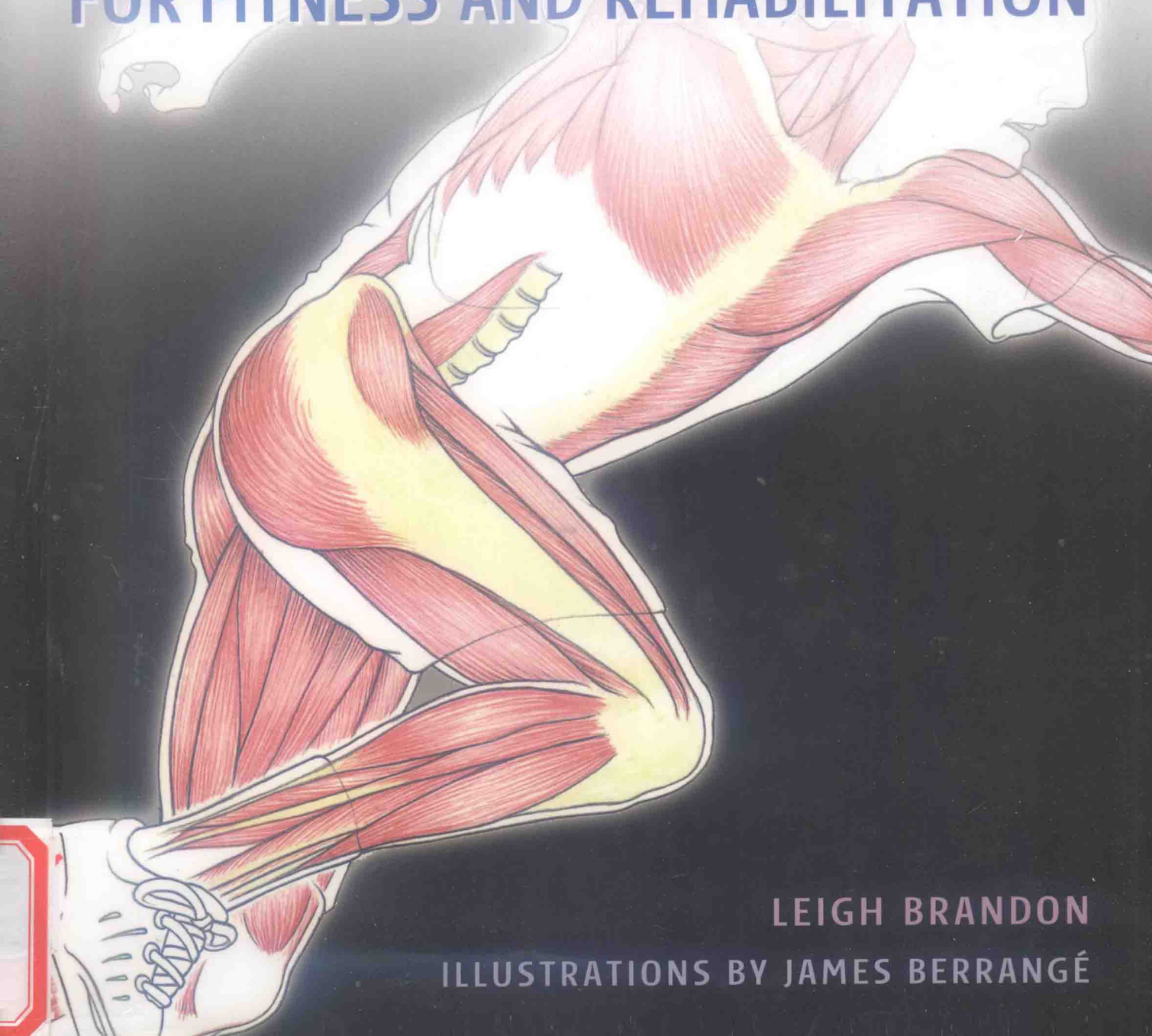


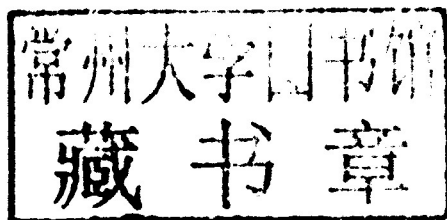
ANATOMY OF SPORTS INJURIES FOR FITNESS AND REHABILITATION



LEIGH BRANDON

ILLUSTRATIONS BY JAMES BERRANGÉ

ANATOMY OF SPORTS INJURIES



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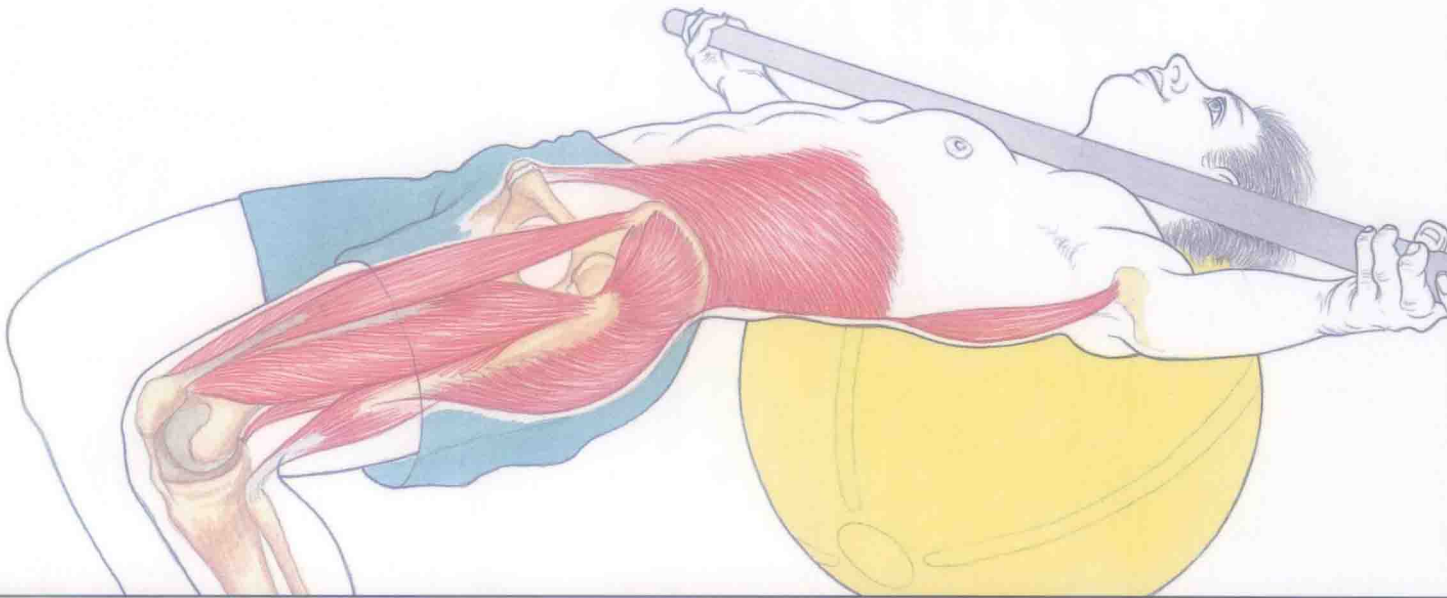
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PART 1 – OVERVIEW OF ANATOMY AND INJURIES

HOW TO USE THIS BOOK

Anatomy of Sports Injuries for Fitness and Rehabilitation is a visual and textual analysis of common sports injuries and rehabilitation of those injuries through effective exercises. It is also a guide to how to do the exercises properly and when to seek professional help to overcome your sports injury.

The book has three distinct parts: the first is a basic introduction to anatomical definitions, terminology and an overview of sports injuries. It also includes guidelines on injury prevention, acute care and first aid, manual therapy, long-term rehabilitation and lifestyle considerations.

Part Two is divided into 13 sections, each covering a region of the body and highlighting some of the most common injuries for that region. Each section defines individual injuries and their potential causes, treatment plans and statistics. Up to three mobilizations, stretches and/or exercises that may be used to help rehabilitate the injury are suggested as part of the corrective exercise programme following the acute phase of the injury.

Note that an injury can have many different causes and should be assessed by a trained professional to find the underlying causes. Any muscle imbalances should be highlighted at this stage and proper corrective stretching and strengthening should be given based on this information.

Disclaimer: Many of the exercises have a degree of risk of injury if done without adequate instruction and supervision. We recommend that you have a thorough assessment with a CHEK Practitioner, physiotherapist, osteopath or chiropractor before undertaking any of the exercises, and that you seek qualified instruction if you are a complete beginner. This book does not constitute medical advice and the author and publisher cannot be held liable for any loss, injury or inconvenience sustained by anyone using this book or the information contained in it.

Without a thorough assessment, the likelihood of full rehabilitation is greatly reduced, therefore, the stretches and exercises recommended may not be applicable to all.

Part Three is an exercise section – a ‘how-to’ guide to doing the exercises as well as a visual and technical exercise analysis describing which muscles are being used. The start and finish positions are usually depicted and training tips may be included.

The adult human body has more than 600 muscles and 206 bones; in this book, emphasis is placed on about 92 muscles involved in movement and stabilization. Many of the smaller muscles, as well the deep, small muscles of the spine and muscles of the hands and feet are not given specific attention.

This book is designed to help you improve your understanding of sports injuries and to overcome them and get back to performing at your best without the worry of further or future injury. Before starting a rehabilitation programme, the reader is advised to fully understand what phase of recovery they are in and introduce the right treatments and exercises at the right time (explained in Part One). For instance, if stretches and exercises are used in the acute phase, this may further damage tissues and make the injury worse. Therefore, it is advised that you work through the book in the order it was written. In Part One, you will understand the anatomical definitions and terminology used in the book as well as a basic understanding of injuries and rehabilitation strategies. In Part Two you will learn about your injury, while in Part Three you will learn how to perform the exercises and stretches.

Ultimately, the injured tissues need to be conditioned to take the rigours of your sport in all planes of motion. This is known as end-stage rehabilitation. While it is beyond the scope of this book to teach you end-stage rehab, the reader is advised to receive professional advice on strength and conditioning or read *Anatomy of Strength and Fitness Training for Speed and Sport* by Leigh Brandon.

How to perform this exercise

Exercise name

How to start or finish the exercise, as shown in the small artwork

Labels for the major muscles being used during the exercise

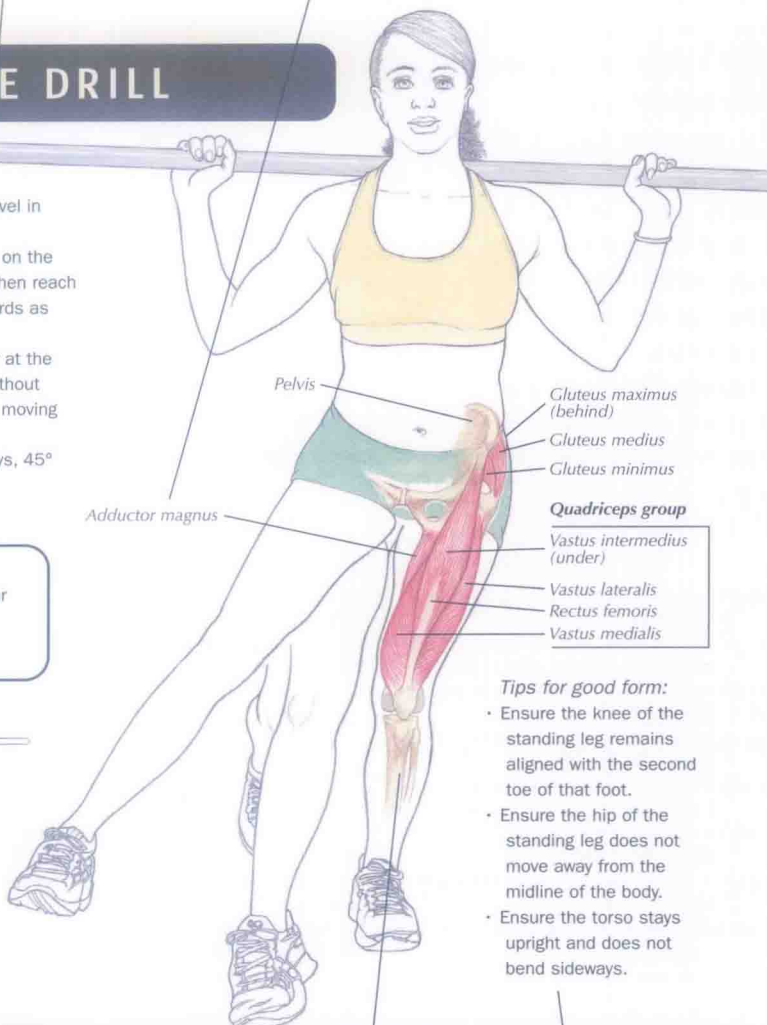
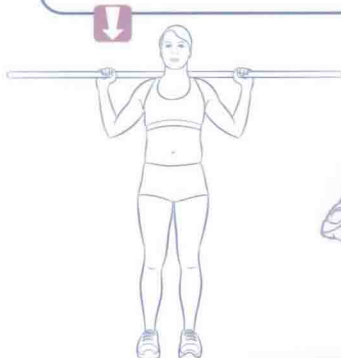
TOUCH TOE DRILL

Basic description:

- Inhale, then gently draw your navel in towards your spine.
- Keeping your standing foot fully on the ground, bend the same knee, then reach with the other foot as far forwards as possible.
- Tap the moving foot on the floor at the furthest point you can reach without placing any body weight on the moving foot.
- Repeat at 45° forwards, sideways, 45° backwards, and straight back.
- Repeat on the other side.

STARTING POSITION

- Stand with a dowel across your upper back, then lift one leg.



Tips for good form:

- Ensure the knee of the standing leg remains aligned with the second toe of that foot.
- Ensure the hip of the standing leg does not move away from the midline of the body.
- Ensure the torso stays upright and does not bend sideways.

ANALYSIS OF MOVEMENT	JOINTS	JOINT MOVEMENT	MOBILIZING MUSCLES
Joint 1	Hip	Up: extension Down: flexion	Gluteus maximus, gluteus medius (posterior fibres), biceps femoris, semitendinosus, semimembranosus, adductor magnus (posterior fibres)
Joint 2	Knee	Up: extension Down: flexion	Rectus femoris, vastus medialis, vastus intermedius, vastus lateralis
Joint 3	Ankle	Up: plantarflexion Down: dorsiflexion	Gastrocnemius, soleus, tibialis posterior, peroneus longus and brevis

7

REHABILITATION

Technical aspects, describing the joints, joint movement and mobilizing muscles

Illustration depicting the major muscles used in the exercise

Essential training guidelines

ANATOMICAL DEFINITIONS AND TERMINOLOGY

Anatomy has its own language and although technical, it is quite logical, originating from Latin and Greek root words that make it easier to learn and understand the names of muscles, bones and other anatomy parts.

Whether you are an athlete, a student, a physio-therapist, a strength and conditioning coach or a CHEK practitioner, using the correct words and terminology enables you to interact with other professionals and professional materials.

Like most medical terms, anatomical terms are made up of small word parts, known as combining forms that

fit together to make the full term. These 'combining forms' comprise roots, prefixes and suffixes. Knowing the different word parts allows you to unravel the word. Most anatomical terms only contain two parts: either a prefix and root or a root and suffix.

For example, take the terms 'subscapular' and 'suprascapular'; the root is 'scapula', more commonly known as the shoulder blade. 'Supra' means 'above', hence 'suprascapula' means something above the shoulder blade. On the other hand, 'sub' means 'below', indicating in this instance something below the shoulder blade.

Common prefixes, suffixes and roots of anatomical terms

Word root	Meaning	Example	Definition
abdomin	pertaining to the abdomen	abdominal muscle	major muscle group of the abdominal region
acro	extremity	acromion	protruding feature on the scapula bone
articul	pertaining to the joint	articular surface	joint surface
brachi	pertaining to the arm	brachialis	arm muscle
cerv	pertaining to the neck	cervical vertebrae	the neck region of the spine
crani	skull	cranium	bones forming the skull
glute	buttock	gluteus maximus	buttock muscle
lig	to tie, to bind	ligament	joins bone to bone
pector	chest region	pectoralis major	chest muscle

Word parts used as prefixes

ab-	away from, from, off	abduction	movement away from the midline
ad-	increase, adherence, toward	adduction	movement towards the midline
ante-, antero-	before, in front	anterior	front aspect of the body
bi-	two, double	biceps brachii	two-headed arm muscle
circum-	around	circumduction	circular movement of a limb
cleido-	the clavicle	sternocleidomastoid	muscle, inserts into clavicle
con-	with, together	concentric contraction	contraction in which muscle attachments move together

Word parts used as prefixes (continued)

Word root	Meaning	Example	Definition
costo-	rib	costal cartilage	rib cartilage
cune-	wedge	cuneiform	wedge-shaped foot bone
de-	down from	depression	downward movement of the shoulder blades
dors-	back	dorsiflexion	movement of the top side of the foot towards the shin
ec-	away from	eccentric contractions	contraction in which muscle attachments move apart
epi-	upon	epicondyle	feature of a bone, located above a condyle
fasci-	band	tensor fasciae latae	small band-like muscle of the hip
flex-	bend	flexion	movement closing the angle of a joint
infra-	below, beneath	infraspinatus	muscle situated below the spine of the scapula
meta-	after, behind	metatarsals	bones of the foot, distal to the tarsals
post-	after, behind	posterior	rear aspect of the body
pron-	bent forward	prone position	lying face down
proximo-	nearest	proximal	nearest the root of a limb
quadr-	four	quadriceps	four-part muscle group on the anterior thigh
re-	back, again	retraction	pulling of the shoulder blades towards the midline
serrat-	saw	serratus anterior	muscle with a saw-like edge
sub-	beneath, inferior	subscapularis	muscle beneath the scapula
super, supra-	over, above, excessive	supraspinatus	muscle above the spine of the scapula
		superior	toward the head
thoraco-	the chest, thorax	thoracic vertebrae	in the region of the thorax
trans-	across	transverse abdominus	muscle crossing the abdomen
tri-	three	triceps brachii	three-headed muscle of the upper arm
tuber-	swelling	tubercle	small rounded projection on a bone

Word parts used as suffixes

-al, ac	pertaining to	iliac crest	pertaining to the ilium
-cep	head	biceps brachii	two-headed arm muscle
-ic	pertaining to	thoracic vertebrae	pertaining to the thorax
-oid	like, in the shape of	rhomboid	upper back muscle, in the shape of a rhomboid
-phragm	partition	diaphragm	muscle separating the thorax and abdomen

SYSTEMS OF THE BODY

The human body can be viewed as an integration of approximately 12 distinct systems that continuously interact to control a multitude of complex functions. These systems are a co-ordinated assembly of organs, each with specific capabilities, whose tissue structures suit a similar purpose and function.

This book illustrates and analyzes the systems that control movement and posture, namely the muscular and skeletal systems, often referred to jointly as the musculoskeletal system.

The other systems are the cardiovascular, lymphatic, nervous, endocrine, integumentary, respiratory, digestive, urinary, immune and reproductive systems.

The muscular system

The muscular system facilitates movement, maintenance of posture and the production of heat and energy. It is made up of three types of muscle tissue: cardiac, smooth and striated.

Cardiac muscle forms the walls in the heart, while smooth muscle tissue is found in the walls of internal organs such as the stomach and blood vessels. Both are activated involuntarily via the autonomic nervous system and hormonal action.

Striated muscle makes up the bulk of the muscles as we commonly know them. The skeletal system includes the tendons that attach muscle to bone, as well as the connective tissue that surrounds the muscle tissue, which is called fascia.

A human male weighing 70 kg (154 lbs) has approximately 25–35 kg (55–77 lbs) of skeletal tissue.

Muscle attachments

Muscles attach to bone via tendons. The attachment points are referred to as the origin and the insertion.

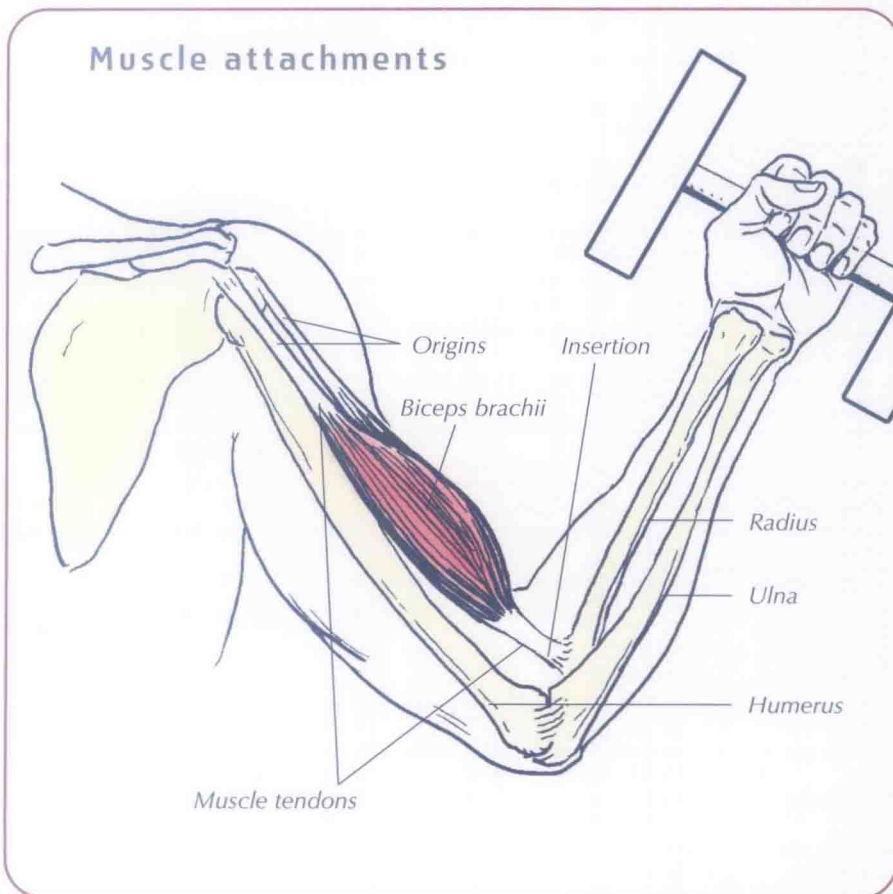
The origin point is the point of attachment that is proximal (closest to the root of a limb) or closest to the midline, or centre of the body. It is usually the least moveable point, acting as the anchor in muscle contraction.

The insertion point is the point of attachment that is distal (the furthest from the root of a limb) or furthest from the midline or centre of the body. The insertion point is usually the most moveable part, and can be

drawn towards the origin point.

Knowing the origin and insertion points of a muscle, which joint or joints the muscle crosses and what movement is caused at that joint or joints is a key element of exercise analysis.

There are typical features on all bones that act as convenient attachment points for the muscles. A description of typical bone features is given in the table on page 11.



Typical features on a bone

Feature	Description	Examples
Condyle	Large, rounded projection at a joint that usually articulates with another bone	Medial and lateral condyle of the femur Lateral condyle of the tibia
Epicondyle	Projection located above the condyle	Medial or lateral epicondyle of the humerus
Facet	Small, flat joint surfaces	Facet joints of the vertebrae
Head	Significant, rounded projection at the proximal end of a bone, usually forming a joint	Head of the humerus
Crest	Ridge-like, narrow projection	Iliac crest of the pelvis
Line, Linea	Lesser significant ridge, running along a bone	Linea aspera of the femur
Process	Any significant projection	Coracoid and acromion process of the scapula Olecranon process of the ulna at the elbow joint
Spine, Spinous process	Significant, slender projection away from the surface of the bone	Spinous processes of the vertebrae Spine of the scapula
Suture	Joint line between two bones forming a fixed or semi-fixed joint	Sutures that join the bones of the skull
Trochanter	Very large projection	Greater trochanter of the femur
Tubercle	Small, rounded projection	Greater tubercles of the humerus
Tuberosity	Large, rounded or roughened projection	Ischial tuberosities on the pelvis
Foramen	Rounded hole or opening in a bone	The vertebral foramen running down the length of the spine, in which the spinal cord is housed
Fossa	Hollow, shallow or flattened surface on a bone	Supraspinous and infraspinous fossa on the scapula

The word 'skeleton' originates from a Greek word meaning 'dried-up'. Infants are born with about 350 bones, many of which fuse as they grow, forming single bones, resulting in the 206 bones found in an adult.

The muscular system

Anterior view

