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## 系统生物学方法在药用植物次生代谢产物研究中的应用

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中文摘要:次生代谢产物是植物在其生长发育和对环境的适应过程中形成的,通常是药用植物中的主要活性成分,药材品质的物质基础。但次生代谢产物的生源途径复杂,其产生和积累受到自身遗传和环境各种生物和非生物因素的调控,影响了药用植物作为药材的品质控制及其活性成分的开发利用。系统生物学思维与方法系统是全面探索生物的有力工具,随着现代分子生物学技术及生物信息学的发展,系统整合基因组、转录组、蛋白质组和代谢组等组学技术,将为药用植物次生代谢产物研究带来新的机遇。这种整体、系统的研究方法在药用植物次生代谢产物形成的生物合成途径、信号转导、生态环境及其代谢工程研究中的应用,构建次生代谢物生物合成基因表达调控系统模型,对于系统阐释药用植物有效成分成因和地道药材形成机制、代谢工程产生药用植物活性成分、和药用植物资源合理开发利用等具有重要意义。

中文关键词:系统生物学 次生代谢产物 生物合成途径 信号转导 代谢工程

### Systems biology applications to explore secondary metabolites in medicinal plants

**Abstract:**Secondary metabolites are produced during the growth and development of plants along with the adaptation of outer environment, as a rule they are the main active ingredients in medicinal plants and ensure the quality of crude drugs. Since biogenesis is quite complex, the production and accumulation of secondary metabolites are influenced by various biotic and abiotic factors either from gene or environments, the complexity may affect quality control of crude drugs and utilization of the active ingredients. The thought and approach adopted in systems biology is a powerful tool to explore biology fully, along with the development of modern molecular biology and information biology, omics integration like genomics, transcriptomics, proteomics, and metabolomics will bring new opportunities for the study of secondary metabolites of medicinal plant. It has great significance to apply this holistic and systematic method in researches on biosynthetic pathway, signal transduction, ecological environment and metabolic engineering of the formation of the secondary metabolites of medicinal plants, and in building secondary metabolite biosynthesis gene expression and regulation system model, in order to explain the origin of the active ingredients of medicinal plants, formation mechanism of the Chinese herbs, metabolic engineering effecting active ingredients of medicinal plants, and the rational exploitation and utilization of resources of medicinal plants systematically.

**keywords:**systems biology secondary metabolites biosynthetic pathway signal transduction metabolic engineering

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