Determining the Effect of Red Sea Sponge: Associated Bacteria against HIV-1 Integrase and HeLa Cancer Cell Line

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In 2012, an estimated 2.3 million people were newly infected with HIV, while 14.1 million people were diagnosed with cancer. Marine sponges are considered to be habitats for numerous multitudes of bacteria that are rich in secondary metabolism. The aim of this study was to test the effect of bacteria that are found in Red Sea sponges against HIV-1 integrase activity and HeLa cancer cells. Three samples of species were collected from the Red Sea: Stylissa carteri sp., Siphonochalina siphonella sp., and a mangrove sponge. Sponge-associated bacteria were then extracted for further cultivation and analysis. The sequence analysis of 16S ribosomal RNA gene was used to identify the cultivated bacterial species. Moreover, the bacterial isolates were later tested for the presence of bioactive secondary metabolite gene clusters; nonribosomal peptide synthetases and polyketide synthases. Organic extracts of these bacteria were analyzed for toxic effects on cultured cells by the XTT cytotoxicity test. Followed by bioactive assays that include testing against HIV-1 integrase, and testing for apoptotic signs on HeLa cancer cells. Results indicated no visible toxicity of the bacterial extracts in the XTT test as the vitality of all cultured cells was almost 90%. The organic bacterial extract of Pseudoaltermonas sp. derived from Stylissa carteri sp. showed a concentration-dependent inhibition against HIV-1 integrase. The cell staining test of the nuclei and cytoskeleton displayed clear signs of apoptosis and cytoskeletal disruption of the HeLa cancer cells. This indicates that marine bacteria may play a vital role in the pharmaceutical industry.

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