engineering proceedings

Abstract

Brain Targeting of Antidepressant and Anxiolytic Drugs †

Jéssica Antunes [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] REQUIMTE/LAQV, 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: jessikitalo1999@gmail.com
† Presented at the 3rd International Electronic Conference on Applied Sciences, 1–15 December 2022; Available online: https://asec2022.sciforum.net/.

Abstract: Depression and anxiety are high incidence and debilitating psychiatric disorders, usually treated by antidepressant or anxiolytic drug administration, respectively. Nevertheless, this treatment is usually administered orally, but the low permeability of the blood–brain barrier, which serves many functions such as being a barrier to prevent the entry of external substances into the brain, reduces the amount of drugs that will be able to reach the brain, also reducing, consequently, therapeutic efficacy. This is why new solutions have been tried, i.e., to make these treatments more effective, safer, and faster. To overcome this obstacle, in the articles analyzed in this work, three main strategies were used to improve brain drug targeting: the intranasal route of administration, which allows the drug to be directly transported to the brain by neuronal pathways (olfactory and trigeminal nerves), bypassing the blood–brain barrier and avoiding hepatic and gastrointestinal metabolism; the use of nanosystems for drug encapsulation, including polymeric and lipidic nanoparticles, nanometric emulsions and nanogels; and drug molecule functionalization, by the attachment of ligands such as peptides and polymers. Pharmacokinetic and pharmacodynamic results showed that intranasal administration can be more efficient in brain targeting than other routes (such as intravenous or oral administration), as well as the use of nanoformulations and drug functionalization, which are also quite beneficial in increasing brain drug bioavailability.

Keywords: anxiety; brain targeting; depression; drug functionalization; intranasal; nanosystems

check for updates

Citation: Antunes, J.; Paiva-Santos, A.C.; Veiga, F.; Pires, P.C. Brain Targeting of Antidepressant and Anxiolytic Drugs. *Eng. Proc.* **2023**, *31*, 50. https://doi.org/10.3390/ASEC2022-13766

Academic Editor: Maria Pesavento

Published: 1 December 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

Supplementary Materials: Presented video. The material is available at https://www.mdpi.com/article/10.3390/ASEC2022-13766/s1.

Author Contributions: Conceptualization, P.C.P. and A.C.P.-S.; methodology, P.C.P. and A.C.P.-S.; investigation, J.A.; writing—original draft preparation, J.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.