

Importance of Benzothiazole Motif in Modern Drug Discovery: Introduction

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Submission: December 21, 2017; Published: January 04, 2018

Abstract

Drug discovery & their progress is major interest and present to the entire scientific community is a distilled version of newer developments in medicinal and pharmaceutical research area. Benzothiazoles are the most significant heterocyclic scaffold, which are widespread and integral feature of a broad range of natural occurring molecules and pharmaceutical agents. It shows a number of pharmacophoric activities, and its derivatives signify a high degree of structural diversity that has proven helpful for explore of newer bioactive agents.

Keywords: Drug design; Benzothiazole, Pharmaceuticals; Biological activity

Introduction

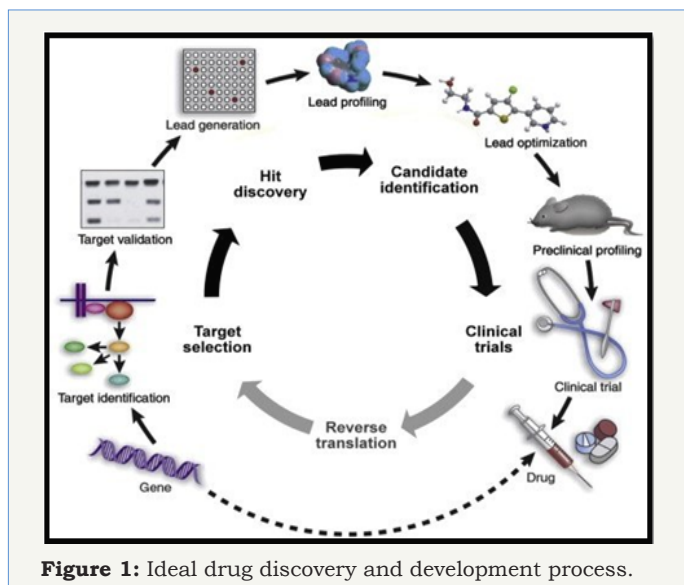


Figure 1: Ideal drug discovery and development process.

Heterocyclic molecules are pervasive in several areas of life sciences. These molecules perform numerous significant functions in nature, medicine, and technology. Heterocyclic hybrids have enormous potential as the most promising molecules as lead structures for the design of novel drug candidates in the field of modern drug discovery (Figure 1). The development of newer drug and pharmaceuticals is currently a critical and challenging issue to the academic researchers and pharmaceutical industry [1,2]. A wide range of synthetic and medicinal properties shown by heterocyclic hybrids inspired organic and medicinal chemists to pursue the synthesis of newer motifs and screen their

pharmacophoric properties. Nitrogen-containing heterocycles specially azoles family are the subject of continuous interest in organic synthesis owing to the fact that they occur ubiquitously in pharmacologically active natural products, multipurpose oriented functional materials as well as highly potent pharmaceuticals and agrochemicals [3,4]. Benzothiazoles found to be most interesting biophore in research because it is used as a synthon for the synthesis of bioactive structures [5]. It is present in compounds involved in research aimed at evaluating new products that possess interesting biological activities viz. antitumor [6,7], antimicrobial [8-10], anti-inflammatory [11], anti-tubercular [12,13], anti-HIV [14], anti-malarial [15], anti-convulsant [16], anthelmintic [17,18], anti-oxidant [19] and analgesic. The versatile synthetic applicability of bioactive heterocyclic scaffold help in the organic synthesis and pharmaceutical chemists to plan organize & implement new strategies towards the drug discovery of newer benzothiazoles. In addition, the benzothiazole system is present in various marine or terrestrial natural compounds, which have useful biological activities. A variety of 2-aminobenzothiazoles have been described as central muscle relaxants and found to interfere with glutamate neurotransmission in biochemical, electrophysiological and behavioral experiments. They have also found application in industry as antioxidants, vulcanization accelerators [20]. Substituted benzothiazoles received much attention due to unique structure and its uses as imaging agents for β -amyloid plaques, photosensitizers, inhibitors of stearyl-coenzyme A δ -9 desaturase, LTD-4 receptor antagonist, orexin receptor antagonist and also a derivative of benzothiazole is the light-emitting component of luciferin, found in fireflies. Some important and clinically used

drugs having benzothiazole ring in their structures are Riluzole, Thioflavin, Pittsburgh compound B, Ethoxzolamine, Pramipexole, Dimazole, Flutemetamol and Dithiazanine Iodide (Figure 2). Novel approach for benzothiazole motif as a biophore opens the door to the design, synthesis bio-evaluation of a variety of novel molecular hybrids. Hence, this information would give rise to design of better molecules with enhanced biological properties and higher specificity, and together with development of novel synthetic strategies.

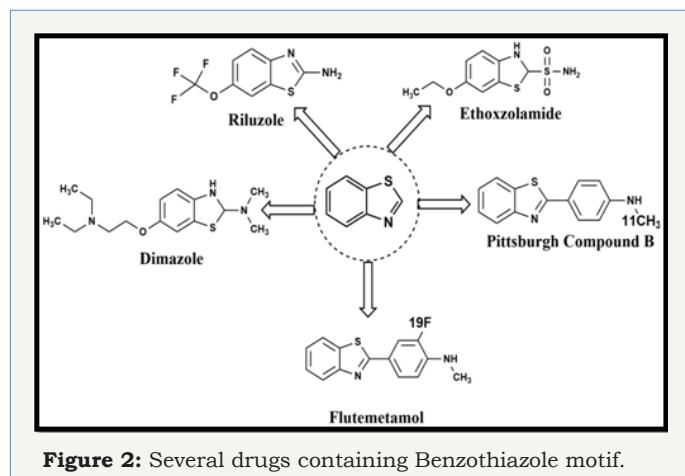


Figure 2: Several drugs containing Benzothiazole motif.

Discussion & Conclusion

Drug discovery and development is and always has been the most exciting part of agrochemical and pharmaceutical industry. Organic synthesis has accredited a lot concern in recent years, mostly those containing more than one heterocyclic ring in a molecule. Benzo-fused nitrogen, sulfur and oxygen-containing heterocyclic ring systems like benzothiazole, benzimidazole, benzoxazole are distinguished by a wide-ranging of high bioactivity, and therefore, they are interesting molecules for medicinal and pharmaceutical chemistry. These main pharmacophores are contained in a vast number of biologically active molecules that are used in agriculture and pharmaceuticals. Finally, this communication helps to find potential future directions on the drug design and development of new effective and specific analogues of azoles family specially benzothiazole for different biological targets or receptors.

Acknowledgement

I thankful to chemistry staff members of the Mehesana Urban Institute of Sciences, Ganpat University, Mehsana, Gujarat for their support.

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