

Traditional Chinese medicine has a history that extends back into the mists of time. Now, experience is slowly being replaced by evidence, as modern exponents attempt to integrate this oriental science with its occidental sibling. Richard A Collins reports from a meeting on the subject in Hong Kong

Eastern promise

Modernisation and integration of traditional Chinese medicine

There was standing room only in the 300-seat lecture theatre at the Hospital Authority Convention 2006 for two presentations on the scientific approach to traditional Chinese medicine (TCM). The convention was held on 8–9 May at the Hong Kong Convention and Exhibition Centre. The speakers were Dr Hen-hong Chang of the Center for Traditional Chinese Medicine at Chang-Gung Memorial Hospital (Taiwan) and Professor De-an Guo from the Shanghai Research Center for TCM Modernization, Chinese Academy of Sciences (China). The session was moderated by Dr Vivian Taam Wong of the Hospital Authority Head Office (Hong Kong).

Dr Chang began by outlining the recent history of Chang-Gung Memorial Hospital (CGMH), which established its Center for Traditional Chinese Medicine in 1996. Its aim is to pass on the wisdom of thousands of years of TCM history and to fully modernise and integrate TCM with Western medical practice.

The CGMH network operates at six sites in northern and central Taiwan, which cover about 12,000 beds. The Center for Traditional Chinese Medicine comprises six major divisions: a Chinese medical hospital, Chinese medical nursing, TCM pharmacy, diagnostics research, TCM clinical trials centre and a pharmacovigilance section to monitor and report on adverse events due to TCM.

The practice of TCM has been modernised extensively in recent years and several innovative techniques have been adopted that make the practice of TCM more convenient for both the patient and practitioner, with more reproducible results. Examples include the use of infrared heating lamps instead of the more traditional moxibustion that involves the burning of

Fig 1. Moxibustion. Moxa (mugwort) preparations are placed on the tips of acupuncture needles and burned to stimulate the flow of qi. Moxa can also be burned directly on the skin surface.



herbs (Fig 1) on the skin and can lead to scarring, and the use of laser acupuncture in place of the usual needling, which is highly dependent on the skill and technique of the individual practitioner. Herbal remedies are used routinely and the TCM pharmacy at

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CGMH prepares and dispenses over 460 concentrated powdered medicines.

Integrated teaching

Currently, the hospital has 44 attending physicians and 27 residents. Trainee doctors may select one of two integrated courses at CGMH. The five-year course comprises two years of TCM training and three years of Western medical training; while the four-year course comprises three years of TCM training and one year of Western medical training. Despite continued political tensions in the region, over 80 medical professionals and academics from mainland China have participated in training and the exchange of expertise at CGMH. Enquiries from potential international collaborators are welcomed.

Modernisation of traditional Chinese medicine

The modernisation of TCM is a major focus at CGMH. Examples of this can be seen in their approach to many of the basic concepts of TCM practice.

Pulse diagnosis

In standard TCM practice, the pulse is felt simultaneously at three specific points on the wrist (the cun, guan, and chi divisions; Fig 2). In TCM practice, abnormal pulses are reported using such phrases as floating (fumai), deep (chimai), rapid (sumai), slippery (huamai) or rough (semai). At CGMH, this

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approach is coupled with a simultaneous electrocardiogram to give a measure of the electrical activity of the heart.

Tongue diagnosis

Colour and appearance of the tongue are used in TCM diagnosis. At CGMH, the tongue is also photographed with a high-resolution digital camera. This allows the patient’s records to be stored and retrieved electronically and allows their response to therapy to be monitored.

Auscultation diagnosis

In TCM practice, the strength of respiration can provide important clues to health. Electronic recording of respiration gives a permanent record of the patient’s status at the time of assessment and allows the observations and interpretations of TCM practitioners to be correlated with actual physiological responses.

Meridian diagnosis

The major element of TCM is the concept of the flow of energy (qi) through channels or meridians in the body. Ill health is due partly to a deficiency of qi in various organs, caused by a blockage in its flow around the body. At CGMH, the electrical activity of the body is correlated with this theory of TCM.

Subsidiary operations

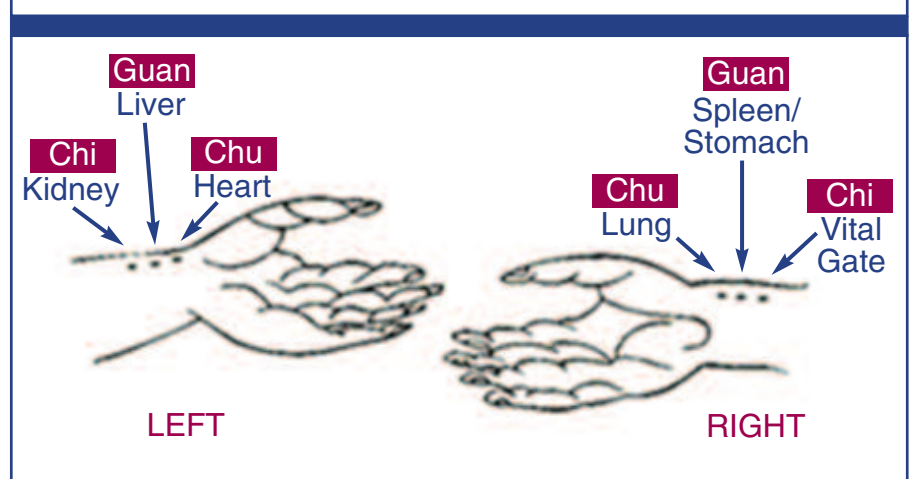
Chang-Gung Memorial Hospital operates several subsidiaries that generate revenue for the hospital network. These include a herbal supplement division that sells about 20 different brand name remedies and medical equipment and apparatus manufacturing companies. The group also operates a nursing home.

Dr Chang concluded his presentation with a case study of a 17-year-old female patient who was seriously injured in a road traffic accident. After 10 days of standard Western treatment for serious trauma, the patient began an intensive and personalised course of TCM therapy. The adjunctive traditional therapy enhanced the rate of recovery.

Cultural heritage

Professor Guo continued the theme of modernisation by emphasising the need for more research into the identity of the active components of herbal remedies, their mechanism of action and their safety.

Fig 2. Traditional Chinese pulse diagnosis.



He underscored a common motif in TCM, which is the cultural as well as the medical heritage that it represents. Traditional Chinese medicine has a long history of experience-based rather than evidence-based use. Furthermore, it can be a very useful treatment in its own right, especially for chronic conditions. This is due to its holistic approach to treating the whole organism rather than a specific tissue, and its use of multi-component remedies that have the potential to target multiple sites of action for the relief of symptoms.

Traditional Chinese medicine is a very rich resource comprising some 12,800 individual components, of which 11,150 are herbal,

1580 are animal-derived and the remainder mineral-derived. Three compounds – artemether, huperzine A and salvianolic acid B – were discussed as examples of how TCM is being modernised to fit the Western paradigm for evidence-based therapy.

Artemether

Artemether is the active component of the Chinese herb qinghao (sweet wormwood, *Artemisia annua*). Extracts of qinghao have been used in TCM to treat febrile illness. Uncontrolled studies have shown artemether to be effective for treating malaria. In clinical trials and by meta-analysis, it has been shown to be as effective as quinine as an anti-malarial.

Huperzine A

Huperzine A is an alkaloid derived from the club moss *Huperzia serrata*. It is a potent, reversible, selective inhibitor of acetylcholinesterase (AChE), the enzyme that breaks down acetylcholine in the synaptic cleft. Acetylcholine is involved in memory and learning. By inhibiting AChE, more acetylcholine becomes available to stimulate neurons. Huperzine A is currently in phase II clinical trials as a treatment for Alzheimer’s disease, a condition characterised by a relative shortage of acetylcholine.

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Table 1. Selected side effects of certain traditional Chinese medicines.

TCM	SOURCE	POTENTIAL SIDE EFFECTS
Ephedra (Ma huang)	<i>Ephedra</i> spp.	Cardiovascular toxicity
Toad venom	<i>Senenum bufonis</i>	Cardiovascular toxicity
Aconite	<i>Aconitum</i> spp.	Cardiovascular toxicity
Ginseng injection	<i>Panax ginseng</i>	Cardiovascular toxicity
Lei gong teng	<i>Tripterygium wilfordii</i>	Hepatotoxicity, cardiovascular toxicity
Cocklebur	<i>Xanthium sibiricum</i>	Hepatotoxicity
	<i>Senecio scandens</i>	Hepatotoxicity, carcinogenic, mutagenic
Aristolochic acid	<i>Aristolochia manshuriensis</i>	Nephrotoxicity, carcinogenic

Dr Richard A Collins pictured at the Hospital Authority Convention in Hong Kong.



‘The amount of any active ingredient present in a herb varies according to the variety or strain of the plant’

Salvianolic acid B

Salvianolic acid B is a water-soluble polyphenolic antioxidant isolated from the root of *Salvia miltiorrhiza*, a Chinese herb widely used for the prevention and treatment of atherosclerosis-related disorders. Salvianolic acid B can improve the microcirculation. The compound may have utility in improving the impaired circulation often seen in diabetic patients and those with coronary heart disease. It has a clear mechanism of action, can be produced under quality-controlled conditions and it has been shown to be safe and effective.

Safety, quality control and efficacy of traditional Chinese medicine

Many issues (eg safety, quality control and efficacy) prevent widespread acceptance of TCM-derived herbal compounds. With regard to safety, there are many aspects that must be addressed when using TCM.

Environmental safety

The parent herb should be grown in a controlled manner, thus minimising its exposure to pesticides, herbicides and other toxic compounds such as heavy metals that may accumulate in the plant and be carried over into the medicinal product.

Biological and clinical safety

Simply because a product is natural does not mean that it is safe. Some TCM components are extremely toxic. The herb itself may be

directly toxic or may induce allergic reactions. For example, the use of TCM remedies containing aristolochic acid from *Aristolochia* species has been prohibited in the UK since 1999 due to its proven renal toxicity. Allergic reactions are due mainly to injection of TCM preparations, a practice rare outside China. Table 1 summarises some of the potential toxicities associated with herbal preparations.

The pharmacovigilance unit at CGMH received 180 adverse event reports associated with TCM in 2005. Many herbal preparations interact with other compounds, inhibiting or potentiating the effects of other medicines. For example, garlic and ginkgo have been shown to interact with warfarin, resulting in increased bleeding. Similarly, ginseng may interact with phenelzine (an antidepressant), leading to insomnia and headache. This problem does not just affect TCM, as some traditional Western herbal remedies (eg St John's wort) have been shown to interact with amitriptyline (an antidepressant), leading to a reduced plasma concentration. The Indian herbal trikatu (a mixture of ginger and pepper) increases the availability of diclofenac (an analgesic).

Quality control and efficacy

The quality control of herbal preparations is of paramount importance. As one is dealing with natural products it is important to remember that the amount of any active

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ingredient present in the herb varies according to the variety or strain of the plant, the climate and soil conditions of the region in which it is grown, the season and whether it is used fresh or dried and stored for long periods. All of these factors affect batch-to-batch variation in the manufacture of the finished product and potentially its efficacy.

Adulteration is another area of concern. Limited supply and/or the high cost of raw materials may tempt suppliers or manufacturers to substitute similar but less active components into batches of their preparations. A bigger problem is the deliberate doping of ineffective TCM preparations with Western medicines to produce the desired effect. Thus, TCM-derived slimming teas have been doped with sibutramine and fenfluramine.

Fingerprinting

An important point to realise about TCMs is that they contain hundreds of active ingredients. Monitoring one or two specific compounds for active or adverse effects will not be sufficient to demonstrate safety or even to ensure batch-to-batch consistency. Thus, a more definitive type of TCM ‘fingerprint’ is required.

Professor Guo described the use of salvianolic acid B as a potential fingerprint molecule for TCM quality control. The compound occurs in *S. miltiorrhiza* as monomers, dimers, trimers and tetramers. Using high-performance liquid chromatography–mass spectrometry (HPLC–MS), the resulting chromatograms for batches of the herb harvested from different parts of China showed characteristic differences. Thus, it is now feasible to use this technique to determine the authenticity, origin and potency of TCMs that contain *S. miltiorrhiza*.

Studies are now underway to identify other potentially useful molecules for these types of fingerprint analysis.

Future perspectives

Professor Guo summed up his presentation by stating that a key element in the modernisation of TCM will be the wider adoption of phytochemistry linked to high-throughput screening technologies to increase the identification of therapeutic lead compounds. At the same time, safety must be maintained by limiting toxicity and contaminants. The efficacy of TCM should be demonstrated unequivocally by randomised double-blind controlled trials. Quality control can be monitored by fingerprinting, and the mechanism of action of the active compounds determined by appropriate *in vitro* and *in vivo* studies.

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