OMICS International
conferenceseries.com

Pharm Anal Acta 2016, 7:1 (Suppl)
http://dx.doi.org/10.4172/2153-2435.C1.028

8th International Conference and Exhibition on

Pharmaceutics & Novel Drug Delivery Systems

March 07-09, 2016 Madrid, Spain

Advanced technologies in oral delivery: Extrusion spheronization, multiple unit pellet system, sublingual microtablets

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Taking one or two pills a day with a glass of water is the easiest and the most acceptable way of administration of a drug to a patient. Various controlled release, solubilization and intraoral delivery technologies have been developed to tailor the drug release profile to meet specific theuraputic needs. A brief overview of various oral and intraoral drug delivery technologies. Controlled release includes taste masking, delayed release, extended relase, multiphasic release, and pulsatile release. Solubilization includes surfactants, particle size reduction, lipid-based systems, and amorphous solid dispersions. Intraoral delivery includes buccal, sublingual, periodontal, lingual, and gingival. Examples of extrusion spheronization, Mutiple Unit Pellet System (MUPS), and sublingual microtablet are presented. Extrusion spheronization has been utilized to produce high drug load spherical substrate for further controlled release coating. Water content, salt level, and wet granules feed rate were found critical of the extrudability and sphere roundness and uniformity for Drug A. MUPS tablets (beads in tablet) offer the benefits of splitable dose and high production rate compared to beads in capsule. However, compaction of pellets is challenging, and beads tend to crack or fuse together and change dissolution profile. Approches of filler particle engineering, and a mixture design of a 3-filler system have been applied to Drug B and C. Sufentanil sublingual microtablet offers the advantage of reducing the amount of swallowed drug. The Zalviso Patient Controlled Analgesia (PCA) system using sufentanil microtablets has been desmontrated superior to current standard of care (IV PCA) in Phase 3 clincical trials.

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Drug delivery strategies aimed at improving bioavailability and bio-distribution of anti-HIV chemotherapy

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In the context of the treatment of HIV/AIDS, many improvements have been achieved since the introduction of the combination therapy (HAART). Nevertheless, no cure for this disease has been so far possible, because of some particular features of the chemotherapies. The first main concern is the poor drug bioavailability, resulting in repeated administrations and therefore a demanding compliance. A second important challenge is the need to target the drugs into the so-called reservoirs and sanctuaries, i.e., cells or body compartments where drugs cannot penetrate or are distributed in sub-active concentrations. The lack of antiviral action in these regions allows the virus to lie latent and start to replicate at any moment after therapy suspension. Recent drug delivery strategies addressing these two limitations will be discussed: (i) strategies aimed at improving the bioavailability by increasing either the drug absorption or the passage of the target cell membrane, and/or by extending the efficacy time of drugs; (ii) strategies aimed at improving the bio-distribution by targeting the drugs to the reservoirs and the sanctuaries, in particular the mononuclear phagocyte system and the brain.

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