

# Chapter 14

## Marine World of Terpenes Targeting Specific Cancers

**Sonia Kamboj**

*Ch. Devi Lal College of Pharmacy, India*

**Minky Mukhija**

 <https://orcid.org/0000-0002-8118-3843>

*Ch. Devi Lal College of Pharmacy, India*

**Jyoti Monga**

*Ch. Devi Lal College of Pharmacy, India*

**Devkant Sharma**

*Ch. Devi Lal College of Pharmacy, India*

### ABSTRACT

*Marine terpenes, found in aquatic flora and fauna including algae, bacteria, sponges, fungi, seaweeds, corals, diatoms, ascidians, etc., are a significant source of bioactive substances with potential anticancer properties. These terpenes have exhibited various biological properties such as antioxidant, antibacterial, and antitumor effects. In the recent past, numerous marine anticancer compounds have been isolated, characterized, identified, and are under trial for human use. This chapter compiles information about marine-derived terpenes with anticancer activities from diverse flora and fauna, their underlying mechanisms, and the increasing interest in these compounds for the treatment of malignant growth over the past several years.*

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## INTRODUCTION

Cancer is a complex genetic disease characterized by the uncontrolled growth of cells, initially leading to tumor formation and eventually the ability to invade other tissues and organs (Malarkey et al., 2013). As per the report by WHO claims about ten millions of lives is taken by neoplasm. While significant progress has been made in diagnosing and treating various types of cancers in recent decades, it remains one of the leading causes of death worldwide, especially in developed countries (Siegel et al., 2021). The treatment of cancer presents significant challenges, requiring the utilization of expensive pharmaceuticals and methodologies. In addition, the administration of anticancer therapy commonly encompasses the use of cytotoxic agents, which may be either targeted or untargeted in their action. Therefore, cancer prevention is more favorable than treating it for patients and healthcare systems (Zhong et al., 2021).

The ocean, recognized as the largest ecosystem on Earth, serves as a promising reservoir for the discovery of a multitude of compounds exhibiting significant biological activities. Characterized by unique environmental conditions, such as diminished sunlight and oxygen levels, elevated pressure, increased salinity, and consistently low temperatures, the marine habitat fosters the evolution of specialized organisms. These conditions lead to the production of special metabolites by marine organisms (**Figure 1**), which show promising biological activity and can be used to prevent and treat human diseases (Mayer et al., 2017). Annually, the scientific community documents the identification of hundreds of novel molecules, thereby highlighting the extensive capabilities of marine organisms as sources of biologically active compounds. This vast biological diversity inherent to the marine environment includes numerous organisms that are capable of synthesizing bioactive natural products, further emphasizing the importance of continued exploration and research in this domain (Mayer et al., 2017). The biosynthesis of microbial natural products depends on various biotic and abiotic factors in the marine environment, including temperature, nutrients, salinity, and interaction with other microorganisms (Debbab et al., 2010). Terpenes, one of the most important groups of natural products in terrestrial microorganisms reported with several biological activities (Tuong et al., 2015). Within the marine-derived metabolites, terpenes represent one of the most significant metabolites that usually present valuable anticancer properties (Valliappan et al., 2014). Various reviews have documented the significant metabolites extracted from marine sources containing mero, mono, di, tri, and sesquiterpenes were algae (20-30%), sponges (30-40%), fungi (10-12%), lampreys (5-7%), bacteria (5-10%), and corals (10-20%). Our search was refined to compounds of the terpene family of compounds of marine origin, finding 66 compounds targeting specific cancer exhibited a significant  $IC_{50}$  value, as tabulated in **Table 1** (Dyshlovoy et al., 2015).

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