



Title: Integrated metabolomic and transcriptomic analysis of triterpenoid accumulation in the roots of *Codonopsis pilosula* var. *modesta* (Nannf.) L.T.Shen at different altitudes

Name: Fang-Di Hu
Lanzhou University School of Pharmacy, 730000, China

Codonopsis Radix is a beneficial traditional Chinese medicine, and triterpenoid are the major bioactive constituents. *Codonopsis pilosula* var. *Modesta* (Nannf.) L.T.Shen (CPM) is a precious variety of *Codonopsis Radix*, which is distributed at high mountain areas. The environment plays an important role in the synthesis and metabolism of active ingredients in medicinal plants, but there is no report elaborating on the effect of altitude on terpenoid metabolites accumulation in CPM. This study aims to analyse the effects of altitude on triterpenoid biosynthetic pathways and secondary metabolite accumulation in CPM. The untargeted metabolomics based on liquid chromatography–tandem mass spectrometry (LC–MS/MS) and 10 triterpenoids based on ultra-performance liquid chromatography quadrupole time-of-flight mass spectrometry (UPLC-Q-TOF-MS) method were analysed at the low-altitude (1480 m) and high-altitude (2300 m) CPM fresh roots. The transcriptome based on highthroughput sequencing technology were combined to analyse the different altitude CPM triterpenoid biosynthetic pathways. A total of 17,351 differentially expressed genes (DEGs) and 55 differentially accumulated metabolites (DAMs) were detected from the different altitude CPM, and there are significant differences in the content of the 10 triterpenoids. The results of transcriptome study showed that CPM could significantly up-regulate the gene expression levels of seven key enzymes in the triterpenoid biosynthetic pathway. The CPM at high altitude is more likely to accumulate triterpenes than those at low altitude, which was related to the up-regulation of the gene expression levels of seven key enzymes. These results expand our understanding of how altitude affects plant metabolite biosynthesis.

Biography

Professor Hu Fangdi, from Lanzhou University School of Pharmacy, is a State Council Special Allowance expert and leading talent in Gansu Province. She has led over 10 national/provincial projects, holds 22 invention patents, and published more than 200 papers.

Full name: Fang-Di Hu
Contact number: +86 13919780068
Twitter account:
Linked In account:
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