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Fibrous NSAID Buccal films

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The buccal route for drug administration has gained importance in the past years due to its accessibility and rapid onset of action. It is a reliable alternative to the oral route, both for local and for systemic delivery of drugs, overcoming some of the drawbacks existent in oral administration, avoids the first-pass effect, pre-systemic elimination by the gastrointestinal tract, and adverse drug reactions. Similarly, because buccal administration is easily achieved, it may be a good alternative to oral drug administration without compromising compliance with treatment, particularly, for young children and older adults. Thus, buccal permeability models are essential to determine important permeation parameters. In this experiment an ex vivo model of oral tissue from pigs was used for drug permeability studies because of resemblances with human oral mucosa. This study compared the ex vivo permeability parameters of PVP/NSAID (Non-steroidal anti-inflammatory drugs) through buccal mucosa using a diffusion cell system as detection method. Currently available rapid disintegrating buccal tablets have limitations relating to the short residence time at the absorption surface. Therefore, the development of drug-loaded nanofibers may be able to overcome this problem by enhancing the surface area for interaction based on grooves and total surface exposure. The object was to evaluate the film forming fibre in the preparation of mucoadhesive patches for the controlled release of NSAID drugs to treat inflammation and pain in the joints, using the electro spinning technique. Fibrous films containing NSAID for buccal drug delivery were prepared using a one-step electrospinning technique. The resulting structures possessed mean diameters between~10-1200 nm. NSAID was encapsulated in the amorphous state, with relatively high encapsulation efficiencies. FT-IR and Raman analysis show that NSAID, PVP and selected co-polymers were well incorporated into the fibre matrix. The XRD and DSC analysis results confirmed that raw NSAID (e.g. indomethacin) changed from the crystallised to amorphous state during electrospinning.

Notes/Comments: Kazem Nazari has his expertise in freeze drying process control and electrospinning. Using an in-line process analytical technology for freeze-drying and further work by developing a temperature map of the freeze-dryer shelf to predict the degree of temperature variation within the shelf. Also, electrospinning of NSAID drugs formulation for use at buccal mucosa area. This help to avoid the first-pass effect, pre-systemic elimination by the gastrointestinal tract, and adverse drug reactions. Correspondingly, because buccal administration is easily achieved, it may be a good alternative to oral drug administration without compromising compliance with treatment, particularly, for young children and older adults.

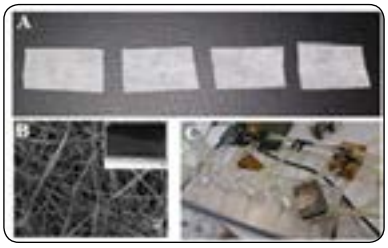

Fig.1. (a) A selection of base INDO/PVP fibrous films prepared using the electrospinning technique. Images of fibrous films using **(b)** scanning electron microscopy (SEM), with the inset showing film thickness through side-view and (c) ex-vivo studies

Recent Publications:

1. 1. Lopez, F.L.; Ernest, T.B.; Tuleu, C.; Gul, M.O. Formulation approaches to pediatric oral drug delivery: benefits and limitations of current platforms. Expert Opin. Drug Deliv. 2015, 12, 1727–1740.
2. 2. Marxen, E.; Axelsen, M;C.; Pedersen, A.M.L.; Jacobsen, J. Effect of cryoprotectants for maintaining drug permeability barriers in porcine buccal mucosa. Int J Pharm. 2016, 511, 599-605.
3. 3. Madhav, N.V.S.; Shakya, A.K.; Shakya, P; Singh, K. Orotransmucosal drug delivery systems: A review. J Controlled Release, 2009,140, 2-11.
4. 4. Amores, S.; Domenech, J.; Colom, H.; Calpena, A.C.; Clares, B.; Gimeno, Á.; et al. An improved cryopreservation method for porcine buccal mucosa in ex vivo drug permeation studies using Franz diffusion cells. Eur J Pharm Sci, 2014, 8, 49-54.
5. 5. Ribiro, S.D.; Rodrigues Filho, G.; Meneguin, A.B.; Prezotti, F.G.; Boni, F.I.; Cury B.S.F.; Gremiao, M.P.D. Cellulose triacetate films obtained from sugarcane bagasse: Evaluation as coating and mucoadhesive material for drug delivery systems. Carbohydrate Polymers, 2016,152, 764-77.

Biography

Kazem Nazari is in write up stage of his PhD studies, and his expertise is in nanotechnology; the creation of fibres using different materials. He obtained his BSc Honors in Pharmaceutical and Cosmetic Sciences and Mphil degree in Pharmaceutical Technology (freeze-drying process control) using in- line process analytical technology for freeze-drying and developing a temperature map of the freeze-dryer shelf to predict the degree of temperature variation within the shelf at De Montfort University before deciding to pursue a PhD in The Advanced Drug Delivery Group (specializing in EHDA systems) (led by Prof. Z Ahmad at De Montfort University, Leicester UK).

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