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EDITORIAL NOTE

Hot Topics in Biomedical Sciences

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It is a pleasure to introduce the Special Issue "Hot Topics in Biomedical Sciences" from the Annals of the Brazilian Academy of Sciences (AABC). We are glad to gather both original papers and reviews from research groups located in different Brazilian regions, permeating topics such as Biochemistry, Molecular Biology, Genetics, Pharmacology, Immunology, Medicine, Biophysics and Neuroscience.

A revision discusses the mechanisms through which the fungus *Cryptococcus neoformans* causes brain damage, focusing on the interaction of host cells with the microorganism. Immunocompromised individuals are particularly susceptible to this infection. Furthermore, regarding infection by fungi, an original paper evaluated the prevalence of *Candida* strains resistant to fluconazole (a widely used anti-fungal drug) in a Brazilian University Hospital. This study stresses the need for rational use of antifungal drugs and the development of compounds that block the efflux pumps that mediate active transport of antifungals.

In the past few years, there is an increase in families that do not vaccinate their children. This resistance may be related tin the increased incidence of infectious diseases, which are easily controlled through vaccination. Based on this analysis, a revision addresses some epidemiological aspects and displays possible arguments that could explain why diseases such as measles, polio, pertussis, diphtheria and tuberculosis are still a threat.

In addition, an interesting review describes a plethora of genome modification methods, focusing on transgenic mice models, which allowed great advances in the study of several human diseases. The authors describe the discovery and upgrade of new techniques, discussing their limitations and applications for biomedical research.

New therapeutic strategies for neurodegenerative and psychiatric disorders are also addressed in the present issue. In this scenario, a review focused on the use of mesenchymal stem cells as an interesting alternative for the treatment of these disorders. In another manuscript, the authors suggested the use of polyunsaturated fatty acids to reduce the symptoms of schizophrenia. In this original paper the authors evaluate the effects of omega-3 on interleukines and neurotrophin levels in an animal model for schizophrenia. Furthermore,

the association between Alzheimer´s Disease and neuropsychiatric comorbidities has been dissected in a revision, to bring light on the causal relationship between depression, schizophrenia and bipolar disorder with Alzheimer´s Disease.

In this special issue, articles also describe beneficial and toxic effects of drugs. In this context, fenproporex (an amphetamine-based anorectic consumed worldwide) administration increased acetylcholinesterase activity in brain structures of rats, indicating that the abusive use of this drug induces cholinergic alterations and such effect might collaborate to the pathophysiological mechanism underlying the brain damage observed in patients who use amphetamines. Moreover, retinoids such as vitamin A in excessive doses induce neurotoxic effects, such as bioenergetics dysfunction, redox impairment, altered cellular signaling, and cell death.

Moreover, in a systematic review, the beneficial effects of the use of the combination of acyclovir plus hydrocortisone on early episodic treatment of herpes simplex labialis has been discussed. Furthermore, an original manuscript describes potential biological activities of lavender essential oil. This oil presented antioxidant activity in a dose-dependent manner. In addition, it was also demonstrated that lavender essential oil has analgesic and anti-inflammatory activities, suggesting a therapeutic potential. Another original paper describes the *in vivo* toxicological evaluation of potential anti-prion compounds. The results indicate that the investigated heterocyclic compounds are safe to mice when administered orally or intraperitoneally, showing that they have potential application for therapy against prion diseases.

In a biophysical perspective, a revision presents the state of the art of disaggregases, which are molecular chaperones that dissolute protein aggregates. The authors focused primarily on a disaggregase from yeast, the Hsp104 that can solubilize aggregates and is related to prion propagation and inheritance in eukaryotic cells. It is also suggested that these chaperones can be used as therapeutic tools against amyloid diseases in mammals.

This issue also covers several articles discussing different aspects of genetic disorders. For instance, experimental evidences of the pathophysiological mechanisms of fructosemia and progressive muscular dystrophies are provided. In this scenario, it was shown that acute fructose administration to rats alters biochemical parameters in cerebrospinal fluid and serum, and bioenergetics parameters in cerebral cortex, suggesting a role of fructose on brain alterations found in fructosemic patients.

D-glyceric aciduria is an inborn error of metabolism caused by the deficiency of glycerate 2-kinase activity and affects mainly the brain. This rare disease is discussed in details in an interesting review published herein. Lastly, another interesting article reviewed the advanced strategies being used for the treatment of orphan genetic disorders.