

Applications of nanotechnology in drug delivery

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An increasing number of newly developed drugs show very poor solubility and, very often, represent a challenging problem in pharmaceutical drug formulation, especially when the drugs are poorly soluble simultaneously in aqueous and in non-aqueous media. Typical problems associated with poorly soluble drugs are a too low bioavailability and/or erratic absorption. Many attempts have been made to increase the saturation solubility of these drugs. Due to the limited applicability of these attempts, a general approach used for many years to improve the solubility of poorly soluble drugs is by reducing the particle size. The next development step was transformation of the micronized drug powder (i.e. drug micro-particles) to drug nano-particle by using different methods. One of the most important methods for Production of nano-suspensions (DissoCubes) is high pressure homogenization. The mean particle size in the nanometer range obtained by this procedure depends on the homogenization pressure and number of cycles applied; in addition it is affected by the hardness of the drug itself. An outstanding feature of nano-suspensions is the increase in saturation solubility and consequently an increase in the dissolution velocity of the compound. A basic advantage of the nano-suspensions compared to all other particulate carriers is the simplicity of the system: easy production and no requirement of matrix material (no excipient problems). In order to optimize the health promotion and disease prevention benefits of drug bioactive they need to be incorporated in carriers which offer high loading capacities, prolonged stability and in some cases controlled release potential for targeting to specific sites within the body. Particulate drug carriers investigated for many years include oil-in-water (O/W) emulsions, liposomes, niosomes and nanoparticles based on synthetic polymers or natural macromolecules. A brief account on certain research work achieved in Department of Pharmaceutical Technology, National Research Center, Cairo, Egypt in the area of application of nanotechnology in drug delivery systems will be presented. The results obtained in these research articles proved clearly that nanotechnology would offer a promising strategy to solve many problems encountered for optimizing bioavailability and biological performance of many drugs.

Biography

R. M. Khalil is the Head of department of pharmaceutical technology, National Research Centre (NRC) Cairo, Egypt. She received her Ph.D in pharmaceutical science from College of Pharmacy, Cairo University in 1989. Dr. Khalil is a Member of the permanent scientific committee for promotion of research staff members, NRC, Principal investigator, CO-Principal Investigator and Participant in many research projects in NRC, member in Egyptian Association and Syndicate of Pharmacists in Egypt. She received "Scientific Encouraging Prize of NRC" in 1998. Dr. Khalil has published more than 42 scientific papers.

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