FASCIAL ANATOMY OF THE LIMBS
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Introduction

In classical anatomy textbooks the topographic description of the fascia prevails and fascia is named specifically in relation to the other structures (mainly muscles, e.g., latissimus dorsi fascia, deltoid fascia, bicipital fascia) with which it is associated topographically. Although this analysis is topographically accurate, at the same time it is abstract, isolated, and has a limited functional correlation between anatomical elements. Anatomical studies on embalmed cadavers do not allow us to fully understand the conditions, connections, and continuity of the fascia and its biomechanical interrelationships. This chapter focuses on the continuity of the fascial system in the extremities and discusses the most relevant anatomical aspects. For a complete topographical analysis it is advisable to consult the classic anatomy texts. All the photographs of anatomical samples presented in this chapter were taken in the course of dissections carried out on cadavers that had not been embalmed.

Fascia taxonomy

From a clinical approach, it is suggested that fascia be described as a system of anatomical and functional continuity, interconnection, and integration. Thus, fascia can be related to movements within and between muscles, including the vascular and neural structures with which the fascial system acts as an uninterrupted communicational network. Considering the basic functional analysis, we recognize the existence of the superficial and deep fascia. The deep fascia can be subdivided into myofascia, viscerofascia, and meninges. The anatomical descriptions in this chapter focus on the functional aspects of the myofascia.

Superficial fascia: construction and mechanics

The superficial fascia is known by different names: subcutaneous fascia (Rouviere & Delmas, 2005), cellular cutaneous tissue (Testut & Latarjet, 2007), or subcutaneous adipofascial tissue (Avelar, 1989). Its characteristics are analyzed mainly in connection with plastic surgery and the skin-healing process (Congdon et al., 1946; Markmann et al., 1987; Avelar, 1989). The superficial fascia is the major anatomical structure, though the lack of an exhaustive anatomical and biomechanical analysis makes it difficult to clarify its precise role in body movements. Superficial fascia has the following key features:

• firm attachment to the skin
• forms a functional whole of protection, lubrication, and motion control
• traps and controls superficial fat
• acts as a store of nutrient reserves in the fat nodules
• fills irregularities at subcutaneous level (wrinkles, cellulitis) (Kapandji, 2012)
• has anatomy that differs depending on gender, amount of fat, and body region
• represents a continuous network extending from subdermal level to the deep (muscles) fascia
• construction consists of two continuous layers—superficial and deep (Fig. 18.1) (Fernández-de-las-Peñas & Pilat, 2012; Nakajima et al., 2004).

Deep fascia: construction and mechanics

Deep fascia has the following key features:

• contains collagen fibers organized in the form of undulating bundles
Introduction

There are contrasting opinions as to which structures can be defined as fascia (Langevin, 2014; Langevin & Huijing, 2009; Schleip et al., 2012; Swanson, 2013; Stecco, 2014). This chapter analyzes fascial classification in manual therapy from a functional approach. Thus, we recommend using the expression ‘fascial system’. This system gathers various types of cells with different activities (similarly to the digestive system or the nervous system) and relates to other body systems through an uninterrupted and innervated structure of functional stability (Pilat, 2014), shaped by the ‘three-dimensional collagenous matrix’ (Kumka & Bonar, 2012).

The fascial system represents a complex communicational architecture, which provides mechanoreceptive information. This process occurs not exclusively because of its topographic distribution, but mainly through the pattern of how it interrelates with other body structures, especially muscles. In its fibrous construction, it has the ability to align with and accommodate the intrinsic and extrinsic tensional body requirements. The tensional paths, created outside the appropriate biomechanical movement patterns, can thus redirect the body’s dynamics. The density, distribution, and organoleptic characteristics of the system differ throughout the body but its continuity is essential, allowing the fascia to act as a synergistic whole, absorbing and distributing local stimuli to the entire system. The inherent synergy of the structured fascial system enables the human body to adapt, according to requirements from outside and inside the body, or in relation to the availability of energy and nutrients in the immediate environment. Besides its structural role, fascia also distributes stimuli to the body. Its sensory network registers thermal and chemical changes, pressure, vibration, and movement impulses, and analyzes, categorizes, and transmits them to the central nervous system. The central nervous system receives, absorbs, transforms, evaluates, and consolidates these impulses and sends the instructions to other body systems (Pilat, 2014).

Considering the basic functional analysis, we recognize the existence of the superficial and deep fascia (Fig. 41.1). The deep fascia can be subdivided into myofascia, viscerofascia, and meninges. This classification may differ in some aspects (e.g., the

![Figure 41.1](image-url)

**Figure 41.1**

Anterior aspect of the knee and thigh in a dissection of an unembalmed cadaver with a high percentage of body fat. Note the two levels of superficial fascia: superficial and deep. A Superficial layer of superficial fascia (honeycomb fascia) with a large amount of cuboidal fatty nodes; B Deep layer of superficial fascia with flat fatty nodes; C Deep fascia (myofascial layer); D Patella; E Iliotibial band