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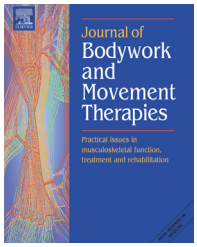

FASCIA SCIENCE AND CLINICAL APPLICATIONS: RESPONSE

Schleip & Klingler's response to Stecco's fascial nomenclature editorial

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Fascia related terminologies: different lenses for different purposes

A previous issue of this journal contained an extensive review of fascia related terminologies (Schleip et al., 2012). Therein, the three most commonly used respective nomenclatures were compared. The most restrictive and precise terminology among them is the 'Terminologia Anatomica', as proposed by the Federative Committee on Anatomical Terminology (FCAT) in 1998. It suggests excluding the previously named 'Scarpa's fascia' and 'Colle's fascia' (membranous connective tissue layers within the anterior abdominal wall and peritoneum) as well as all subcutaneous connective tissue (between skin and underlying muscle fascia) from future descriptions of 'fascia'. Similar to the terminology proposed in the editorial of the Fascia Section of the present issue of the journal, the FCAT suggests restricting the term 'fascia' to much denser fibrous connective tissue sheets — such as muscular envelopes, intermuscular septa and the periosteum — while excluding many other fibrous connective tissues (Wendell-Smith 1997). Although it has the most stringent and convincing logic behind it, the FCAT nomenclature did fail in terms of implementation. Language — whether that used in medicine or other areas of society — often follows different developmental dynamics than those arrived at through logic or those proposed by the current experts in a field. It is therefore not surprising that most of the English textbook authorities continued to use the term "superficial fascia" to describe subcutaneous loose connective tissues (Platzer, 2008; Standring, 2008; Netter, 2011; Tank, 2012). Similarly most descriptive anatomy books in the world today continued to use the terms 'Scarpa's fascia', Colle's fascia and related terms.

The second terminology discussed in that review is the one used in the latest British edition of Gray's anatomy (Standring, 2008). The nomenclature of this highly regarded textbook is currently used by the largest number of medical authors when compared with any other fascia related nomenclature. While excluding aponeuroses as well as the intramuscular layers of perimysium and endomysium from the realm of fascia, this terminology specifically recognizes the whole range of subcutaneous loose connective tissue from the dermis to the denser muscular fascia as 'superficial fascia'.

The third most common nomenclature used today in relation to fascia is the one, which was proposed as a basis for the first Fascia Research Congress (Findley and Schleip, 2007); this was further developed for the following two congresses (Huijing and Langevin, 2009). The term fascia here includes all fibrous collagenous tissues whose architecture is primarily shaped by tensional loading (in contrast to a locally dominant compressional loading) and which can be seen to take part in a bodywide tensional force transmission network. The complete fascial net then encompasses not only dense collagenous tissue sheets (like muscular envelopes, septa, joint capsules, organ capsules and retinacula), which might also be called "proper fascia", rather it also includes local densifications of this network in the form of tendons and ligaments. In addition it includes

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softer collagenous connective tissues like the superficial fascia (as in Gray's Anatomy) and the innermost intramuscular layer of the endomysium. Note that connective tissues having a morphology that is primarily adapted to compressional loading (like bones, cartilage or the nucleus pulposus of the discs) are not considered as fascial tissues in this perspective.

When comparing these three most common terminologies, it is apparent that each approach brings with it major advantages which make it superior when applying the related terminology within a specific context (Table 1). For example the nomenclature of Gray's Anatomy tends to be most applicable when communicating with medical and academic professionals whose semantic understanding is primarily rooted in conventional British or American terminology. Similarly, application of the FCAT nomenclature offers an improved predictive accuracy in terms of histological analysis. When looking through a microscope it is indeed helpful to put loose areolar connective tissues into a different linguistic container than denser joint capsules.

On the other hand, when investigating the role of connective tissues in wound healing, it works well to include both loose as well as denser connective tissues types in a common analysis based on their shared functional properties (Hinz et al., 2012). The same applies to proprioception and nociception for which a high density of nerve endings has been reported in the hypodermal loose connective tissues (Willard et al., 2012). The more comprehensive terminology of the fascia congresses works well when looking at force transmission over several body segments. This newer terminology may also be more useful in describing the anatomical architecture around major joints, where an arbitrary division of local tissues into capsules, ligaments, fascia, tendons and aponeuroses often seems rather cumbersome and would tend to ignore the local tissue continuity present in these areas.

Table 1 Comparison of the three most common fascia related nomenclatures. The relative advantages and disadvantages of each system are listed. *FCAT*: Federative Committee on Anatomical Terminology. *Gray's*: most recent British edition of Gray's anatomy. *FRC*: fascia research congress.

	FCAT 1998	Gray's 2008	FRC 2012
Histology	++	+	−
Force transmission	−	−	++
Tissue repair	−	+	++
Proprioception & nociception	−	+	++
Communication with medical professionals familiar with conventional anatomy	+	++	−
Communication with embodiment oriented movement instructors (yoga, stretching, Pilates, dance, ...)	−	+	++

Table from Schleip et al., 2012.

As described in the previous review (Schleip et al., 2012) unproductive semantic disputes can often be avoided by referring to specialised dense connective tissues (such as capsules or aponeuroses) as being part of the 'fascial web', rather than insisting that they are 'just fascia'; whereas the term 'proper fascia' serves well to acknowledge that the related tissues most clearly express the features described as fascia in more restrictive terminologies such as that of the FCAT and in Gray's Anatomy.

In addition to recognizing a particular tissue as being part of the global fascial net or not, it is also helpful, to use one of the twelve further descriptive terms proposed by Huijing & Langevin at the second Fascia Research Congress (such as 'loose connective tissue', 'periost' or 'endomysium'); at least whenever one of those terms seems applicable (Huijing and Langevin, 2009).

It is true that the fascial tissues recognized by the terminology of the fascia congresses are fairly congruent with the laymen's understanding of the term 'connective tissue'. However proper usage of that term in the field of medicine includes bones, cartilage and even blood, all of which are derivatives of the embryonic mesenchyme. Clinicians referring to connective tissue should also know that 'connective tissue research' is a very well established scientific field, which includes several international research bodies and regular scientific conferences as well as the 'Connective Tissue Research' journal which is included in the Medline index (with more than180 issues published since 1972). While the vast majority of explored topics in this scientific field share very little in common with the current field of fascia research, it would be disrespectful — if not impossible — to hijack and twist this established scientific field into a fascia oriented direction which primarily looks at tissue behaviour and mechanical and sensory responsiveness during manual and movement therapy interventions, or at myofascial transmission across several joints.

The diversity of existing terminologies reflects not only the complex architecture of the fascial web itself, it also reflects the rich diversity of professionals working in different fields who share an interest in this fascinating tissue. Rather than using a sharp scalpel to distinguish between right and wrong, we therefore recommend exercising the capacity to understand and respect the specific advantages of the related terminologies. Each of the three described terminologies, if appropriately applied, allows one to recognise tissue continuities and distinctions through a specially focused lens; with each lens being most appropriate for a specific field of application and perspective while being less suitable for other tasks. For further details on this topic, we refer the reader to the aforementioned extensive review (Schleip et al., 2012).

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