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Realm of drug delivery system: Introduction of nanotechnology into the conventional drug delivery system

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The monarchy of drug delivery has firmly entered into a novel approach termed to be as nanotechnology. The reason for appraising the drug delivery system is to maximize the therapeutic activity and minimize the untoward side effects. Micelles, polymeric nanoparticles, and dendrimers are the basis of remarkable drug delivery system. However, polymeric carbon nanotubes and many others demonstrate a broad variety of useful properties. Augmenting the integration of nanomaterials into drug delivery systems will require standardized methods for their classification, as well as protocols for their handling. The development of such drug carriers will require a greater understanding of both the surface chemistry of nanomaterials and the interaction chemistry of these nanomaterials with biological systems, hence can only be achieved through collaborative efforts among scientists in different disciplines. Nanotechnology is an emerging field with the potential to revolutionize drug delivery. Advances in this area have allowed some nanomedicines in the market to achieve desirable pharmacokinetic properties which reduce toxicity and improve patient compliance, as well as clinical outcomes. Integration of nanoparticulate drug delivery technologies in pre-formulation work, not only accelerates the development of new therapeutic moieties, but also helps in the reduction of attrition of new molecular entities caused by undesirable biopharmaceutical and pharmacokinetic properties.

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Dry particle coating for pharmaceutical applications: Opportunities, progress and current developments

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Dry powder coating is a micro particle engineering process and involves the adsorption of "guest" particles onto the surface of "carrier" particles. This process requires conditions that enable frequent contact between guest and carrier particles, particle adsorption, and ultimately lowering of surface energy of the binary mixture. Although the theoretical paradigm for dry-coating is known, progress and pragmatic translation have been limited owing to the lack of processes and devices capable of producing composite particles while maintaining the innate characteristics of both components (guest and carrier). For instance, mechanofusion works on the principle of high centrifugal forces that generate heat thereby limiting its pharmaceutical application to heat labile materials. Similarly, processing materials using hybridiser can lead to particle attrition. One of the distinct advantages of this technology is the cross application of the fundamental principles to develop solutions for a wide range of different problems. For instance, understanding the role of surface texture of carrier particles on the strength of interaction between the guest and carrier particles can provide vital information on its impact on flowability, guest stability (as a composite particle) as well as functionality of the resultant particles. Research at Aston University within our group has led to the development of a dry particle coater which can produce micro functionilised particles. We have characterised the resultant particles using range of techniques including AFM, surface interferometry, confocal microscopy, inverse gas chromatography and particle size analysis. The resultant particles were studied for flowability enhancement, content uniformity and micro particle based modified drug release.

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