Bioconjugation and Self-Assembly Technologies for Multi-Functional Biologics

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Pharmaceutical industry has witnessed a growing number of biomolecular entities in competition with synthetic small molecules. Excellent target specificity and safety margin of biologics over small molecules are fueling such advancement. Recently, drug discovery efforts are in active transformation towards combining multiple preexisting biologics into a single molecular entity to achieve a higher efficacy and safety. In order to construct such multifunctional biologics, chemical and biomolecular toolkits have been developed. The bioconjugation covalently interlocks two different molecules directly or through a chemical linker. Bioorthogonal reactions developed to increase the site-specificity and the conjugation yield help produce chemically well-defined multifunctional biologics. The self-assembly utilizes a pair of peptidyl domains that non-covalently but specifically associate with each other to tether multiple biomolecules into a hybrid agent. I will review recent technological advances, and applications thereof for construction of multi-functional biologics.