3. Biosimilars

Stage	Technology Readiness Level	Definition
Ideation	TRL-1	**Review of Scientific Knowledge Base** Scientific findings are reviewed, including patent status and assessed as a foundation for conceptualizing new technologies
Proof of Principle	TRL-2	**Development of Hypotheses and Experimental Designs** Scientific studies to identify the innovator molecule. Development of Biosimilar along with assays to test activities of candidate molecules *in vitro*. High expression Clone available
Proof of Concept demonstrated	TRL-3	**Identification and Characterization of Preliminary Product** Expression of biosimilar product, studeis for efficacy and toxicities *in vitro*. Comparative evaluation of product for Biosimilarity with innovator molecule a. Physiochemical b. Biological - *in-vitro* and *in-vivo* Cell line characterization of Master Cell bank and Working Cell Bank & process development Biosimilarity demonstrated, *in vitro* efficacy and preliminary efficacy demonstrated *in vivo* in appropriate small animal model
Proof of concept established	TRL-4	**Process development, optimization, demonstration of biosimilarity and generation of consistency data** Optimization of process development for performing preclinical studies. Generation of three consistent batches. Formulation development, Appropriate formulation finalized for the route of administration. Draft Product Profile. Process optimized and regulatory approvals for preclinical candidate compound from the relevant body (RCGM/GEAC).
Early stage validation	TRL-5	**Advanced Characterization of Product and Initiation of Manufacturing**

		Conduct pre-clinical studies (*in vivo* toxicity and efficacy in relevant *in vivo* models; PK/PD studies, ADME characteristics and/or immune responses) as necessary for regulatory filing. Identify manufacturing partners. Submission of pre-clinical data to RCGM
	TRL-6	**Regulated Production, Regulatory Submission** Manufacture GMP-compliant pilot lots. Begin stability testing on biosimilar. Develop assays/analytical methods for product characterization and release (potency, purity, sterility and identity).
Late stage Validation	TRL-7	**Scale-up, Completion of GMP Process Validation and Consistency Lot Manufacturing and Regulatory Approvals** Develop a scalable and reproducible manufacturing process amenable to GMP. Determine dosing and treatment population for Phase 3 study. Complete stability studies of the GMP drug product in a formulation, dosage form, and container consistent with Target Product Profile. Finalize GMP manufacturing process. Identify clinical sites and begin contract negotiations. DCGI Approval for the Phase 3 Clinical study
Pre-commercialization	TRL-8	**Clinical Trials Phase 3 and Approval or Licensure** Complete clinical efficacy trials (e.g., Phase 3), and/or expanded clinical safety trials as appropriate. Prepare and submit Biologics Licensing Application BLA.
Commercialization and post market studies	TRL-9	**Full commercial application.** The technology has been fully developed and can be distributed/marketed. Post-marketing surveillance.