FumR of Aspergillus niger is involved in production of fumonisin and secreted proteins

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The sporulation pathway of *Aspergillus niger* represses protein secretion. Colonies of this filamentous fungus secrete proteins throughout the colony except for the sporulating zone. Inactivation of the sporulation gene flbA results in colonies that are unable to reproduce asexually and that secrete proteins throughout the mycelium. In addition, the ∆flbA strain mutant strain shows cell lysis and has thinner cell walls. This pleiotropic phenotype is associated with differential expression of 38 transcription factor genes. Here, one of these regulatory genes, fumR, was inactivated. Whole genome expression analysis revealed that 8 out of 63 downregulated genes in ∆fumR are implicated in amino acid metabolism. In addition, 11 out of 15 genes of the fumonisin biosynthetic gene cluster were strongly downregulated in ∆fumR. This was accompanied by absence of fumonisnin production in the deletion strain. When grown dispersed in liquid shaken cultures with xylose as a carbon source, the fumR deletion mutant showed reduced protein secretion and a different secretion profile when compared to the wild-type. This phenotype was complemented by adding amino acids to the medium. Taken together, it is concluded that fumR is involved in fumonisnin production and amino acid production, the latter facilitating protein secretion. As such, fumR is an interesting lead for improving *A. niger* as a cell factory.