

PHYSIOLOGY OF SPORTS AND EXERCISE

BEV LOTT
BLAIR FRASER



Physiology of Sports and Exercise

Bev Lott
Blair Fraser

ETP
ED - TECH PRESS
www.edtechpress.co.uk

Published by ED-Tech Press,
54 Sun Street, Waltham Abbey Essex,
United Kingdom, EN9 1EJ

© 2019 by ED-Tech Press

Physiology of Sports and Exercise
Bev Lott and Blair Fraser

Includes bibliographical references and index.
ISBN 978-1-78882-382-1

All rights reserved. No part of this publication may be reproduced, stored in retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without either the prior written permission of the publisher or a license permitting restricted copying in the United Kingdom issued by the Copyright Licensing Agency Ltd., Saffron House, 6-10 Kirby Street, London EC1N 8TS.

Trademark Notice: All trademarks used herein are the property of their respective owners. The use of any trademark in this text does not vest in the author or publisher any trademark ownership rights in such trademarks, nor does the use of such trademarks imply any affiliation with or endorsement of this book by such owners.

Unless otherwise indicated herein, any third-party trademarks that may appear in this work are the property of their respective owners and any references to third-party trademarks, logos or other trade dress are for demonstrative or descriptive purposes only. Such references are not intended to imply any sponsorship, endorsement, authorization, or promotion of ED-Tech products by the owners of such marks, or any relationship between the owner and ED-Tech Press or its affiliates, authors, licensees or distributors.

British Library Cataloguing in Publication Data.

A catalogue record for this book is available from the British Library.

For more information regarding ED-Tech Press and its products, please visit the publisher's website
www.edtechpress.co.uk

TABLE OF CONTENTS

Preface

xi

Chapter 1	Understand the Human Physiology	1
	History	1
	Women in Physiology	3
	Subdisciplines	4
	Human Physiology	4
	Composition	5
	Anatomy	72
	Physiology	73
	Health and Disease	73
	Society and Culture	74
	Professional Study	74
	Depiction	74
	History of Anatomy	74
	History of Physiology	74
Chapter 2	Exercise Physiology	76
	Energy Expenditure	76
	Metabolic Changes	77
	Rapid Energy Sources	77
	Plasma Glucose	77
	Oxygen	79
	Dehydration	79
	Other	80

Brain	80
Cerebral Oxygen	81
Glucose	81
Hyperthermia	81
Fatigue	81
Intense Activity	82
Endurance Failure	82
Central Governor	82
Other Factors	83
Cardiac Biomarkers	83
Human Adaptations	83
Selective Breeding Experiments with Rodents	84
Exercise-induced Muscle Pain	84
Education in Exercise Physiology	84
Curriculum	85
Chapter 3 Allied Health Professions	87
History	87
Training and Education	88
Professions	88
Anesthesiologist Assistant	89
Anaesthetic Technician	93
Athletic Trainer	94
Autotransfusionist	97
Audiology	98
Cardiovascular Technologist	102
Medical Laboratory Scientist	103
Medical Transcription	109
Clinical Coder	117
Clinical Officer	121
Dental Hygienist	122
Nutritionist	123
Cardiovascular Technologist	123
Emergency Medical Technician	124
Environmental Health Officer	125
Lactation Consultant	127
Medical Assistant	127
Medical Radiation Scientist	128
Music Therapy	129
Surgical Technologist	130
Sonographer	131
Respiratory Therapist	131
Dialysis	131

Rehabilitation Counseling	132
Recreational Therapy	132
Radiographer	132
Radiation Therapist	133
Physical Therapy	134
Physician Assistant	135
Phlebotomy	135
Perfusionist	136
Pedorthist	136
Paramedic	136
Clinical Neurophysiology	137
Occupational Therapy	138
Operating Department Practitioners	138
Optometry	140
Orthotics	140
Orthotics	141
Employment Projections	141
Chapter 4 Emergency Medical Services	143
History	144
Service Providers	146
Purpose	149
Levels of Care	149
Basic Life Support (BLS)	150
Advanced Life Support (ALS)	152
Traditional Health Care Professions	153
Prehospital Delivery of Care	155
Strategies for Delivering Care	156
Models of Care	157
Clinical Governance	158
Chapter 5 Nutrition	160
Meaning and Definition of Sports Nutrition	160
Supplements	160
Factors Influencing Nutritional Requirements	163
Role of Nutrition in Sports	164
Why Study Sports Nutrition?	165
Why Sports Nutrition is Important?	165
What are the Basic Nutrients?	165
Fuel for Exercise	168
Impact of Other Factors Responsible for Food Choices During an Event	170

Ergogenic Aid	171
Basic Nutrition Guidelines	172
Food Groups and Healthy Nutrition: My Plate	172
Food Groups and Healthy Nutrition: USDA Recommendations	173
Food Groups and Healthy Nutrition: Guidelines to Get You Going	173
Nutrients	174
Types of Nutrient	174
Essential and Non-essential Nutrients	176
Deficiencies and Toxicity	176
Carbohydrate	177
Function of Carbohydrates	177
Simple vs. Complex Carbohydrates	177
Sugars, Starches and Fibres	178
Good Carbs vs. Bad carbs	179
Glycemic Index	179
Carbohydrate Benefits	179
Carbohydrate Deficiency	181
Protein	181
Fats	182
Vitamins	183
Minerals	184
Water Dehydration and Fluids Replacement	185
Water Dehydration	185
Fluid Replacement	188
Classification of Food	189
Carbohydrates	190
Organic Food	190
Meaning and Origin of the Term	191
Public Perception	193
Chemical Composition	194
Organic Meat Production Requirements	196
Health and Safety	196
Carbohydrate Loading	199
Without Depletion	200
Short Workout	200
Transient Hypoglycemia	200
Diet Composition	200
Hyponatramia	201
Signs and Symptoms	201
Causes	202
Diagnosis	203
Pathophysiology	205
Treatment	205

Epidemiology	206
Role of Carbohydrates	206
Some General Dietary Considerations	207
Carbohydrate Diets and Endurance Capacity	207
Carbohydrate Diets and Endurance Performance	208
Carbohydrate Diets and High Intensity Exercise	209
Composition of Pre-exercise Meals	209
Recovery from Exercise	210
Fat and Protein on Sports Performance	210
Fat	210
Performance Protein's Role	211
Chapter 6 Physical Exercise	216
Classification	217
Health Effects	217
Fitness	218
Cardiovascular System	218
Immune System	218
Cancer	219
Neurobiological	220
Depression	231
Sleep	231
Excessive Exercise	231
Mechanism of Effects	232
Skeletal Muscle	232
Other Peripheral Organs	234
Central Nervous System	235
Public Health Measures	235
Exercise Trends	236
Social and Cultural Variation	236
Nutrition and Recovery	237
Chapter 7 Obesity	238
History	239
Historical Attitudes	239
The Arts	240
Society and Culture	240
Economic Impact	240
Size Acceptance	242
Industry Influence on Research	242
Classification	242
Effects on Health	243
Mortality	243

Morbidity	244
Causes	247
Diet	248
Sedentary Lifestyle	251
Genetics	251
Other Illnesses	253
Social Determinants	254
Gut Bacteria	258
Pathophysiology	258
Immune System	259
Public Health	260
Reports	260
Management	261
Dieting	262
Exercise	262
Weight Loss Programmes	262
Medication	263
Surgery	264
Clinical Protocols	265
Research	266
Epidemiology	266
Childhood Obesity	267
Chapter 8 Aerobic Exercise	268
History	268
Aerobic Versus Anaerobic Exercise	268
Benefits	270
Aerobic Capacity	271
Aerobic Exercise and Obesity	272
Alternatives	272
Commercial Success	272
Varieties	272
Indoor	272
Outdoor	288
Indoor or Outdoor	288
Anaerobic Exercise	288
Metabolism	288
<i>Bibliography</i>	290
<i>Index</i>	294

PHYSIOLOGY OF SPORTS AND EXERCISE

Physiology is the identification of physiological mechanisms underlying physical activity the comprehensive delivery of treatment services concerned with the analysis improvement and maintenance of health and fitness rehabilitation of heart disease and other chronic diseases and/or disabilities and the professional guidance and counsel of athletes and other interested in athletics sports training and human adaptability to acute and chronic exercise. The book for undergraduate exercise physiology courses, Physiology of Sport and Exercise, has been fully updated in both content and design. New research on effects of physical activity on health, including the addition of international data on the incidence of cardiovascular disease and obesity. Physiology of Sport and Exercise stands alone as the best, most comprehensive resource framing the latest research findings in a reader-friendly format.

Contents: 1. Understand the Human Physiology, 2. Exercise Physiology, 3. Allied Health Professions, 4. Emergency Medical Services, 5. Nutrition, 6. Physical Exercise, 7. Obesity, 8. Aerobic Exercise.

Bev Lott is Professor Emeritus of biology at Community College. While teaching at Community College, he developed a desire to better understand the relationship between the scientific study of the human body and the Physical Education. His book, Human Anatomy and Physiology, is part of the Benjamin/Cummings Series in the Physical Education. Bev Lott's new Edition contains general and specific information on human anatomy and physiology and thoroughly explains and demonstrates normal structures and functions in all body systems. He has considerable experience of teaching anatomy & physiology to undergraduate and pre-university students. Bev Lott has to his credit about 36 research articles published in national and international journals of repute and conference proceedings.

Blair Fraser is a full professor at Romania. He obtained his B.Sc. degree in Zoology and his Ph.D. in Biological Sciences. He has taught both undergraduate and graduate courses for over twenty years. He taught anatomy and physiology to physical education majors. He received the Benefactor Award from the National Council for Resource Development. He has been a contributor to several books and has written numerous research papers in Neuroscience, Anatomy and Pharmacology. He oversaw the recent revision of the Interactive Physiology modules, and co-authored the newest module of the Immune System. Blair Fraser served as a consultant for the Inter active physiology and is an active member of the Human Anatomy and Physiology Society.

