engineering proceedings

Abstract

Intranasal Nanoparticles for the Treatment of Depression and Anxiety Disorders †

Margarida Alberto [1,*], Ana Cláudia Paiva-Santos [1,2], Francisco Veiga [1,2] and Patrícia C. Pires [1,2,3,*]

[1] Faculty of Pharmacy (FFUC-UC), University of Coimbra, Azinhaga de Santa Comba, 3000-548 Coimbra, Portugal
[2] Associated Laboratory for Green Chemistry of the Network of Chemistry and Technology (LAQV REQUIMTE), Group of Pharmaceutical Technology, Faculty of Pharmacy, University of Coimbra, 3000-548 Coimbra, Portugal
[3] Health Sciences Research Centre (CICS-UBI), University of Beira Interior, Av. Infante D. Henrique, 6200-506 Covilhã, Portugal
* Correspondence: margaridaalberto99@gmail.com (M.A.); patriciapires93@gmail.com or patriciapires@ff.uc.pt (P.C.P.)
† Presented at the 3rd International Electronic Conference on Applied Sciences, 1–15 December 2022; Available online: https://asec2022.sciforum.net/.

Abstract: The treatment of central nervous system disorders, such as depression and anxiety, relies on the oral administration of drugs with antidepressant or anxiolytic action. Given the increased incidence of these diseases and the disadvantages of oral drug administration, studies are being performed with the aim of developing new ways of treatment in order to improve the effectiveness of the therapies that are applied. The intranasal pathway has gained interest as a route of administration for drugs to the intended target, the brain, due to its capability of direct transport to the central nervous system. In addition to the route of administration, nanoparticles have been studied as possible alternatives to conventional formulations, with the objective of improving drug bioavailability. The present work aimed to analyze the potential of intranasal nanoparticle administration for the treatment of depression and anxiety, using the analysis of several already performed studies. From the carried-out analysis, it was concluded that nanoparticle development takes into consideration the characteristics of the nasal mucosa to allow for enhanced drug absorption and permeability. The use of nanoparticles allows the protection of the drug from enzymatic degradation, and the modulation of its components provides advantages for intranasal administration. In vitro drug release and ex vivo drug permeation studies were conducted, demonstrating, in the majority of cases, an advantage in the use of these formulations. In vivo studies on rats or mice were also carried out, allowing the efficacy of the treatment with the developed formulations to be verified, with results proving very promising.

Keywords: anxiety; depression; intranasal; lipid nanoparticles; nose-to-brain; polymeric nanoparticles

Citation: Alberto, M.; Paiva-Santos, A.C.; Veiga, F.; Pires, P.C. Intranasal Nanoparticles for the Treatment of Depression and Anxiety Disorders. *Eng. Proc.* **2023**, *31*, 72. https://doi.org/10.3390/ASEC2022-13853

Academic Editor: Maria Pesavento

Published: 13 December 2022

Supplementary Materials: Presentation. The material is available at https://www.mdpi.com/article/10.3390/ASEC2022-13853/s1, Presentation: Improving brain targeting efficiency by nose-to-brain delivery of lipidic and polymeric nanoparticles: a focus on depression and anxiety treatments.

Author Contributions: Conceptualization, P.C.P. and A.C.P.-S.; methodology, P.C.P. and A.C.P.-S.; investigation, M.A.; writing—original draft preparation, M.A.; writing—review and editing, P.C.P., A.C.P.-S. and F.V.; supervision, P.C.P., A.C.P.-S. and F.V. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.