A REVIEW OF THE IMPACT OF KINESIOLOGY TAPE ON FASCIAL CHAINS AND FLEXIBILITY

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INTRODUCTION

Kinesiology tape (K-tape) has gained global attention, as an alternative taping method, since its endorsement at the 2008 Olympic Games. It continues to feature at the highest level of competition across a multitude of sports (1,2). K-tape is designed to mirror the body’s skin properties by using thin adhesive elastic material capable of stretching between 30 and 40% of its resting length (3). This distinctive elastic feature is the key factor behind claims that K-tape can potentially increase circulation, reduce pain, enhance sensorimotor feedback, increase power output and correct mechanical dysfunction (3–6). Such effects are attributed to the elastic recoil which occurs as a result of tension within the tape. Once applied this recoil effect lifts the skin releasing the pressure around the injured area permitting the underlying muscle and fascial (myofascial) tissue to function more effectively including the circulatory, lymphatic and nervous systems within the human body (6).

The concept of tape, capable of mirroring the body externally to enhance functions internally, is attractive to athletes who require all systems within the body to be functioning at an optimum rate. Furthermore, athletes will look to enhance all areas of their physical capabilities where possible (7). One area that has exemplified optimum functioning is that of flexibility.

Flexibility is a crucial component of performance across numerous areas including running velocity, technical execution and body positioning, movement efficiency and posture and a functionally balanced kinetic chain (8–11). Furthermore, muscle flexibility provides tissue maintenance, therefore lowering the risk of spasms and trigger points and subsequent injury (12–14). There are substantial levels of interest in terms of defining the relationship between K-tape and flexibility; however, to date research within this field has failed to provide definitive evidence (3,15–20).

The existence of fascial chains suggests flexibility throughout the body may ultimately result from the condition of entire links of myofascial tissue and, therefore, suggests that to enhance flexibility at a joint locally, it must also be enhanced throughout the whole body.

K-TAPE AND FLEXIBILITY

At a fundamental level flexibility is simply how much range of motion (ROM) is present at an isolated joint or multiple joints in series (22). Extensive research exists around flexibility, its manipulation and the use of reliable measurement techniques (11,22–29). The theories attempting to explain the adaptive mechanisms remain varied and in cases speculative (11,22–29). They can be broadly separated into two main schools of thought whereby adaptation is either structural or sensational (30). This may allow for the relationship between flexibility and K-tape to be more easily identified.

The premise behind this theory is that flexibility results from the physical adaptation of myofascial tissue structure allowing for the associated muscle groups connected to a particular joint to achieve a longer resting length. This permits the joint to move through a greater ROM (11,24). The specific mechanisms that occur within the body during structural adaptation can be further separated into several possible explanations.

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The first and most popular explanation is that additional muscle fibres, known as sarcomeres, are further recruited or re-aligned in series (meaning 'length ways') within the tissue (11,22,24,28). In order for this to take place it is suggested that ‘myofibrillogenesis’ must occur at a molecular level within the tissue (31). The molecular reaction is stated to be a series of ‘signal sensing’ mechanisms evolved by the human body to react to the regular external stress or forces experienced by the body (31,32). This is reported to occur at a cellular level through neural pathways within myofascial tissue prompting gene transduction and transcription (31,32).

Schleip (33) states that the nervous system should primarily be seen as a ‘liquid system’ where blood and lymph also act alongside further neural pathways to provide fluid transmission of nerve signals throughout the body, particularly signals that prompt the process of myofibrillogenesis and protein synthesis. Muscle tension has been stated to have a dysfunctional and debilitating effect on neuronal signalling within myofascial tissue (13,14,34). K-tape proposes improved circulation and lymphatic flow whilst also relaxing muscle to restore normal function (5,18).

The second explanation essentially results from myofascial tissue ‘relaxing’. An altered or reduced amount of messaging from the central nervous system (CNS) allows muscles to lengthen past their normal ROM causing ‘viscoelastic deformation’, or more simply put a permanent reshaping of muscle fibres (22,29). The cause of altered or reduced CNS messaging is specifically about overcoming an autonomous defence strategy known as the ‘stretch reflex’ mechanism. The mechanism suggests afferent and efferent signalling between the CNS and muscle spindles creating a reflexive muscle contraction designed to protect a muscle from rupture by stretching too far too quickly (35,36).

Another alternative theory embraces the idea that flexibility is purely a subjective reflection based on an individual’s ‘tolerance’ of end-range positions. This suggests that myofascial tissue has the potential to reach further end points but is prevented by doing so by the sensation experienced by each individual, therefore preventing them from extending past that point (30,37,38). This mechanism could, at ‘end point’, reduce or stop the increase in flexibility. It is further suggested that routinely stretching the myofascial tissue promotes a change in the perceived sensation of discomfort, or pain, by the subject as the muscle reaches its stretch end point. This routine stretching would then reduce or stop the signals of pain from the increased tension at the end point, permitting further stretching and flexibility (30,37,38). Kase et al. (6) state a direct pain reduction effect by relieving the pressure off pain and discomfort receptors; it may, therefore, be logical to speculate that K-tape could create more relaxed conditions and fewer afferent signals of pain being transmitted, thus the subject’s end point and flexibility may be altered.

**PHYSIOLOGICAL PROPERTIES OF K-TAPE**

The physiological properties that facilitate flexibility, and are purported to be affected by K-tape, suggest that the application of K-tape directly to local muscles around a joint would result in an increase in the ROM of that specific joint. However, this view of flexibility may be limiting the potential of K-Tape application.

The discovery of the fascial network, running throughout the body, has prompted a modern re-evaluation of the complexity and integration of the muscular system. The understanding of anatomy in terms of movement and architecture is moving towards a more interlinked, sophisticated system governed by fascia (33,39–42). Fascia is intrinsically involved in both posture and movement and is abundantly innervated by sensory receptors (21,39). This has been proven to exist as a number of continuous force transmitting ‘chains’ throughout the body (40–42). Stecco et al. (42) state that the presence of referred pain often some distance away from its origin, such as that seen with trigger points, is confirmation of fascial chains. Wadsworth (21) adds that even altered muscle tonus is a component capable of referring restriction distally from its origin to another distal segment of the chain. In other words, tension within one aspect of the body could create restriction elsewhere in the body. This is known as a ‘tension continuity effect’.

Flexibility is potentially not just a property defined by the behaviour of localised muscle connected to a joint, but is in fact a global network defined by the fluid continuity of the fascial chains that binds the human body and supports our movement. The recognition of fascia’s place within flexibility, combined with the enhancements stood to be gained from K-tape, suggests that a tape application which embraces this global network could provide a far deeper and more comprehensive approach to increasing an individual’s ROM and quality of movement.

This ultimately translates as a stronger approach to increasing an athlete’s ROM and therefore links to the chain reaction of biomechanical events and flexibility. Enhancing this link leads to enhanced movement and enhanced performance. The significance of K-tape to fascial chains and flexibility is an under-researched field. If the ‘tension continuity effect’ underlying ‘fascial chains’ does exist then it stands to reason that taping methods, incorporating full ‘chains’, should enhance the flexibility of all joints accommodated within that ‘chain’. Published research in this field remains limited and inconclusive (15,18).

Garcia-Muro et al. (18) present a case report attempting to document effects of K-tape on restricted shoulder ROM in patients with myofascial pain. The visual analogue scale (VAS) was used to gauge the individual’s pain where measurements are based on a subject’s responses which then equate to numerical ratings on a scale of pain (43,44). Subjective responses in this way, however, are largely open to subjective interpretation as there is little way of guaranteeing one subject’s score of 10 on the pain scale will equally be how another subject feels. Therefore any associated gains in ROM through pain reduction would be difficult to support. It should be noted, however, that this report states no change in VAS score post-intervention.

Another methodological void is the lack of definitive protocols which ensure a measured amount of tension.
is running throughout the tape upon application (3,15–20). Kase et al. (6) outlined tape tension as one of the most critical factors towards gaining successful effects from its use. Tension in previous research is both conflicting and unclear. Some research has used the ‘paper off’ method, which relies on the stretch placed and held within the tape whilst on the backing paper (15,19). Research using the paper off method has reported stretches between 10 and 25% (3,15,19). In addition, further research proceeded to investigate the effects of K-tape on ROM whilst declaring no known or intended degree of tension during research at all, leading to a high degree of irrelevance within their results (16–18,20).

The most questionable aspect from previous research is the understanding of the factors associated with facilitating flexibility (3,15–20). Experimental designs have, in all circumstances, simply applied K-tape to subjects in a bid to then measure a potential increase in ROM. However, as noted earlier, flexibility is ultimately a product of some form of regular, consciously applied force, which stimulates the muscle to adapt either its length or neural and cellular functioning (1,22–25,28–30,45). K-tape cannot be viewed separately from these factors, specific to ROM, as in doing so would be to omit the crucial stimulants that are fundamentally needed for increasing ROM. Furthermore, despite the supported existence of fascial chains and the role they may well have in creating global flexibility, none of the research presented in this article incorporates a taping method that reflects or acknowledges this issue (2,33,39–42).

### SUMMARY

Existing studies are fraught with undermining features leading to an inability to conduct a reliable, valid or ‘true’ assessment of K-tape and its impact on flexibility. The inferential power of research is often highly questionable and therefore in many cases the questions surrounding K-tape themselves are still largely unanswered. K-tape in many investigations has been tested under conditions where it was under-appreciated and misplaced. The mechanisms of flexibility appear to operate under the architecture of fascia yet none of these issues are reflected in the research. It would therefore seem appropriate to conduct further research that incorporates improved, standardised, valid and reliable testing methods to investigate K-tape’s relationship towards both flexibility and fascial chains.

### References

Owing to space limitations in the print version, the references that accompany this article are available at the following link and are also appended to the end of the article in the web and mobile versions. Click here to access the references [http://spxj.nl/1BFZQdf](http://spxj.nl/1BFZQdf).

### FURTHER RESOURCES

1. Visit the RockTape website for videos on how to use K-Tape [http://rocktape.net/how-to-use.html](http://rocktape.net/how-to-use.html).

### KEY POINTS

- The concept of K-tape mirroring the body externally to enhance functions internally, is attractive to athletes who require all systems within the body functioning at and optimum rate.
- There are substantial levels of interest in terms of defining the relationship between K-tape and flexibility.
- The significance of K-tape to fascial chains and flexibility is an under-researched field.
- A major methodological void is the complete lack of definitive protocols within K-tape research.
- The effects of K-tape are attributed to the recoil effect lifting the skin and releasing pressure around the injured area.
- The idea that K-tape increases ROM when directly applied to local muscles around a joint might limit the potential benefits of K-tape use.
- The existence of fascial chains suggests that to enhance flexibility at a particular joint, flexibility must be enhanced throughout the whole body.
- The application of K-tape that embraces the idea of a global fascial network could provide better gains in ROM and movement quality.

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**THE AUTHORS**

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Sarah is the programme leader of the Sports Therapy and Rehabilitation degrees at the University of St Mark and St John. The development of these degrees and her clinical work has led her research into the area of Kinesiology tape and the material properties linked to the application of tape in a clinical setting.

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Lance graduated in 1992 with a BSc (Hons) Sport Science from Liverpool Polytechnic (now Liverpool John Moores University). As a research assistant he completed a PGcert in teaching and learning in HE in 1996 and completed a PhD in 2002 on the biomechanics of sports injuries. Lance moved to Plymouth and the University of St Mark and St John in 2001. In 2012 he completed an MEd focusing on the role of the student feedback process. The development of the very successful Sports Therapy and Rehabilitation degrees at the University of St Mark and St John has led his research down the path of Kinesiology tape and predominantly the material properties associated with the tape in relation to injury prevention and rehabilitation.

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Stu is a licensed Sports Therapist, Level Four REPs certified Personal Trainer & founder of The Movement Project; a London based Health, Fitness & Rehabilitation business. Following a successful career as a Royal Marine Commando he went on to graduate with a BSc (1st Class Hons) in Sports Therapy form Marjon University in 2013. Further interest in developing a deeper understanding of the properties linked to improving human movement he focused his research into the area of Fascial Chains and Kinesiology Tape in a clinical setting and continues its practical use towards athletes & clients for enhanced performance.