

Western healers in traditional Chinese medicine

In recent years, some in the West have begun to recognize traditional Chinese medicine (TCM) as a potential source of new drug candidates (Corson & Crews, 2007; Efferth *et al.*, 2007; Li & Zhang, 2008; Schmidt *et al.*, 2007). At the same time, the practice of TCM in Western countries has been increasing (Institute of Medicine, 2005). As TCM is usually thought to have evolved independently of Western medical practices, the two systems are considered to be distinct from one another, with only a few weak connections between them (Food and Drug Administration, 2006). Nevertheless, by analysing both the history of TCM and the compounds used in TCM, we find that TCM and Western medicine are not quite so different after all.

In fact, there have been frequent exchanges of ideas and culture between China and its neighbours over the past 2,000 years, including communication with much of Europe. Not surprisingly, China acquired foreign herbs that were eventually adopted by TCM; common agents such as aloe, olibanum, myrrh, benzoin, styrax, strychnos, saffron, fennel, fenugreek, pepper, garlic, clove, areca seed and evening primrose all came from abroad (Xiao *et al.*, 2001). Even during the last century, new ideas were selectively absorbed by TCM practitioners as modern Western medicine spread to China. Some 80 years ago, Zhang Xi-Chun (1860–1933) combined aspirin, a typical Western drug, and *Gypsum fibrosum*, a TCM product that has been used for more than 2,000 years (Editorial Committee of Chinese Materia Medica, 1999), to create a new formula to treat febrile arthritis (Yue & Wang, 2004). Today, a large number of TCM formulae contain Western drugs and approximately 10–30% of TCM therapeutics are based on synthetic chemicals (Zhu, 2004).

Furthermore, there are many similarities between TCM components and

modern drugs, because around 50% of chemical drugs used today are directly or indirectly derived from natural products (Butler, 2005; Newman & Cragg, 2007). A global structural comparison between approximately 10,000 TCM components recorded in the Traditional Chinese Medicine Database (TCMD) System, and about 8,000 modern Western drugs recorded in the Comprehensive Medicinal Chemistry (CMC) database, revealed that 908 agent pairs are structurally similar and 327 agents are identical in structure (Kong *et al.*, 2008).

It is interesting to note that many of the herbs that contain common agents have a long history of medicinal use in China and elsewhere, such as the leaves or bark of the willow tree from which salicylic acid is extracted (Editorial Committee of Chinese Materia Medica, 1999; Lebwohl, 1999; Lin & Nakatsui, 1998). 5-methoxypsoralen is derived from *Zanthoxylum schiniifolium* and *Ammi majus*, which grow in the Nile river valley, and both herbs were used by Chinese and Egyptians, respectively, to treat dermatological conditions for more than 2,000 years (Editorial Committee of Chinese Materia Medica, 1999; Scott *et al.*, 1976). Sennosides A and B, which have laxative effects, are contents of *Rheum officinale*—the laxative potential of which was recorded in ancient Chinese texts (Editorial Committee of Chinese Materia Medica, 1999)—and *Cassia angustifolia*, a small shrub indigenous to Somalia and Arabia, which has also been used historically as a laxative (Lemli, 1988; Mukhopadhyay *et al.*, 1998). As there was little medicinal communication between China and foreign countries more than 2,000 years ago, we think that the use of similar herbs and/or components in ancient Chinese and Western medicines can be best explained as convergent evolution of different medicinal systems.

In conclusion, several similar compounds or plants have been used in TCM and ancient, as well as modern, Western medicine, which results both from communication between these cultures and convergent evolution of their medicinal systems. At a time when the use of TCM is

increasing in Western medicine, it is therefore noteworthy that both systems are in fact not that different, but have been sharing several compounds and therapeutics for thousands of years.

ACKNOWLEDGEMENTS

This study was supported by the National Basic Research Program of China (2003CB114400) and the National Natural Science Foundation of China (30570383).

REFERENCES

- Butler MS (2005) Natural products to drugs: natural product derived compounds in clinical trials. *Nat Prod Rep* **22**: 162–195
- Corson TW, Crews CM (2007) Molecular understanding and modern application of traditional medicines: triumphs and trials. *Cell* **130**: 769–774
- Editorial Committee of Chinese Materia Medica (1999) *Chinese Materia Medica*. Shanghai, China: Shanghai Science and Technology Publishers (in Chinese)
- Efferth T, Li PCH, Konkimalla VSB, Kaina B (2007) From traditional Chinese medicine to rational cancer therapy. *Trends Mol Med* **13**: 353–361
- Food and Drug Administration (2006) *Guidance for Industry on Complementary and Alternative Medicine Products and their Regulation by the Food and Drug Administration*. Bethesda, MD, USA: Food and Drug Administration
- Institute of Medicine (2005) *Complementary and Alternative Medicine in the United States*. New York, NY, USA: The National Academies Press
- Kong D-X, Li X-J, Tang G-Y, Zhang H-Y (2008) How many traditional Chinese medicine components have been recognized by modern Western medicine? A chemoinformatic analysis and implications for finding multicomponent drugs. *ChemMedChem* [doi:10.1002/cmdc.200700291]
- Lebwohl M (1999) The role of salicylic acid in the treatment of psoriasis. *Int J Dermatol* **38**: 16–24
- Lemli J (1988) Senna—an old drug in modern research. *Pharmacol* **36** (Suppl 1): 3–6
- Li X-J, Zhang H-Y (2008) Western-medicine-validated anti-tumor agents and traditional Chinese medicine. *Trends Mol Med* **14**: 1–2
- Lin AN, Nakatsui T (1998) Salicylic acid revisited. *Int J Dermatol* **37**: 335–342
- Mukhopadhyay MJ, Saha A, Dutta A, De B, Mukherjee A (1998) Genotoxicity of sennosides on the bone marrow cells of mice. *Food Chem Toxicol* **36**: 937–940
- Newman DJ, Cragg GM (2007) Natural products as sources of new drugs over the last 25 years. *J Nat Prod* **70**: 461–477

- Schmidt BM, Ribnicky DM, Lipsky PE, Raskin I (2007) Revisiting the ancient concept of botanical therapeutics. *Nat Chem Biol* **3**: 360–366
- Scott BR, Pathak MA, Mohn GR (1976) Molecular and genetic basis of furocoumarin reactions. *Mutat Res* **39**: 29–74
- Xiao PG, Liu Y, Xiao W (2001) A survey of Western herbal medicines and Chinese countermeasures of development. *China Pharm J* **36**: 505–507
- Yue DM, Wang BL (2004) A brief discussion on combined use of Chinese and Western drugs. *Chin Commun Doct* **6**: 8
- Zhu BC (2004) A brief discussion on drug usage in traditional Chinese medicine and Western medicine. *China Med Bull* **4**: 40–41

Xue-Juan Li & Hong-Yu Zhang are at the Shandong Provincial Research Center for Bioinformatic Engineering and Technique at Shandong University of Technology in Zibo, People's Republic of China.

E-mail: zhanghy@sdut.edu.cn

doi:10.1038/sj.embor.7401166