Engineers on the Field of Bioengineering/Biotechnology

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Bioengineering and/or biotechnology fields require multi-disciplinary scopes through a long pathway for successful commercialization of a product. For example, full orchestration for a protein drug includes task forces of initial discovery, upstream development in the molecular level, downstream process development, process scale-up, process validation, pharmacological validation, safety tests, formulation, stability test, quality control, clinical trial, and marketing. Engineering discipline can/should contribute on many sides of the processes by both of theoretical and experimental approaches. Even simple theoretical approaches often accelerate the speed of development that is most important key of success, and reduce huge amount of experiments.

Exemplary drug delivery studies from an engineer's viewpoint are being presented. At the first design step, theoretical approaches like mathematical modeling and simulation could be done to obtain a conceptual scope for efficient and quick development of a target drug delivery system. Then, experimental work, the main event, should be done on the theoretical base and good understandings for chemistry of the drug and the matrix. In conclusion, a knowledge profile for engineers in the field is being recommended.