

S001 Challenges to Macromolecular Drug Delivery

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The use of macromolecules, particularly monoclonal antibodies, as therapeutic agents has come to the forefront in recent years. The biodistribution and delivery issues for protein drugs are shared to a substantial degree with other emerging therapeutic approaches including pharmacologically active nucleic acids and nanoparticles. A generalized approach to these issues involves consideration of the multiple biological barriers that stand between the macromolecular drug or nanoparticle at its site of administration and its ultimate biological target. Considerations of size, stability, non-specific versus specific associations, and potency versus toxicity all play a role. The creation of delivery approaches that combine high specificity for the target cell or tissue, high therapeutic payload, and modest toxicity remains a challenge, although some very promising examples have emerged recently. A variety of sophisticated targeting strategies, primarily based on combinatorial library methods, when used in combination with new technologies to identify cell surface receptor 'signatures' of specific tissues, will facilitate advances in targeted delivery of macromolecules and nanoparticles. The challenges to contemporary macromolecule drug delivery are complex; thus new research paradigms are emerging that combine the talents of physical and biological scientists to address this key issue for modern pharmacology and therapeutics.