

## NATURE, APPLICATION AND EFFECT OF KINESIO - TAPING

*(Preliminary communications)*

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### **Abstract**

*A study was made on the scientific concepts of researchers on the new paradigm of the nature, structure and meaning of the human body's fascia. It discusses the functions, the biomechanics and its changes in trauma, grades of fascial damage and consequences of the damage. Scientific opinions of researchers and evidence explaining unsuspected possibilities of kinesio-tape - still not popular enough among the specialists physiotherapists, kinesitherapists, etc., were examined. The basic principles of the methodology application, methods of treatment with kinesio-taping, and effects of its application are presented. Contraindications are pointed out, too.*

**Keywords:** *physiotherapists, kinesitherapists, fascia, methods of treatment with kinesio-taping, Screening test, Linder's test, method of deduction, observing, expert appraisal.*

### **INTRODUCTION**

It is known that myofascial dysfunctions and damages are common problems in the clinic. They cause other pathologies - the principle of the domino. However, relatively widely applied in the developed countries kinesio-taping, positively influencing these pathologies, is little known in Bulgaria. This drew our attention to a new methodology in our country.

#### *Purpose of the study*

Research on the problem of fascia - its nature and function, and the abilities of kinesio- tape to accelerate the healing process.

#### *Tasks of the study*

- Research on scientific concepts of nature, structure and role of fascia in the human body
- Establishing the new paradigm for its function.
- Establishing its biomechanics.
- Its changes in trauma
- Grades of damage
- Consequences of damage
- Basic principles of the application methodology of kinesio- taping.
- Effect of its application in practice.
- Contraindications for application.

### **METHODS**

- Analysis of literature sources (method of deduction)

- Observing
- Expert appraisal

### **RESULTS**

Kinesio-taping method was discovered in 1979 by the Japanese doctor - chiropractor Kenzo Kase. In 1988 he presented it to the international community at the Olympics in Seoul, to the U.S. A. in 1995 and Europe in 1996. Kinesio-taping's International Association was established in 2007.

Many years of studies allowed the development of kinesio-taping's strips' parameters to be close to those of the skin - as thickness and elasticity are similar to muscle's (varies within 130 to 140%). Kinesio-tape is a cotton elastic fiber, waterproof, breathable, anti-allergic, without medications, with hypoallergenic glue completely different from previously existing sport - medical tape.

Kinesio-taping is used mainly for non-sports (85%) and about 15% for athletes. It is being used regardless of age.

In more than 40 colleges and universities in the U.S. A. in 2003 kinesio-taping's method is taught and it is part of the education of physiotherapists, sports-medics, kinesitherapists, rehabilitators.

The theory of Kenzo Kase is based on the impact of kinesio-taping on the fascia and thus helps the healing processes of the body. His theory was revolutionary one.

He called the fascia - "organ" and makes made it the most - important organ in the human body with an essential role in regulation of the structure and movement of the body.

Until recently it has been assumed that fascia adapts passively to short-term changes towards the requirements of the muscles' tension. In medicine, until recently, muscle fascia has not been considered significant or has been understated for its functions and meaning. However, over the last years scientists have studied its structure, function and meaning.

Later, it was proved that the muscle fascia is a structure with great opportunities for active adaptation, possessing significant sensory apparatus (Ovcharov (Овчаров) & Pastirova (Пастирова), 2011).

Fascia are connective - tissue plates, wrapping individual muscles or muscle groups. They form lairs often primary or capture places of some skeletal muscles - m. supraspinatus, m. infraspinatus, m. teres major, etc.

In the Anglo-Saxon literature the endomysium, perimysium, epimysium and the muscle's fascia are united in deep fascia - "deep fascia".

Ovcharov (Овчаров) & Pastirova (Pastirova) 2011, stated that "Clearly the fascia (connective tissue) inside the muscle (endomysium, perimysium) is related to the mechanics and pathology, including muscle pain, of muscles".

Superficial fascia (fascia superficialis) is located under the skin and envelops the body like cocoon. In superficial fascia there are multiple perforations through which triads built from a small vein, artery and nerve pass. Staubesand (1997), assumed that the nerves are amyelin autonomous (sympathetic).

Heine (1995), also described these triads and found that 82% of the points of the perforation of the triad are identical to 361 acupuncture points of the traditional Chinese medicine.

Fascia is composed of multiple layers of collagen strands with wavy and parallel way. Besides collagen fibers it includes different amounts of elastic fibers.

Between collagen and elastin it contains numerous fibroblasts. Between these layers or plates there is a thin layer of fat (Ovcharov (Овчаров) & Pastirova (Пастирова) 2011).

Undulating course of collagen fibers and the presence of elastic fibers allow the fascia to be elastic (stretching), which explains its strength.

Staubesand & Lin (1996), reveal the presence of the smooth - muscle cells in the muscle fascia situated between the collagen fibers. It is adopted that smooth-muscle cells are regulated by the nerve fibers of the autonomic nervous system and thus pre-tension of the fascia is regulated regardless of the muscle tonus (Staubesand, 1997), which is typical for actively adapting organs. This is the reason why Dr. Kenzo Kase defined it as a separated organ.

According to Kingler, Schleip & Zorn (2004), with the age the number of contractile cells decreases ten times and rigidity of the collagen fibers decreases twice.

Several years before the establishment of the smooth-muscle cells in the muscle fascia, Yahia (1993), proved that fascia has the ability to retract actively.

It is known that fibroblasts can transform into myofibroblasts that can retract actively. Such a transformation is performed frequently in pathological conditions such as the Duputiren's contracture, rheumatoid arthritis, liver cirrhosis and other inflammatory diseases (Schleip, 2003). In the fascia there is an extensive capillary net that is essential for the metabolism of the cells in it.

There are also nerve fibers and mechano - receptors - with an important role in the structure and function. Mechano- receptors are: Golgi's tendon organs, Fater - Pacini's bodies, Rutiny's receptors, interstitial receptors.

Golgi's tendon organs are receptors for deep sensibility or proprioception, activated by muscle contraction and strong stretch. In stimulation they reduce the tonus of the associated muscle fibers.

Fater - Pacini's bodies and Pacino-like bodies are the largest capsulated receptors. They correspond to the rapid changes in pressure and vibration. Rufini's receptors are activated by the prolonged pressure and tangential forces - lateral stretching (Kruger, 1987). Typical of them is that after the nerve enters the capsule of the receptor it splits multiple times.

It is assumed that as a result of their activation, the sympathetic activity is suppressed (Schleip, 2003). The interstitial receptors are free nerve endings. Around 10% of them are thin myelin fibers and 90% - amyelin fibers. These free nerve endings are nocisensitive and termosensitive receptors. Researches by Mitchel & Schmidt (1977), show that they are mechano-receptors activated by mechanical pressure and strain. On the interstitial receptors vegetative functions are transcribed, as well - their stimulation leads to changes in breathing, heart rate, blood pressure changes, etc. (Schleip, 2003). These receptors enhance vasodilatation and possibly the passage of blood plasma into the connective-tissue of the muscle fascia. We should not forget the presence of vasomotor sympathetic fibers in the muscle fascia and thus the blood flow in them is regulated. Certainly, for the fascial plasticity, except the particular structure, the nervous system has an important role, too. The theory that muscle fascia has only mechanical structures is incomplete and inaccurate and should be corrected. Therapeutic manipulations on the fascia and muscles lead to the stimulation of mechano-receptors, resulting in reaching the areas of CNS, having control over the tonus of the relevant muscles, on which manipulations were performed.

The impact of manipulations through the interstitial receptors and Rufini's receptors reaches to the autonomous (vegetative) system, thence to the hypothalamus, the impact of which affects the global muscle tonus, dynamics of fluids in the tissues of the muscles and fascia, and smooth-muscle cells in fascia (Scheip, 2003).

Mechanoreceptors' stimulation leads to neuro-physiological changes in the structures of the muscle fascia,

including the fluidity of the treated tissue, and changes in its water content (Ovcharov (Овчаров) & Pastirova (Пастирова), 2011).

### **Changes of fascia in traumas**

Fascia responds to the acute traumas or chronic repeater microtraumas as follows:

- Changes, related to aseptic inflammation of soft tissues - liquids associated with the inflammation are resorbed in the superficial fascia, but they damage tissues in its deeper layers. These changes are palpable in the diagnosis of somatic dysfunction.

- Changes in fascia under stress can be temporary or permanent, depending on the grade of the mechanical impact.

- Biomechanical stress in injury irritates receptors that transmit the afferent information to the central nervous system. Different levels of adaptation for both the receptors and the central nervous system determine immediate and long term effects on the neuro-muscular regulation in trauma of the fascia.

- Adhesions, associated with the aseptic inflammation and the injury itself, violate the supportive, motor and lubricating function of fascia.

In connection with this the theory of Kenzo Kase, as already mentioned, is based on the view that the effect of the kinesio-taping on superficial and deep fascia is supporting the natural healing process in different pathologies.

More than 30 years Kenzo Kase and the specialists from around the world explored the clinical effect of the application of kinesio-taping's method for various diseases and dysfunctions of the body. Tape is applied in different fields of physiotherapy: orthopedics and traumatology, neurology, pediatrics, geriatrics, cardiology, obstetrics and gynecology, sports medicine, etc. The results of different studies are surprising. They show a remarkable effect of kinesio-taping in dysfunctions and damages..

Special attention is given to the importance of muscle function and the arising idea of the effect on muscle disbalance by activating the own healing processes. Using kinesio-tape supports the muscle-joint system.

During inflammation of the muscles, tendons, ligaments and swelling or shortening, the space between the skin and fascia decreases, there is a stagnation of lymph and blood flow and compression on the pain receptors (nociceptors). The pain, known as myalgia, is muscle pain. It is one of the reasons for the limited range of motion. Applying kinesio-taping improves freedom of movement, increases the relative space between skin and fascia, decreases the compression on nociceptors, improves the flow of lymph and blood circulation, thus natural biomechanical healing is achieved.

Numerous microtraumas gradually violate the elasticity of fascia and its trophicity and functions. They lead to **three stages of fascial injury**:

- Stretching (distortion I stage)
- Hyperextension (distortion II stage)

- Rupture (distortion III stage)

### **Consequences:**

- bad posture due to the compensatory reactions
- limited range of motion
- loss of elasticity and mobility of the tissues
- edema and hemorrhage
- myofascial pain.

**The effect of applying kinesio-tape** in these cases is as follows:

- Kinesio-tape leads to carefully lifting the skin, increasing the space between the epidermis and fascia, which reduces the stagnation of lymph and improves lymph circulation and blood flow, i.e. quickly affects edema and hematoma.

- Relieves the pain by activating endogenous painkillers (pain-suppressing system) and releasing the compression on nociceptors.

- Proprioceptive stimulation - kinesio-taping stimulates neuroreceptors located in the skin and fascia.

- Mechanical correction of the underlying soft tissues and structures by correcting techniques such as the effect of kinesio-taping, is expressed in correction of the positional errors and functional limitations between the articular surfaces, caused by shortening of muscles or muscle spasms.

- Increasing the range of motion in joints.

- Improving the muscle contraction of the damaged muscle, increasing strength and the range of motion, reducing the muscle tonus.

### **Methodology of treatment with kinesio-taping**

Before placing the tape a Screening test needs to be done to detect the problem using four versions of the Linder's test by regions:

- upper body
- upper limbs
- lower body
- lower limbs

Revealing affected region, we proceed to testing the core muscles in the region and move on to placing the "Kinesio Tech", bar.

"Kinesio Tech" is placed at the maximum tension of the relevant muscle. The glue on the "Kinesio Tech" bar is activated by the heat released from the body, supported with an additional gently rubbing on the tape.

Up to 1 min it reaches the maximum level of its adhesion qualities.

The basic applications of kinesio-tape are:

"I" - strong tape with the biggest effort, the tension is focused directly on the target tissue (therapeutic area), for stabilizing of joints.

"Y" - with less effort than the "I" application, the tension is under the bar and between the two ends of the target tissue. It is U used for the ligament and tendon techniques, corrective, myofascial, for wrapping the muscle, mechanical correction, for supporting the superficial fascia.

"X" - the tension is focused on the target tissue between the two double edges. Works on a small space

– rhomboids, elbow injury, fascia. With it we gather a maximum amount of tissue together.

‘FAN CUT’ - this application is with very low effort. Used for edema, for improving blood and lymph circulation. In sport – for reducing the muscle tension and fatigue - for example riding - inlays on the quadriceps 1-2 pieces, ‘FAN CUT’ on foot and affects 15 to 20 min. It has been proven that the effect is better than the massage.

‘WEB CUT’ - is also used to reduce the edema, but its is stronger than ‘FAN CUT’. It is U used in strains - myofascial bursitis, sports trauma, for pain reduction, etc.

Tension of the ‘Kinesio Tech’ bar:

- 0 – 10 % - effects on the myofascia
- 10 – 15 % - inhibition of the myofascia
- 15 – 25 % - facilitates the myofascia
- 25 – 35 % - corrective techniques
- 50 – 75 % - tendon, ligament, mechanical corrections
- 75 – 100 % - for mechanical corrections and ligament techniques
- 0 % - on the edges of the application, which should be approximately 5 cm long each.

In presence of the areas with a concentration of lymph nodes, lots of sensory areas and concentration of receptors - the tension is low or the application there is to be avoided.

Generally, applications affect optimally for 3 to 4 days. But when the tension is high 75% - 100%, 12 to 24 hours are enough.

**The effect of ‘Kinesio Tech’ is reduced to:**

- reducing pain
- increasing extensibility and mobility of the tissues
- reducing edema and hemorrhage
- correcting an incorrect position of a muscle, fascia and joint.

**Corrective techniques are:**

- mechanical correction
- fascial corrections
- tendon - ligament corrections
- functional corrections
- blood and lymphatic corrections
- correction of cicatrices (dents)

**Kinesio-taping method is used in:**

- muscle disbalance
- postural insufficiency
- disturbances in blood and lymph flow
- ligament<sup>2</sup>, tendon<sup>2</sup>, joints<sup>2</sup> operations
- fascial adhesions and contractures
- scars and cicatrices
- pathological motor activities
- musculoskeletal pathologies
- spinal deformations (postural abnormalities)
- post-traumatic conditions
- post-immobilization conditions
- varicose veins
- neurological disorders

- infantile cerebral paralysis (poliomyelitis)

It is used, as we pointed out, in orthopedics and traumatology, neurology, pediatrics, geriatrics, gynecology, cardiology.

**Contraindications:** open wounds, too obese people, mental illness, cancer, active infections on the skin, thrombosis.

**Careful with:** diabetic patients, kidney diseases, pregnancy, sensitive and strengthen skin.

**Effect on muscles:**

1. Reduces pain
2. Increasing the range of motion
3. Increases contractile ability
4. Improves the proportion length - tension, creating optimal strength
5. Quick recovery of tissues
6. Reduces fatigue
7. Reciprocal inhibition

**Effect on joints:**

1. Balances agonists and antagonists
2. Reduces muscle defense and pain
3. Supports the functions of ligaments and tendons
4. Enhances kinestatic interrelations

D to P (Distal → Proximal)

For inhibition in acute and overworked muscles.

Applies from distal to proximal with tension of tape 15 % – 25 %.

P to D (Proximal → Distal)

To facilitate the work of a weak muscle in the chronic conditions, rehabilitation 15% - 35% tension

**Conditions for placement:**

- Skin need to be dry, not hairy, clean (if necessary cleaned with spirit to remove gels, creams, etc.). On the therapeutic area tissues need to be tightened, the joint – to be mobilized in full range before the tape, at the beginning and at the end of the tape (about 5 cm) there is no tension. The bar from the side of the glue - do not touch with fingers.

We rate before placing ‘Kinesio Tech’ bar and thereafter, allowing us to monitor results.

## CONCLUSIONS

- Kinesio-taping-method is an approved method based on the extensive clinical studies and proven positive results in various areas of physiotherapy.

- Kinesio-tape improves the function of fascia, muscles; and joints. Improves strength and range of motion, tones or inhibits myofascia, overcomes pain, reduces lymphatic and blood stasis, stimulates proprioception, improves movement and coordination.

- By specifying the region and the tissue for application, the technique and the type of application are specified (corrective, stimulating, inhibiting, anesthetic, lympho-draining, proprioceptive-stimulating etc.).

- For the best result of kinesio-taping it is important to know well kinesio-taping methodology, techniques and types of applications, otherwise in case of an improper application - the results can be negative.

- The method of Dr. Kase is widely applicable - not only in different pathologies, but also at all ages.
- Kinesio-taping can be used with all other known methods in medicine, physiotherapy, kinesitherapy, sports, etc. for supporting and accelerating the healing process.

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