

# **Functional Anatomy for Sport and Exercise**

Quick reference

**Clare E. Milner**

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# Functional Anatomy for Sport and Exercise

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*Functional Anatomy for Sport and Exercise* is a quick reference guide to human musculoskeletal anatomy in its moving, active context.

An accessible format makes it easy for students to locate clear, concise explanations and descriptions of anatomical structures, human movement terms and key concepts as they are needed. Covering all major anatomical areas, the book includes:

- A simple, comprehensive guide to functional musculoskeletal anatomy
- Cross-referenced entries throughout
- Highlighting of key terms
- Hot Topics explained in more detail
- Full references and a list of suggested further reading.

*Functional Anatomy for Sport and Exercise* is a must-have supplement for undergraduates in applied anatomy, functional anatomy, kinesiology, physical education, strength and conditioning, biomechanics and related areas

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To KVJ, for your unwavering love and support

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# Introduction

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This A to Z guide is intended to provide a quick and easily accessible reference for students of musculoskeletal anatomy. It is an appropriate supplement to the traditional anatomy textbook in undergraduate courses such as applied anatomy, functional anatomy, and kinesiology. Given the applied focus of the subject matter, details of common sports and other injuries are included alongside the purely anatomical descriptions of each region. The book makes comprehensive reference information available in a concise and easily accessible format. Relevant information about musculoskeletal anatomy can be located quickly and easily without searching through a traditional anatomy textbook that includes details of all of the systems of the body. The compact format of the textbook and A to Z arrangement of entries enables topics of interest to be located quickly and easily.

Entries are grouped by major joint and include a general introduction to the region, plus detailed descriptions of the bones, joints, ligaments, and muscles. The bones of each joint are illustrated in a detailed figure including several views to ensure all of the key bony landmarks are shown. These landmarks tie in with the descriptions of ligaments and muscles and their attachments to the bone. The figure labels are lined up on the left and right sides of the diagram. This arrangement is a study tool which enables the labels to be easily covered and then revealed one by one. In this way the figures can be used to test your knowledge of the bones and their landmarks. The focus of the book is on joints that are involved in movement, including joints of the extremities, vertebral column and thoracic cage.

Key terminology and essential background information, such as the anatomical planes and axes, are also described to provide the reader with a comprehensive reference. In fact, these entries are a good place

to start and will facilitate the reader's understanding of the entries describing the different regions of the body. Suggested entries for the reader who is not familiar with (or needs reminding of) the basic concepts and language of anatomy are:

- Anatomical position
- Anatomical terminology
- Appendicular skeleton
- Articular surfaces
- Axial skeleton
- Bone
- Bony landmarks
- Bone classification
- Joints
- Joint classification
- Muscle contraction – types
- Muscle classification
- Planes and axes of movement

The A to Z entries are cross-referenced extensively throughout the text to guide the reader to related information about the region of interest. Further reading suggestions are also provided where appropriate. These direct the reader to both textbooks and selected research articles. In addition, there are five 'Hot Topics' boxes which provide further information about contemporary items of interest related to musculoskeletal anatomy, such as anterior cruciate ligament injuries in athletes.

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## **A to Z entries**

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#### 4 Anatomical position

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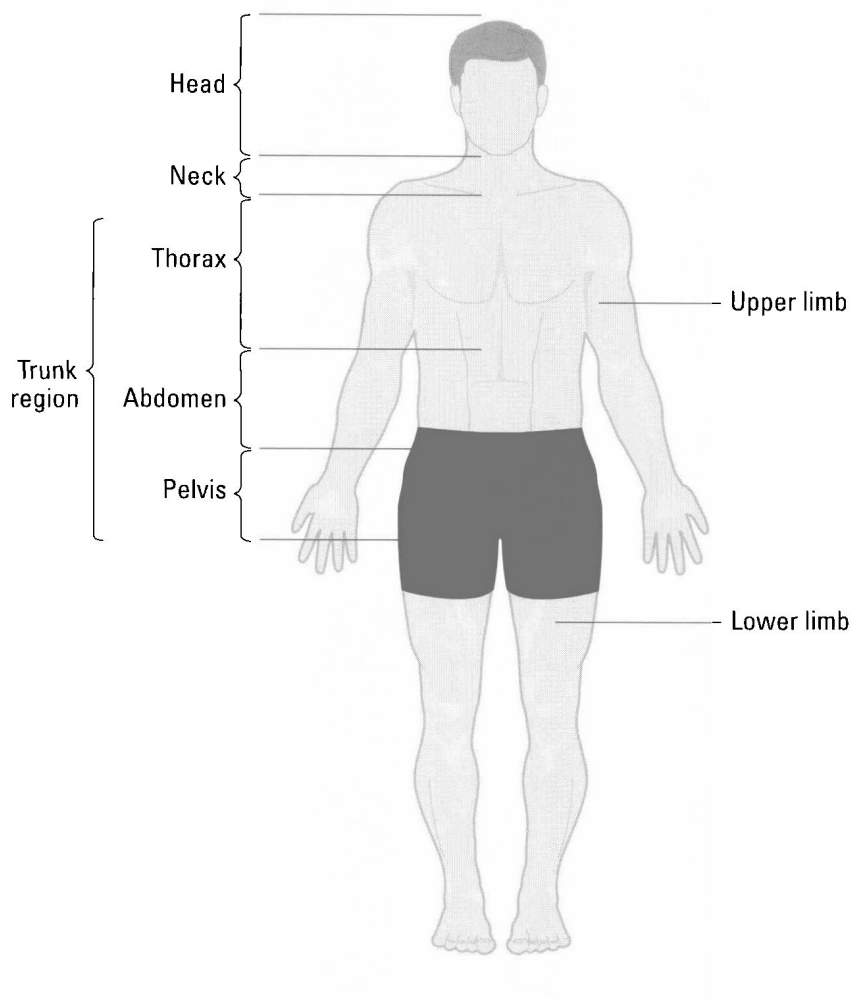


Figure 1 Anatomical position and regions of the body

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## **Anatomical position**

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The anatomical position is the reference position of the body that is used when describing movements of parts of the body (Figure 1). This ensures that movement terminology is consistent, since all axes of rotation are aligned consistently throughout the upper and lower body. The position is standing upright with the head and feet pointing directly forwards, eyes looking straight ahead. The lower limbs are close together with the feet parallel. The upper limbs are down at the sides of the body with the palms of the hands facing forwards. This position of the upper limbs is different to their natural position during relaxed standing, in which the palms face the body. However, with the upper limbs in the palms-forward position, the flexion – extension axes of the elbow, wrist and joints of the hand are aligned mediolaterally. This puts them in the same orientation as the flexion – extension axes of the other joints of the body. Similarly, the abduction – adduction and internal – external rotation axes are also aligned with the rest of the body. Even though the upper limb may move to a position very different to the anatomical position, the naming of the joint rotations remains the same as in the anatomical position. When interpreting the component parts of a complex upper body movement, it can be helpful to imagine moving the limb back to the anatomical position. It will then be easier to isolate the individual joint movement and identify the axis of rotation and direction of movement.

*See also anatomical terminology; planes and axes of movement.*



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## Anatomical terminology

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When referring to movements of the body or locations of anatomical structures in the body, specific terminology is used. The **planes and axes of movement** are used to describe movements meaningfully and unambiguously. However, the relative locations of parts of the body with respect to the whole also need to be described unambiguously.

The relative location of a point on the **axial skeleton** or **appendicular skeleton** is indicated by the use of either 'proximal' or 'distal'. A point that is more proximal lies closer to the axial skeleton than one that is more distal on the extremity. For example, the elbow lies proximal to the wrist. Similarly, a point that is more 'cranial' is closer to the head than one that is 'caudal' to it. So, the sternum (breastbone) is cranial to the pelvis. Superior and inferior are used to describe points that are above and below each other, respectively. For example, the head is superior to the neck. Whether a point is on the front or the back of the body or a segment is indicated by the use of anterior and posterior respectively, for example, the anterior and posterior heads of the deltoid muscle (*see shoulder complex – muscles*). 'Ventral' and 'dorsal' are alternative anatomical terms for the front and the back of the body, such that the pectoral (chest) muscles lie ventrally on the thorax and the trapezius muscle lies dorsally on the upper thorax.

To determine on which side of a segment a point lays, 'medial' is used to indicate a point that is closer to the midline of the body and 'lateral' indicates that a point is further away from the midline. For example, the medial malleolus is the bone on the inside of the ankle, closer to the midline, and the lateral malleolus is the bone on the outside of the ankle, further away from the midline (*see ankle and foot – bones*). Finally, to indicate how close to the center of a segment a point lies, the terms superficial and deep are used, such that skin is superficial to muscle.

*See also anatomical position; planes and axes of movement.*