



Biomechanical measurements are used to investigate the effect of Tai Chi on osteoarthritic knee pain at Fujian University of Traditional Chinese Medicine.

CAN TRADITIONAL CHINESE MEDICINE COMPLEMENT REHABILITATION?

INNOVATIONS IN REHABILITATION are needed to meet the growing demand from an ageing population.

Bringing together traditional Chinese medicine and contemporary medicine could improve outcomes for patients with chronic disease. In this Q&A, Lidian Chen, professor and chief physician at Fujian

University of Traditional Chinese Medicine (FJTCM) in Fuzhou, China, talks about the challenges and the advantages of combining two approaches.

Why is innovation in rehabilitation needed?

Rehabilitation is vital for the elderly and people with chronic disease. It is pivotal for overall well-being and health. It reduces the negative impact of physical dysfunction due to disease and aging.

As the global population ages, more individuals are grappling with chronic conditions and physical

impairment. This significantly impacts their quality of life, and has a huge financial toll for individuals, families and society.

Rehabilitation that integrates traditional Chinese and contemporary medicine is an inherent advantage of rehabilitation in China. We want to show its clinical effect and scientific basis to the world.

The demand for rehabilitation interventions that help recovery and reduce financial burden has grown exponentially. By 2050, the incidence of stroke could double, and even triple in people over 65, in China.

What is FJTCM doing to meet that need?

Our researchers and physicians are committed to leveraging the distinct advantages of integrating Chinese and contemporary medicine within rehabilitation.

We are investigating the rehabilitative value of techniques deeply rooted in traditional Chinese medicine (TCM), such as Tai Chi and acupuncture. And we are drawing on both medical traditions to devise a comprehensive array of interventions for the elderly, and for people with post-

stroke conditions, including both physical and cognitive impairment, and with degenerative joint diseases and other chronic conditions.

We have demonstrated these interventions work through randomized controlled trials. We are researching their scientific underpinnings at the molecular, cellular, tissue, functional and behavioural levels.

We hope to advance rehabilitation science globally so that more people can benefit from evidence-based approaches.

What are some of the challenges of integrating TCM into rehabilitation medicine?

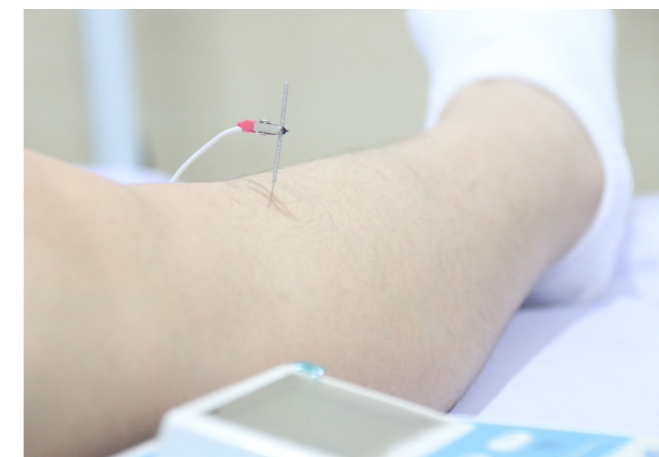
Chinese medicine contains a wealth of clinical therapeutic techniques. The question is, how do we innovate and develop these techniques for rehabilitation using recognised scientific methods.

Take acupuncture, for instance. There is an emerging body of work that demonstrates its benefits for dealing with various neurological conditions, for example following a stroke. But the problem is, treatment varies from one patient and acupuncturist to another, including which acupuncture points (acupoints) the acupuncturist selects. This makes it difficult to find out what works and what doesn't.

How have you tackled that?

For rehabilitation for movement problems following stroke, we examined the TCM literature and used our experience in clinical rehabilitation practice to identify relevant potential acupoints.

We identified two crucial acupoints, *Quchi* (LI11) located at the elbow and *Zusanli* (ST36), which is below the knee. Next, we used fMRI (functional Magnetic Resonance Imaging), to study brain activity in a small



▲ Older adults who practiced Tai Chi improved their memory according to a small study (top); Standardized protocols may help optimize acupuncture for rehabilitation (bottom).

study of healthy individuals and stroke patients treated at ST36¹. We found subjects receiving the acupuncture stimulation had more activity in brain regions involved in motor control, including the supplementary motor area (SMA) and the cerebellum.

Then we conducted a similar experiment in rats that had been treated so that they mimicked stroke-induced brain ischemia, which is when blood flow to the brain is blocked. Electro-acupuncture at the same acupoints improved post-stroke movement in the rats².

To understand why, we delved deeper into the molecular mechanisms behind these positive outcomes.

We found that the acupuncture appeared to inhibit inflammation caused by microglia³, a type of immune cell, in the part of the rat brain that controls body movement. It seemed to have an anti-cell death effect at both the cellular and molecular level. The treatment activated a signalling pathway called P13k/Akt, which is central to regulating cell survival⁴.

Based on these findings, our

team developed standardized acupuncture protocols and crucial acupoints selection schemes designed explicitly for rehabilitation for the limb motor dysfunctions that can follow a stroke. It is a step toward integrating and optimizing Chinese and contemporary rehabilitation approaches.

Our research achievements result from fruitful collaborations with interdisciplinary teams from Massachusetts General Hospital, a teaching hospital for Harvard University, the Hong Kong Polytechnic University and the University of Hong Kong.

We have incorporated our strengths in TCM principles and practices with their knowledge of neurological and molecular research from modern biomedical sciences. This has allowed us to overcome technical challenges within our field and expand TCM rehabilitation technology's global reach and influence.

Are you able to integrate contemporary and TCM rehabilitation approaches?

Yes. We supplemented our acupuncture protocols for treating post-stroke cognitive dysfunction with a computer-assisted cognitive training program called RehaCom. Patients use RehaCom under the direction of their therapist to complete a series of game-like computer tasks to improve their attention, memory and perception.

We ran a randomized controlled trial with acupuncture rehabilitation techniques and RehaCom, either alone or in tandem. With either treatment alone, patients experienced improvements in cognitive function⁵.

But the use of acupuncture in combination with RehaCom had the best therapeutic effect, demonstrating the clinical



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significance of this combination therapy. Merging traditional acupuncture practices with modern technology unlocks new possibilities in stroke rehabilitation.

What other TCM techniques is your team researching?

Tai Chi, a low to moderate-intensity mind-body exercise, has been another research focus. Tai Chi emphasizes the connection between the mind and body, combining purposeful physical movements, deep breathing, meditation, and relaxation techniques. According to the principles of TCM, exercises like Tai Chi enhance body energy circulation, foster inner balance, and promote overall physical and mental well-being.

Our research uses modern techniques such as biomechanical measurement, neuroimaging, and molecular biology assays, to investigate the effects of Tai Chi on the mind and body.

In one randomized control trial, we discovered that Tai Chi and Baduanjin, a mind-body exercise similar to Tai Chi, reduced knee osteoarthritis pain⁶. Advanced neuroimaging using fMRI, showed that these exercises modulate activity in, and connectivity between, brain regions involved in motor function and pain.

In a small study, we have also assessed the effects of Tai Chi on cognitive abilities in healthy adults aged 50-70 using standardized tests taken from the Wechsler Memory Scale. fMRI results showed both Tai Chi and Baduanjin practices led to reduced brain connectivity in brain regions responsible for cognitive control and emotional processing⁷.

Adults in the exercise groups also scored higher on the memory tests than the adults

FUZHOU'S FUTURE HOPE FOR HEALTH

In Fuzhou, a city famous for its ancient hot springs, lies Fujian University of Traditional Chinese Medicine (FJTCM).

FJTCM is spearheading teaching and research that integrates the best of traditional Chinese medicine and contemporary medicine for rehabilitation that will meet China's future health needs.

To this end, in the past five years alone, FJTCM has run 45 nationally important rehabilitation research projects. FJTCM is also home to research platforms that are used by rehabilitation researchers from across China, and increasingly around the world.

These include the Collaborative Innovation Centre for Rehabilitation Technology. It focuses on integrating traditional Chinese medicine with contemporary medicine for rehabilitation; for example, Tai Chi exercise combined with neuromodulation technologies, such as transcranial Direct Current Stimulation (tDCS).

Meanwhile, the Key Laboratory of Chinese Medicine Rehabilitation for Orthopedic Injury and Sports, which is funded by the Ministry of Education, focuses on traditional Chinese medicine for the rehabilitation of bone and joint diseases.

FJTCM also trains medical practitioners and rehabilitation specialists in evidence-based rehabilitation, rooted in both traditional Chinese and contemporary medicine. Training courses are recognized by international organizations, such as World Physiotherapy and World Federation of Occupational Therapists.

For undergraduates, there are courses in rehabilitation therapy, physical therapy, occupational therapy, audiology, and speech therapy. The first three courses are recognized by the Chinese government as a 'Nation First-Class Discipline', reflecting their importance to Chinese healthcare.

who did not exercise.

Our research provides a solid neurological foundation for the role of mind-body exercises in alleviating pain and improving cognitive functioning.

Is research on TCM rehabilitation techniques influencing contemporary medical research?

Yes. We are using the brain regions that are influenced by acupuncture and Tai Chi as targets for neuromodulation rehabilitation technologies such as transcranial Direct Current stimulation (tDCS), which is where electrodes on the head are used to stimulate the brain. Moreover, our discovery of novel neural circuits and inflammation-related pathways has the potential to guide the development of targeted drug therapies, expanding the clinical applications of our research findings.

What does the future hold for the integration of TCM and contemporary medicine for rehabilitation?

The integration of body and mind in rehabilitation, which is a principle of TCM, is pivotal to clinical practice.

To advance the integration of Chinese and contemporary medicine, we will need to use modern biomedical approaches to understand the scientific underpinnings of Chinese medicine in geriatric and chronic disease rehabilitation.

Most current research focuses either on TCM or contemporary medicine, making it hard to fully capture the therapeutic benefits of combining the two approaches in synergistic rehabilitation techniques.

Future research needs to consider the interconnected mechanisms and holistic effects of both approaches. That is why

our team's research roadmap includes studies such as integrating TCM rehabilitation practices with rehabilitation robotics. ■

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