CHARACTERIZATION, DEVELOPMENT, AND APPLICATION OF GENTISIC ACID BIOSENSORS

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Gentisic acid is a secondary plant metabolite, known for its benefits to the human health. This compound alongside other phenolic acids has been recognized for its antioxidant, anti-inflammatory, anti-cancer, antimicrobial, cardioprotective, hepatoprotective, and neuroprotective activities. Gentisic acid is used in cosmetics industry, also for treatment of skin pigmentary disorders, it can be utilized as a marker for renal cell carcinoma, this acid itself and its derivatives are applied in pharmaceuticals synthesis. Conventionally, gentisic acid is produced chemically from hydroquinone or salicylic acid. With the increase in demand and the need of biosustainable production strategy, a microorganism-based production approach would benefit the industry and society. To expedite the enzyme and strain screening for the pathway engineering and production of gentisic acid, this study reports on the development and characterization of gentisic acid biosensor. Here, the transcription factor-based inducible gene expression system is identified, its genetics and mechanism of action are investigated. Moreover, the inducible system with metabolically associated genes is studied in *E. coli* developing it into a non-host whole-cell biosensor. We examine the biosensor's response to the extracellularly added gentisic acid and validate sensor's specificity. This is the first report of the gentisic acid-inducible biosensor.