**Omics-based functional analysis of meristematic cambium-driven storage root development in *Panax ginseng***

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**Abstract**

During the past few decades, the scientific advances have been reaching the molecular mechanisms for perennial root growth and development of Korean ginseng (*Panax ginseng*). Our recent discoveries demonstrate that several internal hormone and external signaling networks are required for secondary growth in the ginseng storage organs. In this talk, I’d like to introduce the positive effects of internal auxin and GA signaling connected with external nitrate uptake and assimilation on storage root secondary growth in *P. ginseng*. Exogenous supplement of nitrate or GA to ginseng seedlings significantly increased the root secondary growth. Histological analysis indicated that the enhancement of root secondary growth could be attributed to the increase in cambium stem cell activity and the subsequent differentiation of cambium-driven storage parenchymal cells. RNA-seq and gene set enrichment analysis (GSEA) revealed that the formation of a transcriptional network comprising secondary cell wall related terms connected with hormones such as auxin, GA and JA mainly contributed to the secondary growth of ginseng storage roots. Thus, through the integration of bioinformatic and histological tissue analyses, we demonstrate key biological processes that establish storage parenchymal tissue and promote the secondary growth of *P. ginseng* storage roots. Finally, I would like to introduce *Capsella rubella* as a new model plant system to implement a heterogeneous experimental approach for functional studies on diverse storage root crops.