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Reprogramming microbes into live biotherapeutics: Next-generation medicines

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The wealth of knowledge on the human microbiota composition and its roles in health and disease has recently spurred the development of novel therapeutic strategies. Moreover, with an array of genetic tools that are readily available, programmable genetic circuits can be designed, genomes can be edited and rewritten, and cells can be reprogrammed to foster novel microbiota-based interventions. In this talk, our recent work on engineering gut-resident microbes as versatile platforms equipped with clinically relevant functionalities will be presented. A particular emphasis will be placed on our efforts to transform gut microbes into live biotherapeutics with prophylactic and therapeutic efficacy against pathogenic infections and chronic metabolic diseases. This work provides a strong foundation for engineering microbes to modulate host-microbiome interactions and supports the use of live biotherapeutics as a viable strategy for clinical intervention.