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Confronting obesity via new orally administered naltrexone/bupropion 3D-printed tablet formulations

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Obesity is a disease characterised by excess body fat and is related with increased mortality and morbidity with associated conditions, like diabetes, cardiovascular diseases and the development of certain types of cancers, including esophageal, colon, and breast cancers (Tec, 2016). The last few decades, the rates of both obesity and the associated diseases have been exponentially increased worldwide. The use of approved pharmacotherapy is suggested in obese or overweight adults with at least one bodyweight-related comorbidity (e.g. type 2 diabetes, hypertension or dyslipidaemia) (Greig and Keating, 2015).

Currently, the obesity menace is mainly confronted by the administration of a commercially available naltrexone/bupropion tablet formulation (Mysimba®), the use of which is, though, not devoid of serious side effects and especially cardiovascular related. In view of this, new compounded naltrexone/bupropion sustained/controlled release bilayer and 3D-printed delivery systems have been developed in our laboratory, aiming at improving the properties of the known naltrexone/bupropion systems. The data we have obtained, regarding the *in vitro* oral dissolution profile of the new matrix tablets are significant and will be utilized in future *in vivo* studies. The new 3D-printed naltrexone/bupropion carriers were prepared by the fused deposition modeling (FDM) method, which is utilized in the fabrication of 3D objects by extruding molten materials layer by layer on a platform. Recently, the applicability of this approach has been broadened and covers the medical/pharmaceutical area, as well, as the FDM printing process is nowadays widely used to manufacture drug delivery systems (Mathew et al., 2020). The new 3D printed naltrexone/bupropion carriers, we have developed, will be sought to be evolved in the future to 4D systems, where "time" is incorporated into the conventional concept of 3D printing, thus providing the Pharma with new prospects.

Recent Publications

1. Zampakola, A. Siamidi, N. Pippa, C. Demetzos, M. Vlachou. Chronobiotic Hormone Melatonin: Comparative *in vitro* Release Studies from Matrix Tablets and Liposomal Formulations Lett Drug Des Discov, 14(4), 476-480, (2017). DOI: 10.2174/1570180813666161006162246

2. M. Vlachou, A. Siamidi, E. Diamantidi, A. Iliopoulou, I. Papanastasiou, V. Ioannidou, V. Kourbeli, A.-S. Foscolos, A. Vocat, S.T. Colec, V. Karalis, T. Kellici, T. Mavromoustakos. *In vitro* Controlled Release from Solid Pharmaceutical Formulations of two new Adamantane Aminoethers with Antitubercular Activity (I) Drug Res, 67(8), 447-450, (2017). DOI: 10.1055/s-0042-121491 (2017)

3. M. Vlachou, A. Siamidi, D. Spaneas, D. Lentzos, P. Ladia, K. Anastasiou, I. Papanastasiou, A-S. Foscolos, M-O. Georgiadis, V. Karalis, T. Kellici, T. Mavromoustakos. *In vitro* Controlled Release of two new Tuberculocidal Adamantane Aminoethers from Solid Pharmaceutical Formulations (II). Drug Res, 67(11), 653-660, (2017). DOI: 10.1055/s-0043-114012

Biography

Marilena Vlachou is an Associate Professor at the National and Kapodistrian University of Athens (NKUoA), Greece. She obtained her Pharmacy and PhD (Pharmaceutical Technology) degrees from the NKUoA. Just prior to obtaining her PhD degree she moved to the University of Rhode Island, U.S.A., as a Visiting Research Scientist, to conduct cutting edge research related to Pharmaceutical Technology techniques. In NKUoA, she teaches, at both undergraduate and postgraduate level, courses related to the fields of Pharmaceutical Technology, Physical Pharmacy and Nanotechnology. She has co-authored the textbook entitled "Pharmaceutical Technology I: Principles of Physical Pharmacy and Nanotechnology", and many book chapters. She has presented her research work in more than seventy (70) International Scientific Conferences and she has published more than sixty (60) articles in peer-reviewed Journals.

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