

NEW AVENUES IN DRUG DISCOVERY AND BIOACTIVE NATURAL PRODUCTS



Editors:

Raja Chakraborty
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(Volume 2)

New Avenues in Drug Discovery and Bioactive Natural Products

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PREFACE

Natural products always play an important role in the process of drug discovery and the development of modern medicine. Drug discovery aiming to find robust and viable lead candidates is a challenging and time taking process that involves the participation of experts from various fields. Screening of natural products to a new molecule or new biological effect of an existing drug candidate requires expertise, experience and modern techniques. Natural products and their structural analogues are used as a lead in the drug discovery process and have always played an imperative role in pharmacotherapy. However, drug discovery from natural products is always challenging because of technical issues, such as screening, isolation, characterization, identification and optimization, which results in a decline in their pursuit by pharmaceutical companies. Over the past few decades, the demand for natural products has been increasing, and researchers have concentrated on drug discovery from natural sources, predominantly focusing on traditional medicinal information. Plants are an abundant source of chemically vastly diverse secondary metabolites, which upon screening, exhibited different biological functions and are still far from being comprehensively investigated. Scientific awareness in natural product-based drug discovery leads to concentrating the focus on finding a new strategy for isolation, identification, characterization, screening of natural products and resupply of biologically active compounds being developed, which are the necessity of the future. Drug discovery from medicinal plants can be considered a hot spot of research. A large number of drugs were obtained from the medicinal plant, and several others have been discovered by using phytochemicals as lead. Plants have historically proven their value as a major source of bioactive molecules, and still represent an imperative tool for the discovery of novel drug leads. Intrinsic complexity involved in drug discovery from plant sources necessitates extremely integrated interdisciplinary approaches. Scientific developments and technological advancement, including sophisticated analytical tools, engineering strategies, in silico approach, *etc.*, are opening up new opportunities to reestablish natural products as a key source for drug discovery and find new drugs quickly. Volume 2 of this series of the book entitled “Natural Medicine: New Avenues in Drug Discovery and Bioactive Natural Products” is devoted to the current research in drug discovery from natural sources, modern analytical and scientific approaches, the bioactivity of isolated phytochemicals and their analogues. This volume is a collection of important research on this field which will strengthen scientific advancement on natural product-based drug discovery and will be helpful for the scientific community.

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Phytochemicals of Promise in the Management of Type 2 Diabetes Mellitus

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Abstract: Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia, resulting from defects in insulin secretion, insulin action, or both. Type 2 diabetes mellitus (T2DM) is typically characterized by insulin resistance, wherein there is a cross-talk involving obesity and inflammation. Symptoms of T2DM include polyuria, polydipsia, and weight loss, often accompanied by polyphagia, blurred vision, growth impairment, *etc.* The disease burden is often complicated by secondary complications like retinopathy, nephropathy, peripheral and autonomic neuropathy, increased incidence of atherosclerosis, peripheral and cerebrovascular diseases. Advances in understanding the pathophysiology involved in disease progression have led to the exploration of novel targets like glucose transporters, incretin-based therapies, SGLT-1/SGLT-2 modulation, AR/PTP1B dual inhibitors, PPAR-based therapies, NFκB and modulation of IRS for the management of T2DM. Various *in vitro* and *in vivo* studies have strongly suggested the potential of phytochemicals for the treatment of different pathological conditions associated with hyperglycemia and its complications. Different secondary metabolites have shown promising results in the treatment of different metabolic disorders, including T2DM, by different mechanisms of action. This chapter aims to provide an overview of some of the major phytochemicals, currently investigated for their potential activity against T2DM along with the mechanisms contributing to glycemic control.

Keywords: Glucose transporters, Hyperglycemia, Insulin resistance, Type 2 diabetes mellitus.

INTRODUCTION

Diabetes mellitus (DM) has emerged as one of the major concerns for the global population because of its disease progression. As reported by the International

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