide a logical and satisfying sequence of information. To enhance the organization, editors also provide introductions to sections or individual chapters, comments linking a number of abstracts, citations to additional literature, and other features.

The published YEAR BOOK contains enhanced bibliographic citations for each selected article, including extended listings of multiple authors and identification of author affiliations. Each YEAR BOOK contains a Table of Contents specific to that year's volume. From year to year, the Table of Contents for a given YEAR BOOK may vary, depending on developments within the field.

Every YEAR BOOK contains a list of the journals from which articles have been selected. This list represents a subset of approximately 500 journals surveyed by the publisher and occasionally reflects a particularly pertinent article from a journal that is not surveyed routinely.

Finally, each volume contains a comprehensive subject index and an index to authors of each selected article.

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Year Book of Rheumatology, Arthritis, and Musculoskeletal Disease™: Drs Panush, Hadler, Hellmann, Lahita, Lane, and LeRoy

Year Book of Sports Medicine®: Drs Shephard, Alexander, Kohrt, Nieman, Torg, and Mr George

Year Book of Surgery®: Drs Copeland, Bland, Cerfolio, Deitch, Eberlein, Howard, Luce, Seeger, and Souba

Year Book of Urology®: Drs Andriole and Coplen

Year Book of Vascular Surgery®: Dr Porter



Journals Represented

Mosby and its editors survey approximately 500 journals for its abstract and commentary publications. From these journals, the editors select the articles to be abstracted. Journals represented in this YEAR BOOK are listed below.

Allergy
American Family Physician
American Journal of Cardiology
American Journal of Clinical Nutrition
American Journal of Emergency Medicine
American Journal of Epidemiology
American Journal of Hypertension
American Journal of Kidney Diseases
American Journal of Medicine
American Journal of Physiology
American Journal of Roentgenology
American Journal of Sports Medicine
Anesthesiology
Annals of Internal Medicine
Archives of Environmental Health
Archives of Family Medicine
Archives of Ophthalmology
Archives of Pediatrics and Adolescent Medicine
Archives of Physical Medicine and Rehabilitation
Arthroscopy
British Journal of Sports Medicine
British Medical Journal
Chest
Circulation
Clinical Biomechanics
Clinical Chemistry
Clinical Orthopaedics and Related Research
Clinical Radiology
Diabetes
Diabetes Care
European Respiratory Journal
Injury
Injury Prevention
International Journal of Epidemiology
International Journal of Obesity
International Journal of Sports Medicine
Journal of Applied Physiology
Journal of Athletic Training
Journal of Bone and Joint Surgery (American Volume)
Journal of Bone and Joint Surgery (British Volume)
Journal of Bone and Mineral Research
Journal of Clinical Endocrinology and Metabolism
Journal of Gerontology. Series A Biological Sciences and Medical Sciences
Journal of Human Hypertension
Journal of Orthopaedic Research
Journal of Orthopaedic and Sports Physical Therapy
Journal of Pain and Symptom Management

Journal of Rheumatology
Journal of Trauma: Injury, Infection, and Critical Care
Journal of Ultrasound in Medicine
Journal of the American Academy of Orthopaedic Surgeons
Journal of the American Board of Family Practice
Journal of the American College of Cardiology
Journal of the American Geriatrics Society
Journal of the American Medical Association
Lancet
Mayo Clinic Proceedings
Medicine and Science in Sports and Exercise
Neurosurgery
Obstetrics and Gynecology
Occupational and Environmental Medicine
Orthopedics
Physician and Sportsmedicine
Respiratory Medicine
S.A.M.J./S.A.M.T - South African Medical Journal
Sports Medicine

STANDARD ABBREVIATIONS

The following terms are abbreviated in this edition: acquired immunodeficiency syndrome (AIDS), cardiopulmonary resuscitation (CPR), central nervous system (CNS), cerebrospinal fluid (CSF), computed tomography (CT), deoxyribonucleic acid (DNA), electrocardiography (ECG), health maintenance organization (HMO), human immunodeficiency virus (HIV), intensive care unit (ICU), intramuscular (IM), intravenous (IV), magnetic resonance (MR) imaging (MRI), and ribonucleic acid (RNA).

NOTE

The YEAR BOOK OF SPORTS MEDICINE is a literature survey service providing abstracts of articles published in the professional literature. Every effort is made to assure the accuracy of the information presented in these pages. Neither the editors nor the publisher of the YEAR BOOK OF SPORTS MEDICINE can be responsible for errors in the original materials. The editors' comments are their own opinions. Mention of specific products within this publication does not constitute endorsement.

To facilitate the use of the YEAR BOOK OF SPORTS MEDICINE as a reference tool, all illustrations and tables included in this publication are now identified as they appear in the original article. This change is meant to help the reader recognize that any illustration or table appearing in the YEAR BOOK OF SPORTS MEDICINE may be only one of many in the original article. For this reason, figure and table numbers will often appear to be out of sequence within the YEAR BOOK OF SPORTS MEDICINE.

Publisher's Preface

The publication of the 2001 YEAR BOOK series marks the 100th anniversary of the original Practical Medicine Series of Year Books. To commemorate this milestone, each 2001 Year Book includes an anniversary seal on the cover. The content and format of the Year Books remain unchanged from the beginning of the last century—each volume consists of abstracts of the best scholarly articles of the year, accompanied by expert critical commentaries.

The first Year Book appeared in 1900 when Gustavus P. Head, MD, produced the first *Year Book of the Nose, Throat and Ear*, a volume consisting of highlights from the previous year's best literature, enhanced by expert observations. Dr Head assembled a small group of distinguished physicians to serve as editors, and the first series of Year Books was published in 1901. The first volumes of the Year Book series—*General Medicine, General Surgery, The Eye, Gynecology, Obstetrics, Materia Medica and Therapeutics, Pediatrics, Physiology, and Skin and Venereal Diseases*—appeared at monthly intervals, with 10 volumes published in 1 year. The entire series was met with critical enthusiasm.

In 1904, Dr Head's brother, Cloyd, assumed responsibility for the management of the Year Books. In 1905, the volumes began to appear at regular intervals during the calendar year instead of on a monthly basis. By World War I, the Year Books had been established as an authority on medical and surgical progress.

The postwar period brought about a significant change in the practice of medicine: specialization. To accommodate the rise of specialization in medicine, the Year Books were now sold as individual volumes rather than only as a complete set. This change brought about a tremendous response and sales of the books increased. In 1922, the Year Books became even more specialized, as the books now had different editors for the different medical specialties covered in each volume. Later, in 1933, the title of the series changed from the Practical Medicine Series of Year Books to the Practical Medicine Year Books to reflect these new designs.

The Year Books have grown significantly from the first 10-volume series in 1901 to a diversified series of 32 volumes in 2001. That the Year Book series is the only series of their kind to have survived is a testament to the vision and commitment of its founders. Some minor changes in format and design have occurred throughout the years, but the mission of the Year Book series—to provide a record of exceptional medical achievements distinguished by the reflections of many of the great names in medicine today—has remained constant.

Introduction

What is new for Sports Medicine in 2001? This year has seen the completion of the human genome project, which offers the prospect of exciting new advances both in our understanding of exercise physiology and in the treatment of a variety of medical conditions. But for the present, a plethora of publications from a consortium of exercise physiologists who have been involved in the human genome project has yielded only a limited amount of new information, and it may be many years before the full potential of this monumental project is realized.

Progress has continued in what may appear more pedestrian fields. This volume offers a wealth of new ideas for dealing with shoulder, knee, and ankle injuries. Orthopedic surgeons are beginning to realize and correct limitations in their use of the technique of meta-analysis. Studies of injury prevention have looked at women's gymnastics, fast-pitch softball, in-line skating, baseball, golf, pole-vaulting, rock climbing, athletes with disabilities, and the use of headgear in rodeos, among other issues. Surprisingly, the cognitive status of football players who have suffered cranial trauma seems influenced by APOE genotype. Recombinant human bone morphogenetic protein and radiofrequency energy are advocated for the repair of articular cartilage defects. Differences in nitric oxide production may explain differences in healing capacity between the anterior cruciate, posterior cruciate, and medial collateral ligaments. Walking poles reduce forces on the knee and redistribute effort around the body musculature during hiking. Prophylactic NSAIDs can reduce muscle inflammation but may also limit the beneficial effects of training. Excessive passive stretching before an event may actually reduce performance. An aerobic training program is effective in reducing back pain. Reattachment of the gluteus minimus tendon is strongly recommended after hip surgery. Techniques of swimming that reduce the risk of shoulder impingement are described. Girls seem to experience more injuries than boys in a number of sports.

The sprint performance of swimmers seems to be influenced by muscle shape and fascicle length. Healing of muscular strains may be helped by the use of growth factors. Strengthening of the myotendinous junction occurs after the injuries that are associated with eccentric exercise. A functional testing algorithm is developed that gives an integrated approach to assessment and rehabilitation of the shoulder. Care must be taken when rehabilitating patients with a weak rotator cuff, as certain limb positions can allow the humeral head to migrate and impinge on the muscle that is being exercised. Close-chain seems somewhat superior to open-chain kinetic exercise in the treatment of patellofemoral pain. Please continue for a more conservative use of radiography in knee injury. The use of meniscal arrows may lead to cyst formation. Guidelines are proposed for nonoperative rehabilitation of some patients who wish to return to high-level activity quickly after anterior cruciate ligament injuries. Cadaver studies show that hamstring grafts are stronger than patellar tendon grafts; if the patellar tendon is used for repair of the anterior cruciate ligament, it seems

helpful to twist it. Meniscal allografts may be unsuccessful because the grafts do not match the 3-dimensional geography of the recipient's knee. Some ankle stabilizers adversely affect joint kinematics.

The potential for duodenal rupture during contact sports has attracted attention, as has the potential for eye injury in paintball sports. Increased muscle hypertrophy has been reported in the elderly when resistance training was accompanied by occlusion of the local blood supply. The search continues for forms of exercise that will maintain bone mass in the space traveler. Experimental respiratory unloading suggests that the use of economical breathing techniques could enhance an athlete's performance substantially. The quantity of exercise needed to confer cardiovascular benefit continues to be a hot topic. The level of fitness that is realized appears to be more important than the volume of physical activity that is undertaken, even if the volume of activity is measured accurately with the use of the high-precision doubly labelled water technique. Three 10-minute sessions of exercise are shown to yield a substantial reduction in systemic blood pressure, but aerobic exercise does not always reduce non-dipper type hypertension. If the US population could be brought to even a moderate level of fitness, this could save the US economy as much as \$77 billion per year. A new meta-analysis challenges traditional norms for maximal heart rate. A simple basis of exercise prescription for the primary care physician is advanced. The ACC/AHA Guidelines for exercise testing are critiqued. Q-T dispersion seems a useful indication of coronary stenosis. The traditional method of calculating mean arterial pressure is shown to require adjustment during vigorous exercise. Concentric exercise imposes more cardiovascular stress than eccentric contractions. Indirect measurements of cardiac output are shown to be more precise if the determination is based upon oxygen intake rather than CO₂ output. Left ventricular shape is confirmed as a useful criterion in distinguishing physiologic from pathologic hypertrophy. Doubt is cast on the hypothesis that homocysteine increases the risk of cardiovascular disease by modulating plasma NO levels. Home cardiac rehabilitation programs can in some circumstances prove more effective than treatment at a central facility. Patients with a small blood pressure response to exercise do not respond well to cardiac rehabilitation. A combination of exercise training and arginine supplements can correct endothelial dysfunction in congestive heart failure.

An initial resting hypoglycemia predisposes patients with type 1 diabetes to hypoglycemia during exercise. Serum insulin drops by 5% to 6% for every 30 minutes of moderate intensity physical activity performed per day. The fat depots of the thighs seem resistant to an exercise program in women. However, postmenopausal athletes avoid an accumulation of both central and total body fat. Administration of growth hormone greatly increases fat loss, apparently by permitting a greater 24-hour energy expenditure. There is growing evidence that muscle may be the source of increased fatty acid utilization after training. Physical activity sustains both skeletal muscle oxidase activity and nitric oxide availability in elderly people. Moreover, elderly exercisers do not increase the fat content of their

muscles. A longitudinal study suggests a faster age-related loss of muscle strength than is inferred from cross-sectional analyses. High-resistance strength training causes more muscle damage in older than in younger women. Bone mineral gains from an exercise program are reversed quite rapidly once training is stopped. A preliminary study has found no effect of genotype on bone mineralization over a 4-week exercise program. However, decreasing levels of androgens seem related to osteoporosis in men. Physical activity seems to increase the risk of duodenal ulcers. The gastric ulceration associated with use of NSAIDs can be averted if such drugs are administered as a topical patch. Regular exercise enhances the quality of life in patients who are undergoing hemodialysis. Progressive exercise seems a better approach than testosterone as a means to restoring muscle mass in patients with AIDS. Exercise does not seem to protect against prostatic cancer, and it may even increase the risk of testicular cancer. On the other hand, *in vitro* antileukemic activity is increased in endurance athletes. Exhausting exercise has profound effects on calcium signaling in lymphocytes.

Data standardization seems critical to age and gender comparisons of muscle strength. Muscle inflammation after eccentric exercise seems less likely in women than in men. Animals show an age-related decline in habitual physical activity, and in humans this is particularly marked at adolescence. The energy cost of treadmill running is higher in adolescent girls than in women, even after equating for body size. Active children in general demonstrate a more favorable lifestyle than their sedentary peers, although this may be related in part to the influence of socioeconomic status on physical activity levels. Further, participation in college athletics is sometimes associated with binge drinking. The inverse relationship between physical fitness and plasma fibrinogen levels is apparent even in childhood. Childhood jumping has a positive influence in reducing the risk of osteoporosis as an adult. A meta-analysis challenges the view that regular physical activity reduces the aging of functional capacity. Participation in a regular activity program twice per week is enough to decrease the active leisure of older subjects on intervening days.

The US National Athletic Trainers' Association has published useful lightning safety guidelines. Appropriately timed intermittent exposure to bright light seems an effective method of resetting circadian rhythms. Criteria for allowing older adults to climb high mountains are reviewed. Increases in fibrinogen synthesis seem related more to the physical activity of climbing than to altitude *per se*. Previous suggestions that calcium antagonists are helpful in preventing mountain sickness have not been confirmed. Forearm sweating during muscular contractions has a predominantly nonthermal origin. Heat exposure increases the production of cytokines, particularly interleukin 6. Application of ice (frozen chips!) by a patient led to clinical frostbite.

Nine months of endurance training are shown to lower plasma concentrations of C-reactive protein, suggesting an anti-inflammatory effect. Acute vitamin C supplementation does not seem to reduce muscle soreness. Plasma leptin concentrations do not change with an increase of

training volume. Physical activity increases the tendency to gastroesophageal reflux, but this is not further exacerbated by caffeine-containing drinks. An increase of amino acid oxidation during exercise is confirmed, but the rate of muscle glycogen resynthesis is not enhanced by ingestion of protein. There is growing concern about the side-effects of indiscriminate creatine administration. Creatine supplements are suggested as an explanation of a case of acute quadriceps compartment syndrome and rhabdomyolysis. About 8% of students are now taking creatine supplements, and this practice is particularly common among football players. Vitamin E supplements may limit leakage of muscle enzymes during strenuous effort. A urinary test is proposed for systemic administration of salbutamol. Anabolic steroids may inhibit the growth of cardiac capillaries and also shorten life expectancy. Doping experts have proposed new methods of detecting abuse of recombinant erythropoietin and growth hormone.

This is just a brief preview of the many exciting topics covered in the YEAR BOOK OF SPORTS MEDICINE for 2001. I hope you find this eclectic selection of the current literature as fascinating as I have.

Roy J. Shephard, MD, PhD, DPE

Physical Activity Determines the Quality of Life in Old Age

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Epidemiologists who have sought to summarize the health benefits of regular physical activity have commonly focused on the quantity of life, or reductions in the relative risk of death, rather than on the quality of survival, probably because indices of mortality are easily measured and seem to be relatively incontrovertible statistics. However, if we ask people why they exercise, they rarely mention the prospect of living longer. The usual response is that they “feel better,” or if we may paraphrase their statement “the quality of life is enhanced.”

The exerciser usually focuses on the immediate enhancement of mood state, but there is growing evidence that long-term changes in the quality of life are at least an equally important argument for engaging in regular physical activity, exercise and sport.¹ An increase in the quality of life during the retirement years augments quality-adjusted life expectancy, and this seems to be a greater benefit than any extension of mere calendar life years.

We first look briefly at current concepts of “quality of life” and specific issues associated with the performance of various types of physical activity. After considering the impact of physical activity on calendar life span, we summarize some issues associated with assessment of the quality of life, and finally, we estimate the potential gains in quality-adjusted life expectancy for those who engage in regular physical activity.

Concepts of Quality of Life

An individual's overall quality of life on any given day is influenced by personal perceptions of a wide variety of factors. These include (on an ascending scale) the adequacy of basic physical functions such as mobility and the capacity for self-care, a reasonable level of intellectual and emotional function, the extent of any pain or other symptoms, social dimensions such as opportunities for intimacy and social contact, opportunities for appropriate role performance within the family, the community and the work-place, and feelings of comfort, well-being, and self-efficacy. The impact of, for example, a given level of physical disability depends on the temperament of the individual, the choice of coping mechanisms, the environment in which the person must operate, and the extent of support from a spouse or caregiver.

For everyone, the quality of life is located somewhere along a continuum. At one end of the scale lies an optimal quality of life. This can be assigned an arbitrary multiplier of 1.00. If this quality of life were to be enjoyed throughout a calendar year, the individual concerned would gain one quality-adjusted life-year of survival. For a person at the other end of

the scale, the quality of life has dropped to near zero. The affected individual loses the will to survive, refuses to eat, or presses for euthanasia. We can assign an arbitrary multiplier of zero to such a state. Too often, a doctor who is faced with this circumstance attempts to extend the patient's life span by drastic and/or costly measures, ranging from forced or IV feeding to heart/lung transplants. Such an approach may increase the patient's longevity, but it does nothing to augment the individual's quality-adjusted life expectancy.

Sometimes, observers attempt to distinguish the health-related quality of life from the social and environmental factors that influence the life experience. But our patients do not draw such a nice distinction. Social and environmental factors such as aids for daily living and the support of caregivers exert a strong influence on a person's perceived quality of life and health status. Interventions such as group participation to increase habitual physical activity can influence not only medical outcomes but also the social and psychological dimensions of quality of life. It is thus best to regard the quality of life as a Gestalt, which integrates over an entire life span the individual's instantaneous appraisal of all factors influencing the life experience, from ill health and physical disability to a sense of self-efficacy and pride in performance, and embracing such psychosocial influences as the extent of independence and opportunities for social contacts.

Type of Physical Activity and Quality-Adjusted Life Expectancy

The influences of an increase in physical activity on calendar and quality-adjusted life expectancy are not necessarily equivalent for sport, exercise, and physical activity. Specific issues associated with involvement in competitive athletics, prescribed exercise, and "active living" are discussed below.

Specific Issues Associated With Competitive Athletics

Competitive athletes are strongly selected in terms of their body build,² and this has important practical implications in terms of their calendar life expectancy. On average, for example, a muscular, mesomorphic football player lives several years less than an ectomorphic long-distance runner. Competitive athletes are also strongly selected in terms of their personality traits; these traits not only favor successful participation in sport, but they also increase the risk of violent death, thereby tending to offset any favorable effects of vigorous physical activity on life expectancy.

There is no evidence that recreational runners suffer more from osteoarthritis than do their sedentary peers,³ but participation in competitive sport and associated musculoskeletal injuries can predispose to osteoarthritis,^{4,5} with adverse implications for the individual's long-term quality of life. Comparisons of quality-adjusted life expectancy with matched sedentary populations are further complicated because athletes and habitual exercisers are often unusually health conscious. Their risks of chronic disease and a resulting poor quality of life are reduced by adoption of a prudent diet, the ingestion of megadoses of vitamins, and abstention from cigarette