

November 19-21, 2012 Hilton San Antonio Airport, USA

Gut microbiota is key to understanding the holistic actions of chinese medicine in traditional oral use: An example from pharmacokinetic study of Calycosin-7-O- β -D-Glycoside and Astragaloside IV from Astragali Radix

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There is growing evidence that gut dysbiosis is associated with many chronic diseases, especially diabetes, inflammatory L bowl diseases and obesity. As 'natural cocktails', Chinese medicine is believed to act holistically through synergistic multitarget mechanism. In traditional oral practice, it seems inevitable that Chinese medicine will more or less interact with gut microbiota before being absorbed into circulation to elicit activities. This interaction should account for part of the holistic action of Chinese medicine and makes it superior to western medicine in treatment of some chronic diseases. However, the significance of gut microbiota in traditional oral application of Chinese medicine has not yet received wide recognition. Our laboratory has focused on pharmacokinetic study of Astragali Radix (Chinese name Huangai) which is extensively used for both medicinal and nutritional purposes in China due to its notable *Qi-tonifying* effect. Calycosin-7-O- β -D-glycoside (C7G) and astragaloside IV (AIV) are the most abundant flavonoid and saponin in Huangqi and documented in China Pharmacopeia as the chemical markers for quality control of the herb. Using both in vitro and in vivo models, we found that both the saponin and the flavonoid glycosides underwent rapid biotransformation in rat gut bacteria. On one hand, C7G acted as a prodrug by generating its aglycone to enables rapid transepithelial transport. The latter was subjected to further hepatic metabolism to form the main in vivo existing form which showed potent angiogenic effect on HUVEC cells and a zebrafish model. On the other hand, C7G itself showed a probiotics-like effect through stimulating growth of beneficial gut bacteria. In the case of the saponin marker, AIV itself as well as the bacterial metabolites have been marketed as telomerase activator supplements for disease treatment and longevity and they also appeared as the main components in rat plasma after oral dosing of AIV. These findings provide pharmacokinetic rationale for traditional applications of Astragali herb in anti-aging and immune-enhancement. This study also exemplified the importance of gut bacteria in the holistic actions of Chinese medicine in conventional oral uses.

Biography

Ru Yan received her Ph.D degree in Pharmacokinetics from Chinese University of Hong Kong and completed her postdoctoral study at University of Texas Medical Branch before joining University of Macau as an assistant professor in 2008. Dr Yan is an expert in metabolism and pharmacokinetics of herbal medicine. Currently, Dr. Yan's research focuses on deciphering the reciprocal interactions between gut bacteria and Chinese medicine adopting multidisciplinary approaches. She has published more than 60 SCI papers/conference abstracts and serving as the editorial board member and ad-hoc reviewer of many repute journals on pharmaceutical sciences. She holds several state-, local- and university- level research grants.

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