

Contents

Foreword vii

Preface ix

Acknowledgments xi

1 Fundamental Concepts 1

Introduction 3

Manual Muscle Testing 4, 5

Objectivity in Muscle Testing 6–8

Musculoskeletal System 9

Joints: Definitions & Classification, Chart 10

Gross Structure of Muscle 11

Range of Motion and Muscle Length 12

Classification for Strength Tests 13

Strength Testing Procedures 14–17

Suggested Order of Muscle Tests 18

Grading Strength 19–24

Key to Muscle Grading 23

Nerve Plexus 25

Spinal Nerve and Muscle Charts 26–29

Treatment Fundamentals 30, 31

Neuromuscular Problems 32, 33

Musculoskeletal Problems 34, 35

Treatment Procedures 36

Treatment Modalities 37

Polio: Factors Influencing Treatment 38

Polio and Postpolio Muscle Tests	39–43
Complications of Polio	44
Post-Polio Suggested Readings	45
References	46, 47

2 Posture 49

Introduction 51

Section I: Fundamentals of Posture

Posture and Pain	52
Body Segments	53
Anatomical and Zero Positions, and Axes	54
Basic Planes and Center of Gravity	55
Movements in the Coronal Plane	56
Movements in the Sagittal Plane	57
Movements in the Transverse Plane	58
The Standard Posture	59–63

Section II: Postural Alignment

Types of Postural Alignment	64
Segmental Alignment: Side View	65–69
Abdominal Muscles in Relation to Posture	70–71
Sway-Back Posture	72
Ideal Alignment: Posterior View	73
Faulty Alignment: Posterior View	74, 75
Handedness: Effect on Posture	76
Faulty Posture: Side and Back Views	77
Shoulders and Scapulae	78, 79
Posture of Feet, Knees and Legs	80–83
Radiograph of Legs	84
Sitting Posture	85

Section III: Postural Examinations

Procedure for Postural Examination	86–88
<i>Postural Examination Chart</i>	89
Good and Faulty Posture: Summary <i>Chart</i>	90, 91
Faulty Posture: Analysis and Treatment, <i>Charts</i>	92, 93

Faulty Leg, Knee, and Foot Positions, *Chart* 94

Acquired Postural Weakness 95

Section IV: Posture of Children

Factors Influencing Children's Posture 96, 97

Good and Faulty Posture of Children 98–100

Normal Flexibility According to Age Level 101

Flexibility Tests: *Charts* 102, 103

Problems with "Physical Fitness Tests" 104, 105

Section V: Scoliosis

Introduction 107

Scoliosis from Neuromuscular Disease 108

Postural Examination, and *Chart* 109–111

Functional Scoliosis 112

Exercises and Supports 113, 114

Early Intervention 115

Corrective Exercises 116

References 117

3 Head and Face 119

Introduction 121

Section I: Innervation

Cranial Nerves and Deep Facial Muscles 122

Cervical Nerves and Superficial Facial
and Neck Muscles 123

Temporomandibular Joint Movement 124

Cranial Nerve and Muscle Chart 124, 125

Section II: Facial and Eye Muscles

Facial and Eye Muscles, *Charts* 126, 127

Facial and Eye Muscles Tests 128–133

Section III: Facial Paralysis

Case #1 134, 135

Case #2 136, 137

Muscles of Deglutition 138, 139

References 140

4 Neck 141

Introduction 143

Section I: Innervation and Movements 144

Spinal Cord and Nerve Roots 144

Spinal Nerve and Muscle Chart 144

Cervical Plexus 145

Joint Movements of the Cervical Spine 146

Neck Range of Motion 147

Section II: Neck Muscles 148Anterior and Lateral Neck Muscles, *Charts* 148, 149

Suprahyoid and Infrahyoid Muscles 150, 151

Cervical Spine Extension and Flexion 152

Faulty Head and Neck Positions 153

Section III: Neck Muscle Tests 154

Anterior Neck Flexors 154

Error in Testing Neck Flexors 155

Anterolateral Neck Flexors 156

Posterolateral Neck Flexors 157

Upper Trapezius 158

Section IV: Painful Conditions 159

Tight Posterior Neck Muscles 159

Upper Trapezius Strain 160

Cervical Nerve Root Pressure 160

Computer Ergonomics 161

Section V: Treatment 162

Massage of Neck Muscles 162

Exercises to Stretch Neck Muscles 163

References 164**5 Trunk and Respiratory Muscles 165**

Introduction 167

Section I: Trunk 168Innervation, *chart* 168

Joints of Vertebral Column 168

Trunk Range of Motion	169
Movements of Vertebral Column	169
Movements of Spine and Pelvis	172
Tests for Length of Posterior Muscles	174
Variation in Length of Posterior Muscles	175
Trunk Muscles	176
Neck and Back Extensors, <i>Illustration</i>	177
Neck and Back Extensors, <i>Charts</i>	178–179
Back and Hip Extensors	180
Back Extensors: Testing and Grading	181
Strong Back Extensors, Misdiagnosed	182
Quadratus Lumborum	183
Lateral Trunk Flexors and Hip Abductors	184
Lateral Trunk Flexors: Testing and Grading	185
Oblique Trunk Flexors: Testing and Grading	186
Section II: Abdominal Muscles	187
Analysis of Curled-Trunk Sit-Ups	187
Movements during Curled-Trunk Sit-Ups	188–189
Muscles during Curled-Trunk Sit-Ups	190–192
Trunk Movement	193
Rectus Abdominis, <i>Illustration</i>	194
External Oblique, <i>Illustration</i>	195
Internal Oblique, <i>Illustration</i>	196
Tranversus Abdominis, <i>Illustration</i>	197
Obliques: Weakness and Shortness	198
Divisions of Abdominal Muscles, <i>Chart</i>	199
Differentiating Upper and Lower Abdominals	200–201
Upper Abdominal Muscles: Testing and Grading	202–203
Abdominal Muscle Weakness: Trunk Raising	204
Abdominal and Hip Flexor Imbalance	205
Sit-Up Exercises	206–208
Therapeutic Exercises: Trunk Curl	209
Abdominal Muscles During Leg Lowering	210–211
Lower Abdominals: Testing & Grading	212–213
Abdominal Muscle Weakness: Leg Lowering	214
Therapeutic Exercises: Posterior Pelvic Tilt	215

- Therapeutic Exercise: Trunk Rotation 216
 Marked Abdominal Muscle Weakness 217–218

Section III: Painful Conditions of Low Back 219

- Low Back Enigma 219
 Low Back Pain 219–222
 Anterior Pelvic Tilt 223–225
 Back Supports 226
 Hip Extensor Weakness 227
 Posterior Pelvic Tilt 228
 Lateral Pelvic Tilt 229
 Lifting 230–231
 Treatment for Back Weakness 232

Section IV: Muscles of Respiration 233

- Introduction 233
 Therapeutic Objectives 234
 Primary Muscles of Respiration 235–237
 Accessory Muscles of Respiration 237–238
 Respiratory Muscle *Chart* 239
 Muscles of Respiration 240–241

Corrective Exercises 242–243

References 244

6 Upper Extremity and Shoulder Girdle 245

Introduction 247

Section I: Innervation

- Brachial Plexus 248, 249
 Cutaneous Distribution Nerves 250
Spinal Nerve and Motor Point Chart 251
 Nerves to Muscles: Motor and Sensory
 and Motor Only and *Chart* 252, 253
Scapular Muscle Chart 253
Chart of Upper Extremity Muscles 254–255
 Cutaneous Nerves—Upper Limb 256, 257

Section II: Hand, Wrist, Forearm and Elbow

- Movements—Thumb and Finger Joints 258

Movements—Wrist, Radioulnar and Elbow 259

Chart for Analysis of Muscle Imbalance 260

Strength Tests

Thumb Muscles 261–268

Digiti Minimi 269–271

Dorsal and Palmar Interossei 272, 273

Lumbricales and Interossei 274–276

Palmaris Longus and Brevis 277

Extensor Indicis and Digiti Minimi 278

Extensor Digitorum 279

Flexor Digitorum Superficialis
and Profundus 280, 281

Flexor Carpi Radialis and Ulnaris 282, 283

Extensor Carpi Radialis and Ulnaris 284, 285

Pronator Teres and Quadratus 286, 287

Supinator and Biceps 288, 289

Biceps Brachii and Brachialis 290, 291

Triceps Brachii and Anconeus 292, 293

Brachioradialis 294

Range of Motion Chart 295

Strength Testing of Thumb and Fingers 295

Joint Measurement Chart 296

Section III: Shoulder

Joints and Articulations 297–299

Charts: Shoulder Girdle Articulations 300, 301

Combined Shoulder & Scapular Muscles 302

Movements of Shoulder Girdle & Scapula 303

Movements of Shoulder Joint 304, 305

Length of Humeral and Scapular Muscles 306

Test for Length of Pectoralis Minor 307

Test for Tightness of Muscles that Depress
the Coracoid Process Anteriorly 307

Tests for Length of Pectoralis Major 308

Tests for Length of Teres Major,
Latissimus Dorsi and Rhomboids 309

Tests for Length of Shoulder Rotators 310, 311

Upper Extremity Muscle Chart 312

Strength Tests—Shoulder

- Coracobrachialis 313
- Supraspinatus 314
- Deltoid 315–317
- Pectoralis Major, Upper and Lower 318, 319
- Pectoralis Minor 320
- Shoulder Lateral Rotators 321
- Shoulder Medial Rotators 322
- Teres Major & Subscapularis 323
- Latissimus Dorsi 324, 325
- Rhomboids, Levator Scapulae and Trapezius 326–331
- Serratus Anterior 332–337

Section IV: Painful Conditions of Upper Back

- Weakness of Upper Back 338
- Short Rhomboids 338
- Middle & Lower Trapezius Strain 339
- Back Pain from Osteoporosis 340

Painful Conditions of the Arm

- Thoracic Outlet Syndrome 341
- Coracoid Pressure Syndrome 342, 343
- Teres Syndrome (Quadrilateral Space Syndrome) 344
- Pain from Shoulder Subluxation 345
- Tight Shoulder External Rotators 345
- Cervical Rib 345

Section V: Case Studies

- Case 1: Radial Nerve Lesion 347
- Case 2: Radial, Median, & Ulnar Nerve 348, 349
- Case 3: Probable C5 Lesion 350
- Case 4: Lateral and Medial Cord 351
- Case 5: Partial Brachial Plexus Lesion 352–354
- Case 6: Stretch Weakness Superimposed on a Peripheral Nerve Injury 355
- Overuse Injuries 356

Corrective Exercises 357**References 358**

7 Lower Extremity 359

Introduction 361

Section I: Innervation

Lumbar Plexus, Sacral Plexus 362, 363

Spinal Nerve and Muscle Chart 364

Spinal Nerve and Motor Point Chart 365

Chart of Lower Extremity Muscles 366, 367

Nerves to Muscles: Motor & Sensory 368

Cutaneous Nerves of the Lower Limb 369

Section II: Joint Movements

Movements of Toes, Foot, Ankle and Knee 370, 371

Movements of Hip Joint 372, 373

Joint Measurement Chart 374

Treatment of Muscle Length Problems 375

Test for Length of Ankle Plantar Flexors 375

Test for Length of Hip Flexor Muscles 376, 380

Hip Flexor Stretching 381

Problems with Hamstring Length Testing 382

Tests for Length of Hamstring Muscles 383, 384

Short Hamstrings 385, 386

Effect of Hip Flexor Shortness 387

Errors in Testing Hamstring Length 388, 389

Hamstring Stretching 390

Ober and Modified Ober Test 391–394

Hip Flexor Length Testing 395–397

Tensor Fasciae Latae Stretching 398

Section III: Muscle Strength Tests

Chart for Analysis of Muscle Imbalance 399

Toe Muscles 400–409

Tibialis Anterior 410

Tibialis Posterior 411

Peroneus Longus and Brevis 412

Ankle Plantar Flexors 413–415

Popliteus 416

Hamstrings and Gracilis 417–419

Quadriceps Femoris 420, 421

- Hip Flexors 422, 423
- Sartorius 424
- Tensor Fasciae Latae 425
- Hip Adductors 426–428
- Medial Rotators of Hip Joint 429
- Lateral Rotators of Hip Joint 430, 431
- Gluteus Minimus 432
- Gluteus Medius 433
- Gluteus Medius Weakness 434
- Trendelenberg Sign & Hip Abductor Weakness 435
- Gluteus Maximus 436, 437
- Leg Length Measurement 438
- Apparent Leg Length Discrepancy 439

Section IV: Painful Conditions

- Foot Problems 440–443
- Shoes and Shoe Corrections 444–446
- Knee Problems 447, 448
- Leg Pain 449
 - Tight Tensor Fasciae Latae and ITB 449, 450
 - Stretched Tensor and ITB 450, 451
 - Protruded Intervertebral Disk 452
 - Piriformis Muscle and Sciatic Pain 453, 454
- Neuromuscular Problems 454
 - Case 1: Peroneal Nerve Injury 455
 - Case 2: Lumbosacral Nerves 456, 457
 - Case 3: L5 Lesion 458
 - Case 4: Guillain-Barré 459
 - Case 5: Guillain-Barré 460
 - Case 6: Polio 461

Corrective Exercises 462, 463

References 464

Appendix A: Spinal Segment Distribution to Nerves and Muscles 465–467

Charts 468–472

Appendix B: Isolated Paralysis of the Serratus Anterior Muscle 473–480

Glossary G–1

Suggested Readings SR–1

Index I–1