We are IntechOpen,
the world's leading publisher of
Open Access books
Built by scientists, for scientists

6,900
Open access books available

185,000
International authors and editors

200M
Downloads

154
Countries delivered to

Our authors are among the

TOP 1%
most cited scientists

12.2%
Contributors from top 500 universities

BOOK CITATION INDEX
CLARIVATE ANALYTICS
INDEXED

WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Introductory Chapter: Behavioral Pharmacology - From Basic to Clinical Research

Juan Francisco Rodríguez-Landa
and Jonathan Cueto-Escobedo

1. Behavioral pharmacology

Behavioral pharmacology is a multidisciplinary field of science focused on exploring and understanding the effects of chemical substances, hormones, and drugs on the behavior of humans and experimental animals, all with the final objective of understanding the neurobiological substrate of behavior and contributing in the development of therapeutic agents or pharmacologic tools for research in neurosciences [1]. The relative new popularity and accelerated growth of neurosciences have simultaneously led to an exponential growth on the scientific literature on this area that has been produced every day [2–6]. That makes necessary new strategies to be ready in a field that has been constantly actualized; for example, years ago, students with different backgrounds, who are graduates of psychology, medicine, or chemistry, had to study postgraduate trainings to specialize in the field of neurosciences. Nowadays, students from diverse universities can apply a career in "neurosciences" that has been recently designed by the National Autonomous University of Mexico few years ago [7]. This is an example on how universities have adapted to offer a better preparation on neurosciences fields. In this sense, the present book also attempts to offer the reader a source of current knowledge in behavioral pharmacology from different backgrounds.

Despite the relatively brief history of the behavioral pharmacology, it has significantly contributed in the understanding of the importance of the environmental and behavioral factors that determine the effect of drugs and chemical compounds with potential therapeutic and toxicological actions that impact on the health of the human being or another organisms [8]. In this way, the experimental and clinical procedures into the behavioral pharmacology have permitted the identification of natural or synthetic substances with potential utility in the treatment of central nervous system disorders, including anxiety, depression, and Alzheimer's and Parkinson's diseases [9–15], among others.

In support, the present book is a multidisciplinary compilation that illustrates the advancement and development of behavioral pharmacology supported in areas as pharmacology and psychology, experimental analysis of behavior, psychophysiology, and the recently called neurosciences such as neuroethology, neurophysiology, and neurochemistry, among others. In this book, the authors included and discussed results in the field of behavioral pharmacology and neurosciences. The chapters include scientific information derived from basic research in laboratory animals and the impact that this information has in the

development of potential pharmacological treatments to be applied in the clinical research to contribute in the wellness of the human being. The relevance of these contributions is the discussion of the experimental analysis of behavior under diverse pharmacological treatments, including complementary results from neurochemistry, neuropharmacology, neurophysiology, psychopharmacology, neuroanatomy, and molecular biology that permit the identification of the mechanism of action involved in the potential beneficial and toxic effects of the evaluated drugs.

2. Author's contribution to the present book

Cueto-Escobedo and collaborators (Chapter 2) show a brief history of the development of behavioral pharmacology over the years, as well as the contribution of this science in the development of animal models that have contributed in the knowledge of the biological bases of behavior and importantly in the identification of potential therapeutic and toxic agents that may impact on the central nervous system disorder. Fernández-Demeneghi and collaborators (Chapter 3) report how identifying the potential beneficial effects of functional food on health has been possible through the use of the techniques of behavioral pharmacology. In this case they report the effects of berry juice or its secondary metabolites (i.e., polyphenols, anthocyanins, and other constituents) on some central nervous system disorders like anxiety, depression, Alzheimer's and Parkinson's diseases, and cognitive alterations. Hernandez-Lozano and collaborators (Chapter 4) discuss the potential use of botanical and natural pharmaceutical resources in the management of neuropathy pain based on preclinical studies. Additionally, include relevant information about of the phytochemical, toxicity, adverse effects, and biosecurity reported to botanical and natural pharmaceutical resources used in pain control.

The evaluation of natural products or new synthetic molecules with potential application in the treatment of symptoms that impact on the wellness of animals or human beings firstly may be based on exploring their effects in a traditional context (i.e., using extracts, infusions, or juice), but derived from these studies, a more specific screening is focused on isolated, characterized, and purified secondary metabolites, where a more controlled dosage may be realized. Garcia-Rios and collaborators (Chapter 5) describe and discuss preclinical results of specific plant secondary metabolites and their potential use in clinical therapy of anxiety and depression, which is compared with clinically effective anxiolytic and antidepressant drugs. Particularly, the anxiolytic and antidepressant effects of terpenes, flavonoids, alkaloids, and sterols and their mechanism of action on the central nervous system are discussed.

Behavioral pharmacology studies also had contributed in understanding neurobehavioral bases that underlie some psychiatric disorders and the pharmacological action of drugs in a specific context. Guillen-Ruiz and collaborators (Chapter 6) provide a general overview of the usefulness of animal behavioral models to explore the anxiety disorders in childhood and its neurobiological bases and to then explore potential anxiolytic therapies to minimizing side effects in this particular population. Finally, Ocampo-Ocampo and collaborators (Chapter 7) address the problem of addiction and their treatment from behavioral analysis and an integrative holistic approach, with the aim of preventing or reducing the physical and mental damage that addictive substances may cause to the health, improving the quality of life of psychoactive substance consumers.

3. Concluding remarks

This short chapter must be considered to be a brief and necessarily incomplete review that has the only purpose of introducing the works of the authors in the next chapters to the reader. As you can see, behavioral pharmacology has brought great progress in the understanding of the neurobiology of different central nervous system disorders and in the understanding of the mechanism of action of drugs used to treat such disorders, as those mentioned in this chapter and the whole book. We hope the present work will enrich your knowledge on the study of behavioral pharmacology.

Author details

Juan Francisco Rodríguez-Landa[1,2]* and Jonathan Cueto-Escobedo[3]

1 Laboratory of Neuropharmacology, Institute of Neuroethology, Universidad Veracruzana, Xalapa, Veracruz, México

2 Faculty of Biological Pharmaceutical Chemistry, Universidad Veracruzana, Xalapa, Veracruz, México

3 Translational and Clinical Research Department, Institute of Health Sciences, Universidad Veracruzana, Xalapa, Veracruz, México

*Address all correspondence to: juarodriguez@uv.mx

IntechOpen

References

[1] Branch MN. Behavioral pharmacology. In: Lattal EA, Iversen IH, editors. Experimental Analysis of Behavior. Amsterdam: Elsevier; 1991. pp. 21-70

[2] Branch MN. How research in behavioral pharmacology informs behavioral science. Journal of the Experimental Analysis of Behavior. 2006;**85**(3):407-423. DOI: 10.1901/jeab.2006.130-04

[3] Planchez B, Surget A, Belzung C. Animal models of major depression: Drawbacks and challenges. Journal of Neural Transmission. 2019;**126**(11):1383-1408. DOI: 10.1016/j.neurol.2015.07.011

[4] Kuhn BN, Kalivas PW, Bobadilla AC. Understanding addiction using animal models. Frontiers in Behavioral Neuroscience. 2019;**13**:262. DOI: 10.3389/fnbeh.2019.00262

[5] Maximino C, Arndt SS, van der Staay FJ. Animal models. In: Vonk J, Schackelford TK, editors. Encyclopedia of Animal Cognition and Behavior. Basel: Springer Nature Switzerland; 2019. pp. 1-17

[6] Ferreira GS, Veening-Griffioen D, Boon W, Moors E, de Gispen-de Wied C, Schellekens H, et al. A standardized framework to identify optimal animal models for efficacy assessment in drug development. PLOS One. 2019;**14**(6):e0218014

[7] Nacional Autonomous University of Mexico (UNAM), Faculty of Medicine, Bachelor degree in Neurosciences. Mexico City: Neurosciences UNAM. 2020. Available from: http://neurociencias.facmed.unam.mx [Accessed: 03 March 2020]

[8] Chast F. A History of Drug Discovery: From First Steps of Chemistry to Achievements in Molecular Pharmacology. London: Academic Press; 2008. pp. 3-62

[9] Bourin M. Experimental anxiety model for anxiety disorders: Relevance to drug discovery. In: Kim YK, editor. Anxiety Disorders. Advances in Experimental Medicine and Biology. Singapore: Springer; 2020. pp. 169-184

[10] Robbins TW, Murphy ER. Behavioural pharmacology: 40+ years of progress, with a focus on glutamate receptors and cognition. Trends in Pharmacological Sciences. 2006;**27**(3):141-148. DOI: 10.1016/j.tips.2006.01.009

[11] Marr MJ. Behavioral pharmacology: Issues of reductionism and causality. In: Barrett JE, Thompson T, Dews P, editors. Advances in Behavioral Pharmacology. Hillsdale: Lawrence Erlbaum; Vol. 7. 1990. p. 1-12

[12] Rodríguez-Landa JF, Hernández-Figueroa JD, Hernández-Calderón BC, Saavedra M. Anxiolytic-like effect of phytoestrogen genistein in rats with long-term absence of ovarian hormones in the black and white model. Progress in Neuropsychopharmacology and Biological Psychiatry. 2009;**33**(2):367-372. DOI: 10.1016/j.pnpbp.2008.12.024

[13] Rodríguez-Landa JF, Puga-Olguín A, Germán-Ponciano LJ, Olmos-Vázquez OJ, Bernal-Morales B. Phytoestrogens as potential therapeutic agents for the treatment of anxiety and affective disorders. In: Atta-ur-Rahman, editor. Studies in Natural Products Chemistry. Vol. 58. Amsterdam: Elsevier; 2018. pp. 133-159

[14] Rodríguez-Landa JF, Hernández-López F, Cueto-Escobedo J, Herrera-Huerta EV, Rivadeneyra-Domínguez E,

Bernal-Morales B, et al. Chrysin (5,7-dihydroxyflavone) exerts anxiolytic-like effects through GABAA receptors in a surgical menopause model in rats. Biomedicine & Pharmacotherapy. 2019;**109**:2387-2395. DOI: 10.1016/j.biopha.2018.11.111

[15] Rodríguez-Landa JF, Olmos-Vázquez OJ, Dutra-da-Costa BP, Lima-Maximino M, Maximino C, Guillén-Ruiz G. Action of progesterone on depression-like behavior in a model of surgical menopause are mediated by GABAA receptors. Salud Mental. 2020;**43**(1):43-53. DOI: 10.17711/SM.0185-3325.2020.007