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The Challenge  
of Interpretation

# Sports Injuries – Improved Healing Processes due to Integrative TCM Therapy

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**Figure 1:** Sprained ankle with or without fibula fracture, a frequent sports injury (© iStockphoto)

Sport injuries are, both in hobby and professional sport, something that happens regularly. In a worst case scenario they may end a sports career. A fast and painless comeback with a minimum in performance loss is therefore of the highest priority.

Acute ankle injuries are most common and frequent (figure 1) among athletes practising sports such as tennis, soccer, basketball, dancing, where fast sprints, sudden turns, stop and go techniques or physical contact with an adversary are commonplace.

## **Conventional Therapy versus Integrative TCM Treatment**

First aid measures in conventional therapy are what is known as RICE (rest, ice, compression, elevation), where besides applying ice and compression, the injured part is raised, immobilised and rested. The severity of the injury usually determines the kind and length of the immobilisation. After that, physiotherapeutic and physical treatments are applied to help maintain a proper and full functioning and early mobilisation of the joint.

The therapeutic principle for first aid measures in TCM, on the other hand, is to unblock the *qi* and Blood stagnation resulting from the trauma as soon as possible. A combination of TCM methods like acupuncture, internal and external herbal remedies

and *tui na* massage has successfully proven its worth. The idea of the body, which includes anatomical structures like tendons, ligaments and bones, being a pulsating energetic system with self-regulating healing power, changes the approach regarding mobilisation and immobilisation.

Movement is not only interpreted by biomechanical analyses, but can also be seen as a necessary means to circulate *qi* in the meridians which helps to recover physical function.

This concept, common also to *qi gong* theory, leads to a reduced immobilisation time in the case of injury and to individually adapted rehabilitation programmes, which begin right from the moment of injury. A strict and rigid classification into different stages, with immobilisation both in the acute and the reconstruction phases and movement only in the rehabilitation phase, is considered an obsolete strategy.

The widespread practice in the West of using ice therapy for acute injuries seems superfluous or even counterproductive from an energetic point of view: In the short term it may help to soothe pain and reduce swelling caused by the injury, but the longer it is applied, the more it decelerates the energy and blood flow,

Diagnosis/ examination/ symptoms	Therapy	Chronology	Immobilisation/ physical activity
Acute injury	Gentle massage, with Blood ( <i>xue</i> ) stasis breaking and Blood moving acute phase herbal tincture. <b>No ice therapy!</b>	First aid	Compression
Physical examination: suspected ankle bone fracture	Application of Blood ( <i>xue</i> ) stasis breaking and Blood moving overnight herbal paste	After 30 minutes	Taping
Radiologically: stable distal fibula fracture of type Weber B	Gentle classic sports massage once a day, with acute phase herbal tincture and overnight herbal paste	One day	<b>No immobilisation</b>
Patient is free of pain, no pressure pain or rest pain	Classic daily sports massage with acute phase herbal tincture and overnight herbal paste every other day for 14 days. Twice daily magnetic field therapy	Third day	<b>Vertical maximum load, careful gait not necessary anymore</b>
	Starting rehabilitation programme with bicycle	Seventh day	Start rehabilitation
<b>Subjectively: trauma is overcome</b>	Extended rehabilitation programme with light running training	Tenth day	The injured player said: 'let's get back to soccer playing' (still not allowed)
Physically fully recovered		From four weeks on	<b>Return to team training and soccer playing</b>
<b>Ready for competition</b>		Forty-first day (after six weeks)	<b>Comeback for 65 minutes in a competitive game</b>

**Table 1:** Chronological treatment and rehabilitation procedures after ankle sprain with fibula fracture

which already are stagnant due to the trauma. TCM instead offers excellent and effective options to handle acute injury conditions without using ice.

One can apply herbal formulas, acupuncture and *tui na* already in the acute and reconstructive phases. The benefit of implementing TCM concepts and treatments lies in the fact that pain relief, energy and blood circulation, as well as rapid absorption of oedema and haematoma, can be achieved and are fundamental for the acceleration of the healing process.

#### **Example Case History: Weber B Fracture of a Professional Soccer Player**

During an indoor tournament a professional soccer player was injured through direct contact with an adversary. He was diagnosed with a fibula fracture at the level of the syndesmosis (type Weber B).

Based on the clinical symptoms and the radiological evaluation the fracture was considered sufficiently stable to avoid immobilisation,

ice, a plaster cast or surgical procedures. From various previous experiences the soccer club expected to lose the player for a period of three months, minimum. Instead of the RICE protocol, Chinese medicine treatment was implemented (see table 1).

To the astonishment of both the medical team and outside observers the injured soccer player was able to participate in a competitive match after only six weeks, half the time expected at the outset, thanks to the integration of various TCM herbal treatments. The treatment and rehabilitation protocol may be summarised as follows (table 1):

- regular daily application of specific TCM herbal tinctures and herbal pastes, together with *tui na* or classic sports massage, especially during the acute and reconstructive phases
- apart from initial taping almost no immobilisation
- starting with vertical maximum load (walking) after three days

- resuming the running training after ten days
- continuous increase of the physical exercise load and returning to team training after four weeks
- comeback to competitive match play after six weeks

Despite the initial prognosis, both healing and rehabilitation time could be reduced by 50 per cent due to the combined and efficient TCM herbal treatment.

### Just a Lucky Coincidence? Possible Explanatory Models and Current Research Results

The harmonious interactions and self-regulatory forces of the body play an important role in adjusting the healing process. From a TCM point of view, therapeutic strategies aim at optimising the body's own healing mechanisms and regulatory processes. The healing mechanisms, brought into action through the injury itself, are supported and speeded up through TCM treatment strategies. They must be adapted to individual conditions and to the three healing stages: the acute or absorption phase, the reconstruction phase and the rehabilitation phase. The pathophysiological subdivision into three healing stages only serves as a theoretical guide. In reality the three stages exist simultaneously and are influenced by each other.

The self-regulating mechanisms for the reconstruction and functional rehabilitation of the affected body structures start from the first impact of the injury if obstruction is eliminated quickly. During each of the three stages the free flow of *qi* and Blood (*xue*) may be successfully stimulated by TCM according to the following principles:

#### 1. Acute or Absorption Phase – Reduction of Oedema and Pain, Accelerated Haematoma Absorption

Acute haematoma and swelling after trauma can be eliminated most effectively by using TCM methods such as light *tui na* massage and application of liniments and herbal pastes (see as an example table 2 and table 3)

Acupuncture, however, offers an additional *qi* moving method to relieve pain and to increase blood flow to accelerate absorption processes in the acute phase. According to TCM theory (*yin* and *yang* relation), by improving the flow of *qi* it is possible to increase blood circulation.

A Japanese scientific study titled 'Changes in Blood Circulation of the Contralateral Achilles Tendon During and After Acupuncture and Heating'<sup>1</sup> investigated the effects of acupuncture and heating treatments (application of hot pack) on the blood circulation in the ipsilateral (affected side) and contralateral human Achilles tendon. Measurements of blood circulation during and after treatment were made by using red laser lights (BOM-L1TRSF: Omegawave).

<b>Zi jin jiu – 'Precious purple medicated wine'</b>	<b>Quantity</b>
<i>Xue jie</i> (Draconis resina)	6g
<i>Hong hua</i> (Carthami flos)	6g
<i>Zhang nao</i> (Camphora)	3g
<i>Gao liang jiang</i> (Alpiniae officinari rhizoma)	12g
<i>Bi bo</i> (Piperis longi fructus)	9g
<i>Xi xin</i> (Asari herba)	6g
<i>Bai jie zi</i> (Sinapis albae semen)	6g
<i>Bing pian</i> (Borneolum)	3g
<i>Sheng di huang</i> (Rehmanniae radix)	6g
<i>E bu shi cao</i> (Centipediae herba)	9g
<i>Ru xiang</i> (Olibani resina)	4.5g
<i>Mo yao</i> (Myrrha)	4.5g
In 50% Alcohol	500g

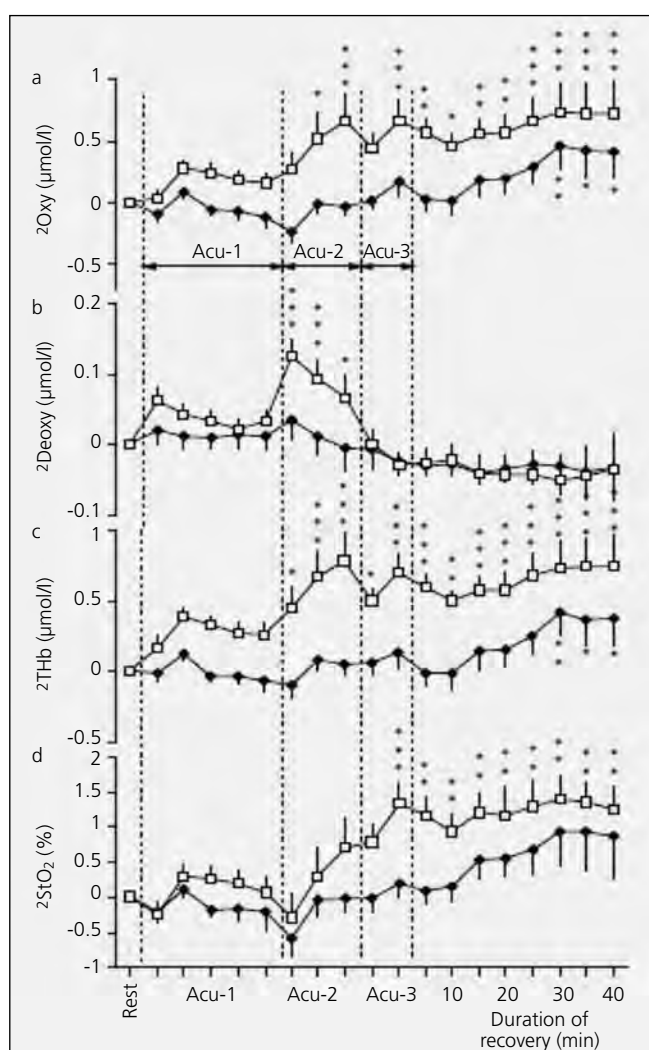
**Table 2:** Example of a TCM herbal tincture used for injury in acute and subacute stage

<b>Jie gu gao – 'Bone knitting paste'</b>	<b>Quantity</b>
<i>Wu jia pi</i> (Acanthopanax cortex)	2 parts
<i>Di long</i> (Lumbricus)	2 parts
<i>Ru xiang</i> (Olibani resina)	1 part
<i>Mo yao</i> (Myrrha)	1 part
<i>Tu bie chong</i> (Eupolyphaga seu steleophaga)	1 part
<i>Gu sui bu</i> (Drynariae rhizome)	1 part
<i>Bai ji</i> (Bletilla rhizoma)	1 part
Mel	As required to get a homogenous paste

**Table 3:** Example of a TCM herbal paste used for injury in acute and subacute stage

As ipsilateral acupuncture treatment, a stainless steel needle (0.16mm diameter, 40mm length) was inserted vertically into the skin, about 4cm proximal from the calcaneus, to a targeted depth (3mm) to reach the Achilles tendon. The needle was left in place for five minutes without any manipulation (Acu-1). After that the needle tip was moved from the targeted depth, with up-and-down manipulation at approximately 1mm amplitude and twice per second, for three minutes (Acu-2). Finally, the needle was left

in place for another two minutes without manipulation (Acu-3). To verify the precision of this procedure (the needle reaching the Achilles tendon), ultrasonography was used to verify that the distance from the skin to the superficial surface of the Achilles tendon was  $2.1\text{mm} \pm 0.4\text{mm}$ . In addition, the acupuncturist confirmed, visually and by sense of touch through the needle, that the needle had reached the Achilles tendon.



**Figure 2** (Kubu, K. et al., 2011:809)

Figure 2 presents the time course changes of oxyhaemoglobin (Oxy: a), deoxyhaemoglobin (Deoxy: b), total haemoglobin (THb: c) and oxygen saturation (StO<sub>2</sub>: d) of the treated (open spots) and the non-treated (closed spots) tendons, expressing blood circulation and metabolism of the Achilles tendon during and after acupuncture treatment. Various acupuncture techniques were applied. However, only after using the up-and-down manipulation (Acu-2) the blood volume and oxygen saturation increased significantly on the treated tendon although the measured variables for the non-treated side still did not change.

An interesting finding in this study was that the values of the contralateral side changed gradually, not during acupuncture but only after the removal of the needle. During the second half of the recovery period (measuring interval was 40 minutes), the increase in THb and metabolism activity of the contralateral side was significantly correlated to that of the ipsilateral tendon. Both tendons showed signs of higher blood circulation after ipsilateral acupuncture following the removal of the acupuncture needle.

These results indicate that the healing of the injured tendon, through better blood circulation, may be stimulated by applying acupuncture not only ipsilateral, but also to the contralateral healthy limb. This circumstance offers an additional treatment option when the treatment of the affected tissue becomes impossible due to immobilisation measures. Herbal pastes may be applied to the injured area (beneath the cast) while acupuncture and *tui na* can be applied, among other methods, to the contralateral side.

**Conclusion:** Acupuncture and herbal treatments during the acute and absorption phases are indicated to improve *qi* and Blood (*xue*) circulation, as well as absorption and elimination of accumulated blood, liquids and cells. This is the basic key for a short acute and absorption phase with a faster transition to the reconstruction phase. If the body is able to start earlier with the reconstruction of tissues, a significantly shorter healing time can be obtained, with a reduced risk of post-traumatic syndromes like persistent pain and later onset chronic arthritis.

## 2. Reconstruction Phase – How to Stimulate the Healing Process of Injured Tissues

A combination of herbal applications, *tui na* and acupuncture is recommended to accelerate the healing process and to achieve an improvement of the cellular structures.

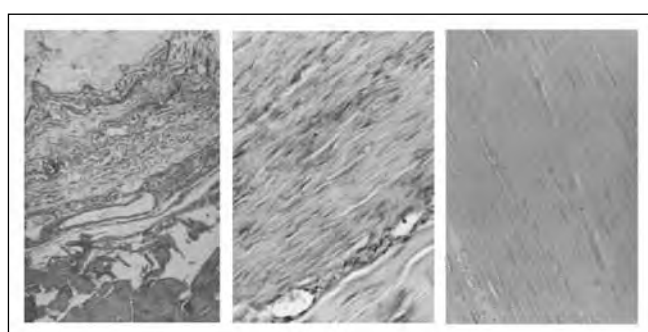
As far as acupuncture treatment to improve tissue healing is concerned, one animal (\*) study showed an interesting result in this context.<sup>2</sup> The authors examined the effect of acupuncture following a longitudinal splitting of the Achilles tendon in dogs.

The dogs were randomly divided into two groups from the third day after surgery. Only one group received acupuncture therapy, ten minutes per day on GB 30 *huan tiao*, BI 40 *wei zhong* and St 36 *zu san li* for two weeks. Macroscopically, the dogs with acupuncture treatment showed less peritendinous adhesion formation compared to the control group.

\* Quoting these two animal studies does not mean that the authors are in favour of animal studies in general.

Histologically, there were fewer inflammatory cells. Furthermore, the newly formed tendon showed a more regular and parallel arrangement of collagenous fibre bundles and it was covered with an epitenon and a paratenon, which were not attached to the underlying tendon (figure 3).

This animal experiment study postulated that acupuncture therapy may have played a role in the prevention of adhesions and that using acupuncture seemed to cause cells to differentiate, leading to the formation and better organisation of collagen fibres.



**Figure 3:** Longitudinal section of the Achilles tendon, 60 days after splitting, of a dog from the control (untreated) group (left), of a dog treated with acupuncture (middle) and a longitudinal normal section of the Achilles tendon of an uninjured dog (right) (Sharifi, D. et al., 2009:183)<sup>2</sup>

Concerning external application of Chinese herbs, another animal experiment study aimed to determine the effectiveness of a herbal paste (see table 4) in the promotion of fracture healing and the formation of callus of an artificially induced standard midshaft fracture of the rabbit tibia.<sup>3</sup>

In vitro this TCM formulation was able to significantly increase the cell proliferation rate in osteoplastic UMR-106 and human endothelium HUVEC cells. In vivo the bone healing stimulating

Mixture of	Quantity
<i>Jie gu mu</i> ( <i>Sambucus williamsii ramulus</i> )	30g
<i>Xu duan</i> ( <i>Dipsaci radix</i> )	15g
<i>San qi</i> ( <i>Notoginseng radix et rhizoma</i> )	9g
<i>Hong hua</i> ( <i>Carthami flos</i> )	9g
<i>Da huang</i> ( <i>Rhei radix et rhizoma</i> )	30g
<i>Zhi zi</i> ( <i>Gardeniae fructus</i> )	9g

**Table 4:** Herbal formula used topically for bone fracture treatment; aqueous and ethanolic extracts mixed into a paste

effect could be proven by radiological findings of an increment of callus size at weeks two to five in the treatment group.

**Conclusion:** Both studies show interesting scientific results about the effectiveness of Chinese herbal applications and acupuncture treatment to speed up the healing process in body tissues during the reconstruction phase.

### 3. Rehabilitation and Mobilisation Phase – Establishing Functional Integrity

The aim of rehabilitation is to gain mobility without pain and to restore physiological and functional movements. Specific physical exercises (physiotherapy) stimulate, through pressure and tensile forces, to obtain greater directed proliferation of fibres and tissue. They help to build the functional integrity. Hence physiotherapy is a fundamental part of the rehabilitation treatment protocol at this stage.

In 'Western' thinking the injury quite often is considered as cured, as soon as the damaged structures have gained stability and daily work is manageable, or a return to sportive activities is possible again. Minor ailments and restrictions of motion, pain caused by load or sensitivity to climate and climate changes, are often accepted or seen as inevitable.

TCM takes a very different view: The symptoms, as mentioned above, are an expression of a still remaining latent, persistent *qi* stagnation and Blood (*xue*) stasis with blocked meridians. If left untreated, this condition causes movement-induced pain and, in the long term, can lead to osteoarthritis. Therefore it is essential to give continuous treatment according to TCM principles also in stage three, the rehabilitation stage of trauma, especially since we have very efficient options available. Additional to, and in combination with, moxibustion there are a variety of specific herbal formulas that warm and open meridians, move Blood (*xue*) and *qi* and steam the injured body areas in late stage (table 5).

Combining those warming methods (moxibustion and liniments) with *tui na* techniques, to soften tissue and to open meridians, helps to overcome rigidity and pain syndromes in late stage trauma.

Acupuncture offers, beside pain relief, further interesting options: the authors of a study titled 'Improvement in training quadriceps muscles after ACL-reconstruction

<b>Gu Shang Wai Xi Yi Fang – 'No. 1 tincture for bone injury'</b>	<b>Quantity</b>
<i>Kuan jin teng</i> (Cissi caulis)	30g
<i>Gou teng</i> (Uncariae ramulus cum uncis)	30g
<i>Jen tong teng</i> (Lonicerae caulis)	30g
<i>Wang bu liu xing</i> (Vaccariae semen)	30g
<i>Liu ji nu</i> (Artemisiae anomalae herba)	15g
<i>Fang feng</i> (Ledebouriellae radix)	15g
<i>Da huang</i> (Rhei radix et rhizoma)	15g
Jing jie (Schizonepetae herba)	10g
Decoct in water for bathing and steaming	

**Table 5:** *gu shang wai xi yi fang*. Washing and steaming the injured area in stage 3

(anterior crucial ligament) with acupuncture<sup>4</sup> believe that a long-lasting rehabilitation phase, as well as chronic secondary injuries, are mainly the consequence of disordered proprioception and reduced capability to recruit neuromuscular structures. The aim of this human study was to examine the use of acupuncture in rehabilitative strength training and to improve the excitability of quadriceps muscles after anterior cruciate ligament plastic.

Needling the points St 32 *fu tu* and St 36 *zu san li* caused a significant increase in electric activity (EMG-amplitudes) leading to an improved use of the neuromuscular potential of the tested quadriceps muscles. The study showed that acupuncture can increase motoric excitability and support the neuromuscular

system. Higher levels of muscular strength were reported due to a better recruitment of neuromuscular structures.

### CONCLUSION

Traditional Chinese traumatology, as part of traditional Chinese medicine, exists since ancient times. It is based on the principles of Chinese medicine and includes not only acupuncture and *tui na*, but also external and internal use of Chinese herbs. The use of all TCM therapies (moxibustion, acupuncture, *tui na* and herbal treatment) also during the late stages of trauma is absolutely indicated. They are useful to prevent persisting *qi* stagnation and Blood (*xue*) stasis and to prevent complications like chronic pain syndromes and post-traumatic osteoarthritis after soft tissue injuries and fractures.

Many current research results, as well as the author's long-term personal practical experience, confirm these traditional concepts and they show how relevant TCM concepts can be in the treatment of sports injuries. Shortened healing and rehabilitation phases through TCM treatments, and a minimised risk for long-term complications, such as post-traumatic arthritis or chronic pain syndromes, are the result. This is highly welcomed by patients and athletes alike and should be given more consideration by the public healthcare system and society as a whole for the considerable cost reduction.

### Acknowledgements

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