PLANT CELL CULTURE PLATFORMS FOR PRODUCTION OF BIOSCAVENGERS FOR BIODEFENSE

Karen A. McDonald, Department of Chemical Engineering and Global HealthShare Initiative, University of California, USA
kamcdonald@ucdavis.edu
Jasmine M. Corbin, Department of Chemical Engineering, University of California, USA
Kantharakorn Macharoen, Department of Chemical Engineering, University of California, USA
Zachary R. Kyser, Department of Chemical Engineering, University of California, USA
Sara Sukenick, Department of Chemical Engineering and Biomedical Engineering Graduate Group, University of California, USA
Somen Nandi, Department of Chemical Engineering and Global HealthShare Initiative, University of California, USA

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There is a critical need for flexible, rapid, cost effective biomanufacturing platforms for medical countermeasures. Our team has developed plant cell culture-based manufacturing platforms for production of recombinant protein bioscavengers against organophosphate (OP) nerve agents and anthrax toxins using both stable transgenic cell cultures for known chemical and biological threats, as well as transient production for rapid response to new and/or unanticipated threats. Plant cells offer several advantages over other hosts for production of medical countermeasures, particularly their ability to produce complex biologics and perform post-translational modification, inherent biosafety since they don't harbor or propagate mammalian viruses thereby simplifying and/or eliminating viral clearance steps required for mammalian production systems. Plant cells are robust, have minimal nutrient requirements (grow in simple, chemically defined media containing sucrose, salts and plant hormones), and are relatively insensitive to changes in environmental conditions. These characteristics, robustness of upstream cultivation/use and reduced downstream purification requirements, make plant cells an ideal choice for field-deployable production of medical countermeasures. Here we present results for the production of functional recombinant butyrylcholinesterase (BChE), an OP nerve agent bioscavenger, in transgenic rice cell suspension cultures in different bioreactor configurations, and transient production of a bioscavenger against an anthrax toxin in *N. benthamiana* cell cultures. Techno-economic models for scaled-up versions of these plant cell culture production systems will also be presented.