



## LETTER TO THE EDITOR

# Shorter and sturdier bridges between traditional Chinese medicines and modern pharmacology



Dear Editor,

Chinese ancient philosophy describes divers concepts such as Qi (spirit or energy) and the five natural elements (fire, earth, water, wood and metal) that along with the Yin and yang principle (Xu et al., 2011, 2013; Zeng et al., 2013) represent the fundamental bases of Traditional Chinese medicines (TCM) theories that consider the unbalances in the body as the pathological state and thus, rebalancing the body as remedy. From a therapeutic viewpoint, TCM have always benefited from natural products, including plants, animals and minerals. TCM are based on different principles such as the Doctrine of Signatures, that thrived particularly during the Middle Ages, and it supposes a relation between the plant's shape, structure, biological behavior and the symptoms of the disease for which this plant could represent a remedy (Richardson-Boedler, 1999). Based on simple empiric observations (Ho, 1993), but also on religious or philosophical beliefs in some cases, the selection of useful natural drugs is a process that has taken centuries and has required cumulative efforts of many generations to find out the most efficient therapeutic approaches for each health problem. Yet, TCM have succeeded in treating many diseases, however have also failed to treat others and have even been toxic in other cases.

Chinese scientists, as well as international researchers, working on TCM and more generally on natural products, have been continuously trying to map the “Pharmacological Puzzle” of TCM (Liu et al., 2013a; Song et al., 2013; Li and Zhang, 2013), especially with the standards and requirements of modern pharmacology and the divers national, regional and international regulations that put conditions for any product or molecule before it can be designed as “Drug” or “Medicine” within both a legal and therapeutic context. The main obstacle that TCM progress faces is that many products are still a part of the ethnopharmacology and have not switched yet into the modern pharmacology.

The main research field that might solve this issue remains the pharmacognosy since it is the science that mainly combines a scientific precise description of the phytochemical constituents and their pharmacodynamic activity. Importantly, for a product or a molecule to be considered as “Drug” or “Medicine” biological, chemical, pharmacological and toxicological profiles need to be established, which requires the implication of divers research fields, such as biochemistry, molecular biology, cytology and molecular pharmacology, that constitute together the bridge we are in need of to move from TCM as “Ethnopharmacology” to modern therapy with a full Pharmacological profile. Indeed, the data we have now are very encouraging (Li and Zhang, 2013; Boubertakh et al., 2013; Liu et al., 2013b; Wang et al., 2013a) and the future of TCM appears highly promising. TCM constitute a gargantuan therapeutic dictionary, within which each word needs a “modern pharmacological definition” to be recognized as a “modern therapy”. The basic processes consist on selecting TCM known for their ethnopharmacological use, and after a phytochemical study, selected compounds would go through *in vitro* then *in vivo* pharmacological and toxicological investigations. The final step would be clinical studies (Pengfei et al., 2013; Liu et al., 2014) to confirm the final pharmaco-toxicological profile of the TCM and their active ingredients.

Importantly, the modern pharmacology has identified the G protein coupled receptor as an extremely important target (Emery, 2013; Ghanemi, 2015; Ghanemi et al., 2013) especially within the nervous system on one hand (Millar et al., 2012; Ghanemi, 2014b). On the other hand, the chemostructural similarities that exist between some phytochemical compounds and the endogenous neurotransmitters have encouraged more investigations toward the discovery of TCM derivatives and extracts to treat many diseases, such as neurological disorders (Wang et al., 2013) including schizophrenia and Parkinson's diseases, which have divers neurotransmitters implicated within the underlying patho-mechanisms (Weickert et al., 2013; Ghanemi, 2013). The use of developed cellular and animal models (Ghanemi, 2014a; Reddy and McWeeney, 2006; Chen et al., 2013) for disease studies is still highly required for further elucidation of TCM therapeutic effects.

These bridges linking TCM to modern pharmacology have beneficial impacts on other fields such as cosmetology. Indeed,

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the example of skin whitening products would clarify this approach, and here we mention the efficient volcanic mud, which is effective in skin whitening. Furthermore, it has been also found out that *Nigella glandulifera* Freyn et Sint seeds contain ingredients that have melanogenesis inhibition activity (Nguyen et al., 2007). These two natural products are both black, and they both have a skin whitening effect, and this may, probably according to the Doctrine of Signatures, encourage focusing more on black drugs when looking for skin whitening effect, as this would save time during primary investigations. Yet, it remains important to follow the modern recognized methods and techniques to study the pharmacodynamics, toxicology, clinic and other aspects of the TCM. For instance, after identification of this activity in *N. glandulifera* seeds, and the isolation of the active ingredient, that is dioctyl phthalate, it has been classified as an endocrine disrupter and its use was prohibited (Sekiguchi et al., 2006; Tickner et al., 2001). This example may apply for any natural product showing any potential to be active against any disease before further necessary scientific investigations, and this would help to expedite the progress of drug discovery toward a modern pharmacological use of the TCM.

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