

## Traditional chinese medicine in health care in Macao

A medicina tradicional chinesa nos cuidados de saúde em Macau  
Cuidado de la salud de la medicina china tradicional en Macao

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### Abstract

**Background:** Traditional Chinese medicine (TCM) has been founded for more than 2,500 years of Chinese medical practice and also been practiced in Macau since the 19<sup>th</sup> century. Recently the Macau Special Administrative Region (MSAR) Government has established the World Health Organization (WHO) Collaboration Centre for Traditional Chinese Medicine (Macau) and has focused to the investment of TCM. Education for TCM is offered in higher education institutions in MSAR, however, nursing in TCM is not yet offered as a degree program.

**Objectives:** Describe the healthcare system and the evolution of the western and eastern medicine in Macau; identify the quality assurance and future development of TCM; and the future challenges and implications for science and education in Macau.

**Main topics under analysis:** Descriptive analyses by reviewing statistical data, historical and literature review are applied in this article.

**Conclusion:** Macau's characteristic eastern and western culture is reflected in the expansion of TCM. With collaboration from WHO, this will benefit the Macau's bridging and linking role with Portuguese-speaking countries.

**Keywords:** medicine, Chinese traditional; Macau

### Resumo

**Enquadramento:** A medicina tradicional chinesa (MTC) teve origem há mais de 2.500 anos, sendo praticada em Macau desde o século XIX. Recentemente, o Governo da Região Administrativa Especial de Macau (RAEM) criou o Centro Colaborador da Organização Mundial da Saúde (OMS) para a Medicina Tradicional Chinesa (Macau) e reforçou o investimento na MTC. O ensino de MTC é oferecido em instituições de ensino superior da RAEM. Contudo, ainda não existe um programa de graduação em enfermagem associada à MTC.

**Objetivos:** Descrever o sistema de saúde e a evolução da medicina ocidental e oriental em Macau; identificar a garantia de qualidade e o desenvolvimento futuro da MTC bem como os futuros desafios e implicações para a ciência e o ensino em Macau.

**Principais tópicos em análise:** Neste artigo são apresentadas análises descritivas com base na revisão de dados estatísticos, revisão histórica e da literatura.

**Conclusão:** A cultura oriental e ocidental que caracteriza Macau reflete-se na expansão da MTC, o que, com a colaboração da OMS, permitirá estabelecer a ponte entre Macau e os países de língua portuguesa.

**Palavras-chave:** medicina tradicional chinesa; Macau

### Resumen

**Marco contextual:** La Medicina Tradicional China (MTC) ha sido fundada por más de 2.500 años de práctica médica china y también se ha practicado en Macao desde el siglo XIX. Recientemente, el Gobierno de la Región Administrativa de Especial de Macau (RAEM) estableció el Centro Colaborador de la OMS para la Medicina China Tradicional (Macao) y se centró en la inversión de la MTC. Educación para el MTC se ofrece en las instituciones de educación superior en Macao, sin embargo, la enfermería MTC no se ofrece como un programa de grado.

**Objetivos:** Describir el sistema de salud y la evolución de la medicina occidental y oriental en Macao; identificar la garantía de calidad y el desarrollo futuro de la medicina tradicional china, así como los desafíos y las implicaciones para la ciencia y la educación en Macao futuras.

**Temas de análisis principales:** Análisis descriptivo a través de la revisión de los datos estadísticos, revisión histórica y bibliográfica se aplican en este artículo.

**Conclusión:** El oriental y la cultura occidental función de Macao se refleja en la expansión de la MTC. Con la colaboración de la OMS, esto beneficiará el papel de puente de Macao y enlazar con los países de habla portuguesa.

**Palabras clave:** medicina china tradicional; Macau

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## Introduction

Macau is a Special Administrative Region (SAR) of the People's Republic of China, situated at the Pearl River Delta on the south-east coast of Mainland China, 60 km southwest of Hong Kong. Macau comprises the Macau peninsula, Taipa and Coloane Island. With an estimated population of around 647,700 living in an area of 30.4 km<sup>2</sup>, population density 21.1(000/km<sup>2</sup>), (Direcção dos Serviços de Estatística e Censos [DSEC], 2016), it is one of the most densely populated region in the world.

Macau Special Administrative Region (MSAR) had been a Portuguese colony since 1557, and was handed over to China on 20 December, 1999 under the policy of *one country, two systems* (Gabinete de Comunicação Social, [GCS], 2016). With the past historical background of almost 500 years of Portuguese governance, Macau possesses characteristics of eastern and western culture, and this extends to health care, in which there is combination of Western Medicine and Traditional Chinese Medicine (TCM).

TCM has been founded for more than 2,500 years in Chinese medical practice, and it includes various forms of herbal medicine, acupuncture, massage, exercise and dietary therapy. TCM is widely used in China and is becoming increasingly prevalent in Europe and North America (National Center for Complementary and Integrative Health [NCCIH], 2016).

TCM has also been practiced in Macau since the 19<sup>th</sup> century mainly by non-governmental parties and later with support by government. Recently the MSAR Government, with support from the mainland Beijing government, has focused to the development of TCM and established the World Health Organization (WHO) Collaboration Centre for Traditional Medicine (Macau) in August 2015 (WHO, 2015). The Guangdong-Macau Traditional Chinese Medicine Industrial Technology Park is a new investment located on Hengqin Island in the Zhuhai Prefecture adjoining Macau, and, as mentioned by Chief Executive of the MSAR, this will benefit the steps taken to enable Macau to further its role as a bridge and link with

Portuguese-speaking countries (Serviços de Saúde de Macau [SSM], 2016a). This article describes the healthcare system in Macau, the evolution of western and eastern medicine in Macau, and the quality assurance and future development of TCM in Macau. Additionally it sets out future challenges and implications for science and education to further the considerable prominence that Macau gives to TCM as part of its declared policy of, and strategy for, economic diversification.

## Development

### The healthcare system in Macau

“A sound healthcare system, putting prevention first” (GCS, 2016, p. 1) is the policy of MSAR Government, with a commitment to improve medical and healthcare quality, as well as the health of the population in Macau (SSM, 2016b). Macau's Healthcare System is one the most well developed in Asia, and the life expectancy of its people is also one of the longest, with an average of 79.9 years for men and 86.3 years for women (DSEC, 2016).

Macau has five hospitals and 708 primary health care establishments, among which are 194 TCM clinics. In 2015 there were 1,674 doctors and 2,279 nurses, with ratios of 2.6 per thousand residents and 3.5 per thousand residents respectively (DSEC, 2016).

Macau's healthcare services are provided by governmental and non-governmental institutions. The governmental institutions include Conde São Januário Hospital (CHCSJ) which provides specialist medical services; and seven health centers and three health stations for primary healthcare; and the Public Health Clinical Center in Coloane. The primary healthcare system was established in 1985 by the Macau Health Bureau under the Portuguese Administration, to realize the objective of *Health for all 2000* advocated by WHO. The health centers and health stations are located in the different districts of Macau and offer easy access and free primary health care services for Macau residents in their own neighborhoods. Among them, the Health Center of Macau Norte (Bairro Fai Chi Kei), Health Center of Areia Preta (Hac Sa Wan)

and Health Center of Nossa Senhora do Carmo-Lago are equipped with TCM Clinics. The primary healthcare network based on Government Health Centers is considered a model of good practice by the WHO (GCS, 2016).

The non-governmental health institutions include Kiang Wu Hospital, Macau University of Science and Technology Hospital (UH), Malo Clinic Day Hospital, Macau Yin Kui Hospital, Tung Sin Tong Clinic, the Workers' Clinic, and various private clinics offering a range of medical services. Among these non-governmental institutions, Kiang Wu Hospital, the University Hospital, the Workers' Clinic and Tung Sin Tong Clinic provide consultation for, and treatment with, TCM. The Macau Health Bureau is responsible for coordinating the activities between the public and private organizations in the area of public health, and for assuring the health of citizens through specialized and primary health care services, as well as disease prevention and health promotion.

### Introducing TCM

Going into a TCM department or pharmacy of a hospital or health center in Macau, is interesting to westerners and to those unfamiliar with TCM, as it is unlike going into a western medical center in some respects. Typically, upon entry to the TCM pharmacy, the TCM patient is faced with many rows of small brown drawers, often numbering over one hundred, each of which is labeled, and in which the dried herbs and TCM ingredients for medical preparations are kept. The layout is similar to going into what would be an 'apothecary's' shop in times past. The dry ingredients are selected and weighed out by hand, following the prescription from the TCM doctor, on a simple hand-held two-pan balance, and assembled and wrapped by the TCM pharmacist. Patients can collect these and boil them themselves at home, to make the medicinal liquid, or the TCM establishment itself can prepare and boil the ingredients and pass them to the patient in sealed watertight packets, for the patient to heat up and drink at home. Sometimes the medical establishment will also offer a traditional candy to conceal the aftertaste of what can some-

times be a strong, unpleasant or bitter taste of some TCM medication.

The herbal combinations used in TCM are prepared for, and tailored to, each individual (maybe 8-15 herbs in any preparation), and they change over time in response to the whole person's condition and health status (Flower et al., 2012). Some of them are designed for therapeutic action (*Emperor* herbs), some support the therapy and other co-existing factors (*Minister* herbs), some support the main therapy whilst reducing adverse effects (*Assistant* herbs), and some focus on a particular part of the body (*Envoy* herbs; Flower et al., 2012).

Some TCM medication acts more slowly than some western medicines, as it focuses on restoring the whole body and bringing it into overall balance rather than focusing on symptoms or isolated parts of the body. Hence the duration of a course of TCM is often longer than for western medicine.

In terms of health diagnosis and treatment, TCM focuses on the whole person, including *hot, cold, wet* and *dry* classifications of patients and their presenting symptoms (Liu, Leung, & Tian, 2011). Patients visiting a TCM doctor may have up to 29 different pulses taken, their tongue examined, with data gathered from observation, testing, smelling, listening, palpation and questioning (van der Greef, 2011), that is, a whole person approach. This differs from some patient treatments in the West, which focus only on the specific disease rather than the whole person, and often only on one disease at a time.

In research terms, TCM often focuses on the therapeutic effect of TCM on specific ailments and functions of the body and randomized controlled trials (RCTs) are widely used in testing TCM. Van der Greef (2011), Liu et al. (2011) and Flower et al. (2012) report that RCTs are used for identifying the biochemical elements of herbs and their efficacy, and Flower et al. (2012) report that there are 17,000 such RCTs in TCM.

Alongside RCTs for testing the efficacy of TCM, other research on TCM in Macau is of a more fundamental 'blue skies' nature, investigating the effects of identified herbs on particular aspects of diseases and their cure, that is, pre-clinical trial research.

Much contemporary medical research focuses on personalized medicine and attention to: the *real world*; the whole person; the personal characteristics of participants. In personalized medicine the doctor faces a person, not simply a disease (Leon, 2012). TCM, focusing on the whole person, recognizes that the whole person is a *system* and TCM works on the whole person, not only a specific ailment. In TCM the whole person is regarded as a system (van der Greef, 2011; Flower et al., 2012), involving, for example, 'nutritional, psychological, and lifestyle factors when deciding the best course of treatment' (van der Greef, 2011). Like western medicine, TCM focuses not only on treatment but on disease prevention, health promotion and other positive benefits of herbs.

### **Evolution of western and eastern medicine in Macau**

Macau is enjoying not only a revival of TCM but its expansion and development, not only in provision but in research, development and industrialization. It is becoming an important and targeted element of its economic development and the Macau government is providing much support for this development, capitalizing on the long history of TCM in Macau. Alongside this there is increasing regulation, licensing, professionalization, standards and quality control of TCM and its practitioners and trainees.

In the 16<sup>th</sup> century, the first European Hospital (São Rafael Hospital) was built to care for poor, sick people. Until the middle of the 19<sup>th</sup> century, Macau had three Portuguese hospitals providing western medicine (Santa Casa da Misericórdia Hospital/São Rafael Hospital, São Lázaro Hospital and the Military Hospital), mainly serving Portuguese missionaries and soldiers. Of these, only the Military Hospital still remains today and the Government Hospital that practices western medicine is now renamed Conde São Januário Hospital (SSM, 2016b).

Kiang Wu Hospital, the first Chinese Hospital providing TCM services for the Chinese population, was established at 1871. It gradually turned to western medicine and stopped its TCM services in 1944. However, in the middle of the 1980s, with the influence of

TCM expanding worldwide, it resumed its TCM services. The service did not last for long and only parts of the service remain such as: acupuncture, massage and limited TCM services. From March 1998, the TCM restarted and continues to the present. The TCM services offered in Kiang Wu Hospital include: consultation for TCM; TCM in males, gynecology, pediatrics, orthopedics and trauma, acupuncture and massage; and delivering and packaging herbal medicine (Kiang Wu Hospital, 2013).

Tung Sin Tong Clinic, the first TCM clinic, was established at 1892 and offers free consultation and herbal medicine for the sick in Macau, regardless of their nationality, race or social status. From 1989 it started to receive subsidy from Macau government, and Tung Sin Tong Clinic is currently expanding and establishing more clinics in several districts in Macau.

The development of TCM was initiated by non-governmental efforts, and later gained additional support from the Macau government. In 1999, the first TCM services started to be provided in the Government Health Center (the Fai Chi Kei Health Center), serving the increasing Chinese population located in the Northern District of Macau City. Since then the services have expanded into two more Health Centers: Hac Sa Wan Health Center in Macau and Nossa Senhora do Carmo-Lago Health Center in Taipa. Together these three Government Health Centers provide free TCM services for Macau residents, including consultation, acupuncture, and herbal medicine. The characteristics of these governmental health care institutions, then, are that they combine eastern and western medicine.

The number of private TCM clinics and herbal medicine shops is increasing in Macau. In 2015, there were in total 194 registered private TCM clinics with nearly 1,135,908 consultations recorded. The ratio of doctors practicing TCM/Chinese Herbalists, approximately one per thousand of the population, has remained steady since 2011 (DSEC, 2016).

The government of Macau values the development and application of TCM. With the approval of the government of Macau, the

Faculty of Traditional Chinese Medicine at Macau University of Science and Technology (M.U.S.T.) was established in 2000 and its Bachelor's degree programme in TCM was offered at the same time. In early 2011, the university became the support institution of the State Key Laboratory of Quality Research in Traditional Chinese Medicine (SKL-QRCM). In 2003, in order to meet the increasing medical needs of the local population, MUST established a TCM with the approval of the Macau Health Bureau. This clinic also provided opportunity for clinical practice for MUST medical students and staff. Recently, the Faculty of Traditional Chinese Medicine of MUST offers Bachelor, Master and Doctor of Philosophy Programs in TCM. (Table 1: Macau University of Science and Technology, 2016a). The University of Macau established the Institute of Chinese Medical Sciences (ICMS) and the SKL-QRCM in 2002. The ICMS/SKL has devoted itself to promoting research in TCM and the nurturing of local talents in the interdiscipli-

nary fields of biomedical and pharmaceutical sciences. ICMS/SKL started offering Master of Science degree programmes in Chinese Medicinal Science and Medicinal Administration from 2002, and it currently also provides the PhD degree programme in Biomedical Sciences, and Bachelor of Science degree programme in Biomedical Sciences (Table 1). The Expert Committee of the Ministry of Science and Technology in Beijing appraised highly the achievements of the SKL (at the University of Macau and Macau University of Science and Technology) and successfully passed the mid-stage assessment of the SKL in 2013 (University of Macau, 2016a)

A characteristic of research in TCM in Macau is that it seeks to investigate the effects of TCM and herbal medication on ailments that can also be treated with western medicine. This rapprochement, or fusion, between eastern and western medicine is not only unusual but embodies the fusion of eastern and western cultures that is a characteristic of Macau.

Table 1

*Traditional chinese medicine program in higher education in Macau*

University	Program	Degree
	Chinese medicine	Doctor of Philosophy
	Traditional Chinese medicines	
	Integrated Chinese and Western medicine	
Macau University of Science and Technology (The Faculty of Chinese Medicine)	Traditional Chinese medicine	Master
	Pharmacology in Traditional Chinese medicine	
	Integrated Chinese and Western medicine	
	Management in production and Sales of Traditional Chinese medicine	
	Traditional Chinese medicine	Bachelor
	Pharmacology in traditional Chinese Medicine	
	Biomedicine	
University of Macau (Institute of Chinese Medical Sciences)	Biomedical sciences	Doctor of Philosophy
	Chinese medicinal science & medicinal administration	Master
	Biomedical sciences	Bachelor



### Quality assurance of TCM in Macau

In past times a few TCM practitioners were graduates of formal institutions of TCM, and the majority of TCM practitioners in Macau were scattered among the grass-roots health care services. Most of their training came from ancestral sources or was under the tuition of a teacher, or from study or training in Mainland China's Chinese Medicine colleges and universities (Zeng, 2003).

In 1990, the Macau Health Bureau, through its 84/90/M decree (Governo de Macau, 1990), established the criteria for eligibility and recognition of health professionals, including doctors of TCM/Chinese Herbalists. From this ordinance, doctors of TCM must obtain a certificate of Higher Education in TCM from a recognized education institution in Macau, Portugal or Mainland China, and Chinese Herbalists must obtain recognition of relevant knowledge from the Chinese Medical Association.

In addition, the Macao Health and the Macao Traditional Chinese Medicine Association also actively strengthens cooperation with the Mainland. In 1996 and 1997, there was a twosemester Macao TCM training course for Macao civil servants and practitioners of TCM, running over one year with 10 subjects, including TCM, TCM surgery, acupuncture, and massage. Well-known professors from Mainland China were invited to teach, greatly improving the professional quality and ability of TCM practitioners (Zeng, 2003)

More recently, Chinese Herbalists must also obtain a certificate equal to, or more than, 3 years of study on a TCM day program, and doctors of TCM must have 5 years or more of study for a Bachelor in TCM, on a day program (SSM, 2015).

In order to maintain the public health of Macao and improve the quality, effectiveness and safety of TCM, the Macao Health Bureau posted new drug regulations on November 14, 1994. Its purpose was, and remains, to strengthen the management of TCM: (1) to ensure the use of safe, effective and high-quality TCM for the people of Macao in order to improve the rational and careful use of TCM; (2) to regulate the import, export, wholesale, distribution and pharmacy business of

traditional Chinese patent medicines; (3) to review the technical qualifications of pharmacists and pharmacies in the profession.

In line with the new regulations, the Macao government approved 456 kinds of traditional Chinese herbal medicines for pharmacy sales. The list includes two categories: one list of toxic traditional Chinese herbal medicines, and another of commonly used herbal treatments. The pharmacies must have a technically responsible person with one of the following qualifications: (1) pharmacist; (2) Chinese or TCM practitioner; (3) staff member with 5 years of experience in the preparation and adjustment of TCMs, who must be certified by their own statements together with those from the pharmacies or TCM associations in which they obtained their experience (Decreto-Lei n.º 53/94/M of 14/11/1994). The Consumer Council of Macao also has the power to investigate the quality of TCMs, and it periodically conducts checks of these and, where necessary, alerts the public to dangerous or unauthorized products.

In addition, the Center for Safety and Quality Assurance of Traditional Chinese Medicines and Foods in MUST provides standard analytical tests to evaluate the level of harmful pollutants, such as heavy metals and pesticide residues in Chinese medicinal herbs and products, by mass spectrometry analysis. Further, it provides quality assurance tests for medicinal products, dietary supplements, food or other products that contain Chinese medicinal components, from the University's Hospital or Macao's Chinese pharmaceutical industry, to improve the quality of clinical services in Macau. This Center was awarded the ISO/IEC17025 laboratory accreditation by the National Association of Testing Authorities, Australia (NATA) in 2008, and continues to expand international accredited testing and food commercial certification licenses, such as the *China CNAS* certification. The SKL-QRCM also keeps detailed records of the sourcing and quality of herbs used in TCM.

### Future developments in TCM in Macau

The Macau government expressly values the development of TCM and has announced its commitment to the industrialization of TCM

in Macau, emphasizing how the development of the TCM sector is one of the major elements in the diversification of Macau's economy.

The WHO Collaborating Centre for Traditional Chinese Medicine (Macau) was established in August 2015, with help from the global health body and the Chinese central government. Several agreements in relation to the development of TCM have also been signed between the Macau government and the State Administration of Traditional Chinese Medicine. These processes evidence the international recognition of Macao's effort to promote TCM and have created the expectation of further development of the sector in Macau.

Development of TCM is not limited to MSAR, but in its worldwide expansion and links. Macao's Health Bureau plays an important role in the future development of TCM, for the control of quality of both the human resources and related products, and for research and development of TCM.

In terms of research, Macau University of Science and Technology has set key directions in TCM. (Macau University of Science and Technology, 2016b). The study of immobilized anti-respiratory virus component in TCM by the viral receptor on the respiratory cells and its mechanism; A study of the active ingredients of Lei Gong Teng (*Tripterygium Wilfordii* Hookf) and their nano-particle drug carrier for treating chronic nephritis; Identification of the molecular mechanisms and drug action targets of Rh2E2, a new derivative of ginsenoside, on anti-cancer by using proteomics technology; Establishment of LC-MS and LC-NMR-based Novel Lipidomic Platform and Its Application in Traditional Chinese Medicine Research. (Macau University of Science and Technology, 2016b). The University of Macau has received funding for several research projects in TCM (University of Macau, 2016b), for example: Chemical and Pharmacological Study on a Novel Fungus from Natural *Cordyceps Sinensis*; Key Technologies of Innovative TCM based on Network Pharmacology and Molecular Pharmaceutics; Characterization, structural optimization and mechanistic study of the neuroprotective components from TCM

for minimising and treating Parkinson's disease complications; Pharmacological Study of the Chinese Herb Pair *Radix Puerariae-Salvia miltiorrhiza* Bunge in Ameliorating Insulin Resistance and Endothelial Dysfunction (University of Macau, 2016c).

The training of professionals and the scientific evidence from research studies are essential features here, and the Macau and Beijing governments have provided generous grants for research in TCM in Macau. The degree programs in TCM have been well developed for some time, however, though at the time of writing this subject has not yet been offered as part of, or the whole of, a degree program in nursing. The TCM degree program in Nursing has been already for many years in Mainland China and the Hong Kong SAR. With the characteristics of health care in Macau, a combination of Western Medicine and Traditional Chinese Medicine, it is important for nurses to learn more about TCM to provide health education and promotion for the population.

## Conclusion

Macau is poised to become a leading center for TCM research, development, industrialization, pharmacology and practice, and this has already commenced and is thriving. In this, sponsorship from the governments in Beijing and the Macao SAR has been extensive and provided a major source of support. As the Macao government, in its 5-year strategic plan, has placed economic diversification as a strategic initiative for the development of Macao, it has accompanied this with a strong emphasis placed on all aspects of TCM and the developments of networks of researchers and practitioners across the world. Macau's characteristic eastern and western culture is reflected in the expansion of TCM, including the steps taken to integrate eastern and western medicine. The successful collaboration between governmental and non-government institutions in promoting TCM is clearly in evidence in Macau. The government's future efforts will include ensuring that Macau is positioned as an international base for quality control and quality develop-

ment of TCM and as a platform for international exchange and trading for the health industry. This also takes advantage of Macau's long-established role in bridging and linking with Portuguese-speaking countries.

The criteria for eligibility and recognition of health professionals in TCM have been established for a long time, and in this, further revisions of the regulation for TCM will be a demand for the development in TCM. Research studies should be encouraged expanded for providing evidence to promote confidence and trust in TCM by the worldwide community and industry. For improved quality control in TCM, one possible development could be for the Macau Health Bureau to consider setting up a specific expert committee for liaising between governmental and non-governmental TCM parties.

With the support of the WHO and the political commitment, as well as the educational preparation and research base in MSAR, the future development of TCM in Macao has a bright future, with dynamic developments that are posed to gain attention worldwide.

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