Identification of genes involved in early stage of fruiting body development in *Coprinopsis cinerea*

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**Purpose:** Light is one of the crucial environmental factors influencing fungal sexual reproduction. In *Coprinopsis cinerea*, blue light induces simultaneous hyphal knot (earliest stage of fruiting body) formation in mycelia grown on low glucose (0.2%) media within 24h. Genes that are crucial for hyphal knot development after light stimulation were investigated.

**Methods:** Gene expression after 0, 1, 6, 12, 18h after light stimulation was analyzed by RNA-seq. Genes specifically expressed in each time point were mutated by CRISPR/cas9.

**Results and conclusion:** It is revealed that cell adhesion (fas1), fatty acid modification (cfs1, cfs2) and transcription factors were highly expressed at 1h after light stimulation. Disruption of the cfs1 resulted in deficient of hyphal knot induction, suggesting that some of genes expressed in this stage will be involved in induction of hyphal knot. 12 to 18h after light stimulation, the ich1 which is involved in fruiting body development, galectins (cgl1-3), pheromone peptides and farnesyl cysteine-carboxyl methyltransferases (fccm1 and fccm2), hydrophobins were upregulated. Disrupted mutant of the fccm2 by CRISPR/cas9 could form immature fruiting body but could not fully mature. This suggests that some genes expressed in this stage will be involved in fruiting body development from hyphal knot. Therefore, we investigated genes up-regulated 6h after light stimulation. There were fewer genes up-regulated at 6h after light stimulation compared with genes up-regulated at 1h and 12h after light stimulation. We could identify that expression of the hydrophobin genes started to increase at 6h after light stimulation. The hydrophobins would be involved in hyphal aggregation for hyphal knot development.