



Innovative Approaches in Drug Discovery: Ethnopharmacology, Systems Biology and Holistic Targeting.

Bhushan Patwardhan and Rathnam Chaguturu. Academic Press, An Imprint of Elsevier, 125 London Wall, London EC2Y 5AS, UK. 2017. xxxvii + 422 pages. Price: US\$ 89.95.

A comprehensive book written by experts in corresponding fields, it comprises 16 chapters. The first chapter is about drug discovery and pharmacogenosy, which is more a historical account of the concepts and pitfalls of drug discovery. It is sub-divided into fourteen sub-sections covering areas such as synthetic drugs, ethnopharmacology and natural products, emergence of biotechnology, drug discovery process, drug discovery impasse, new drug approvals, drug recalls and withdrawals, why drugs fail, need for novel approaches, chemical approaches, pharmacology approaches, biological approaches and formulatory discovery.

The second chapter focuses on reasons as to why and how drugs fail. The concepts are explained using four case studies. Statins, the discovery and diabetes induced by consumption, are highlighted in the first part. Troglitazone is the second case study which discusses in detail the reasons for TGZ withdrawal. The case study is the famous story of Rofecoxib, its development and downfall. The fourth example is the old story of thalidomide which is taught in schools and colleges.

The third chapter deals with holistic drug targeting. The sub-sections elaborate the concept of how a single target specificity is preferred. It also deals with target identification and validation, HTS, rational drug design, approaches for

holistic drug targeting, drug reposition, combination therapy and multitarget drug discovery.

The fourth chapter explores the relation between modern medicine and ancient knowledge, through reverse pharmacology. The chapter gives details about how modern drugs were identified based on traditional knowledge. The sub-titles explore the discovery of natural product-based NCEs and Ayurveda inspired Hits and Leads and Ayurveda therapeutics. Challenges and opportunities and future directions in the area of reverse pharmacology and traditional medicine are also discussed.

The fifth chapter introduces a new concept of network pharmacology, which is the study of the effect of a drug molecule on multiple targets. Network biology and network ethnopharmacology are also covered. Ayurveda and traditional medicine are explored in terms of network pharmacology. Triphala has been used as a case study and its application in targeting human proteasome and disease and microbial proteasome are explained in detail.

Genetic driven drug discovery is the premise of the sixth chapter. All aspects of drug discovery like target identification, lead identification and optimization, preclinical studies, clinical development, clinical trials, IND for marketed drugs are the important sections of this chapter.

Pharmacogenomics is the basis of the seventh chapter. It covers the ADME of drugs. Drug response and adverse drug reactions, drug metabolizing enzymes, drug transporters, drug targets, concept of personalized medicine in terms of traditional medicine, etc. form the main content of this chapter.

Chapter 8 covering transcriptomics and epigenomics is divided into two main parts; one dealing with different aspects of RNA and the second based on DNA. Small interfering RNA (siRNA) and application of RNAi in various diseases are described. Transcriptomics in herbal drug discovery, lead optimization, toxicogenomics are explained in detail. DNA methylation and epigenomics methodologies are described in detail.

Chapter 9 describes the advances and applications of proteomics. Details of recent advances in proteomics and how proteomic studies help in understanding disease mechanisms and mode of action are covered. Role of proteomics in lead optimization, drug toxicity, ethnophar-

macology research, toxico-kinetics and herb-drug interactions is covered in the chapter.

Chapter 10 is on the role of chemical informatics. Key challenges in informatics, target identification, SAR elaboration, structure-based design, achieving target specificity and accurate toxicity predictions are the main points in this chapter.

Chapter 11 focuses on the discovery of vaccines and immunodrugs. Rational, genomic and discovery approaches to vaccines and antigens are described. HIV/AIDS and malaria vaccines are two case studies in this chapter. The focus then shifts to vaccine adjuvants, immunomodulators, immunodrugs and biological and polysaccharides as adjuvants.

Chapter 12 is devoted to curcumin and its applications.

Safety of traditional medicines forms the topic of the thirteenth chapter in the book. Conventional quality control, newer approaches in quality and safety are the main points covered in this chapter.

Chapter 14 describes the importance of holistic lifestyle and importance of lifestyle and behavioural interventions and importance of yoga, meditation and Ayurveda.

Chapter 15 is devoted to the collaborative strategies for future drug discovery. The case study is the contributions from Indian government agencies in helping drug discovery attempts in industries and academic institutions. Noteworthy efforts from NMITLI, OSDD, DST, DBT (SBIRI and BIRAC), ICMR, AYUSH and biotech parks are the highlights.

The last chapter brings out the data reproducibility conundrum. Some instances described here show that the data was manipulated or hidden to project desired results.

The book is very comprehensive and recalls various aspects of drug discovery and the role of traditional medicine in strengthening the drug pipeline. The illustrations are well done and very informative. The book will be of use to colleges and academic institutions involved in drug discovery.

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