The 'anatomy trains'

Understanding the role and nature of fascia in health and dysfunction is of vital importance to bodyworkers and movement therapists of all schools and Tom Myers, a leading Rolfer, has responded to *JBMT*'s request for a review which will increase our awareness of the significance of this ubiquitous tissue with an exciting series. He has modelled these discussions on a format which has proven popular and illuminating in his teaching programmes. The peer reviews of the article in this issue were enthusiastically positive.

Editor

T. W. Myers

Abstract Myofascial continuities are key to global pattern assessment in bodywork and movement treatments. Five major lines are traced and their clinical implications discussed.

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He is also influenced by his direct studies with Buckminster Fuller, Emilie Conrad-Da'oud, Judith Aston, and Oscar Ichazo. A certified Touch-in-Parenting Instructor, Mr Myers is especially interested in perinatal issues and teaching appropriate touch and handling skills for caregivers and new parents.

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Introduction

In the 20th century development of kinesiology and touch-based therapies, great emphasis has been placed on particular intraskeletal relationships, and on the actions (or tonus) of individual muscles. Whether under the law of the artery or the law of the nerve, the chiropractors and osteopaths became fixated for some time on getting every joint unfixated. The point was to get each and every joint positioned properly with a normal range of motion. Kinesiology and massage-related texts were packed with goniometric angles and analyses of what each muscle does based on drawing the origin nearer to the insertion. Techniques concentrated on restoring each individual muscle to proper strength and elasticity, be it through treating trigger points, strain-counterstrain, muscle testing, or particular exercise (Luttgens 1992, Kendall & McCreary 1983, Warfel 1985, Travell & Simons 1983, Beck 1994, Shafer & Faye 1975).

Latterly, with the introduction of holism and its accompanying concepts, the realization is abroad that no joint works alone. More attention has therefore been paid to the soft tissue as an entire network, and it is increasingly understood that articular *chains* of muscles are more clearly indicative of healthy function than the freedom or strength of any one component (Chaitow 1987, Calais-Germain 1993, Rolf 1989, Todd 1937, Alexander & McNeill 1982).

This article outlines five clinically useful sets of articulated myofascial chains – using the metaphor of train lines – and gives a brief overview of the clinical implications of working with them in their entirety. Part 1 introduces the fascial net, lays out the rules for constructing an 'anatomy train', and traces the first three of the five lines. Part 2, in a subsequent issue of this journal, will follow the other two lines, indicate some of the branch lines, and give some general notes on using the lines in principle and in practice.

The origin of the fascial net

A brief overview of the ontogeny and disposition of the fascial net will help lay a railbed for our tracks. Around the 14th day of embryonic development, the rapidly growing blastosphere of dividing cells begins to undergo its first differentiation, into ecto-, meso-, and endodermal layers. From this point forth it requires some kind of structure – apart from the mucopolysaccharide intermembranous 'glue' which has sufficed until then – to keep it from being deformed, scrambled, or 'smooshed' by the hydraulic forces inside the womb (Synder 1975, Schultz 1996) (Fig. 1).

Until this initial act of specialization, spatial arrangement has been largely irrelevant, because all the cells have been carbon copies of each other. From the moment cells start to take on discrete functions, it is essential to maintain consistent spatial arrangement in the face of gravity and other forces.

To meet this challenge of maintaining a developing pattern while allowing radical growth,* a very interesting event occurs: from the middle layer, the mesoderm – from which will arise all the muscle and connective tissues – a special class of cells called the *mesenchyme* (literally 'the mess from the middle') organizes and then disperses its cells throughout

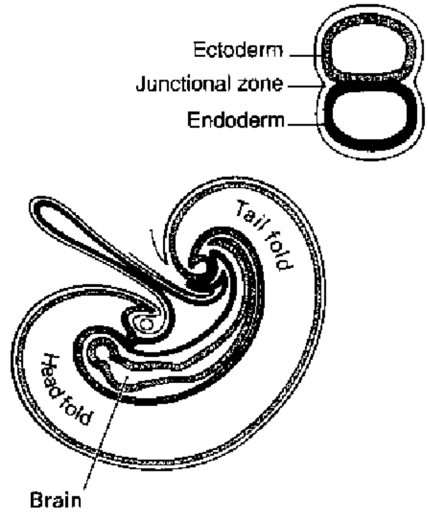

Fig. 1 The magical origami of human development begins with the formation of the neural, notochord and alimentary tubes.

all three layers of the embryo (Snyder 1975). These primitive connective tissue cells then secrete a three-dimensional cobweb of reticulin into the interstitial spaces (Fig. 2).

Reticulin is immature collagen, very thin and delicate. The fibres of this net do bond chemically, but they also entangle with each other like Velcro®. The embryo at this point is around 98% water and very small, so that even a minor hairnet does the job of retaining spatial relationship nicely. As the forces become greater, the reticulin will gradually be almost entirely replaced by collagen produced by mesodermal fibroblasts during the rest of embryonic development and growth. This three dimensional cobweb of collagen forms the basis, along with the gluey ground substance and elastin, of the strong, perlescent, pliable extra-cellular matrix (ECM) so well-known to osteopaths, rolfers, and other explorers in the realm of soft-tissue (Rolf 1989, Oschman 1987) (Fig. 3).

The collagenous net is to animals what cellulose is to plants – the scaffolding around which everything else is built, hung, or inserted (Juhan 1987). The major difference is that plant cellulose maximizes stability

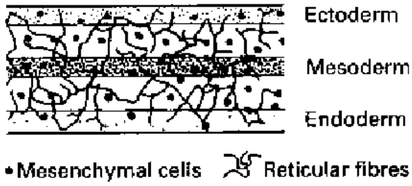

Fig. 2 The fascial net begins shortly after the first cellular specialization.

over movement, whereas collagen favors mobility – with the price being a more dynamic stability. Our stability requires near-constant maintenance. If we could somehow cause everything but the cellulose in a tree to disappear, the tree would likely remain standing. In contrast, if everything but the skeleton disappeared from a human body, the bones would clatter to the ground. Without the ligaments, nothing would lock the bones together – the overlapping shingles of the articular facets would not be enough to keep the vertebrae from scattering. Deprived of their fibrous grout, even the sutures might separate and the cranial and facial bones unlock. If, through another bit of magic, we managed to make everything but the collagenous net disappear, it likewise would not stand alone: the webbing – gossamer in some places, strapping tape in others – would waft and sag to the floor with a sigh. The upright human is a unique interdependence between the skeleton, the ECM webbing and interstitial fluid, and the neurally-run electrogel of muscle that provides the second-to-second adaptation responses.

Fig. 3 Collagen fibers like these are dispersed through every living tissue, and truly determine our shape.

*This explosive growth can be approximated by putting a straw into a child's jar of bubble mixture and blowing vigorously. The resulting cloud of bubbles flowing out of the jar and down your hand begins to simulate, though not nearly match in number, the incredible proliferation of cells following the second week of development. The job of the mesenchymal net is to shape these spiralic outpourings.