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Survey of current biomedical applications for therapeutic benefit from oceanic bioactive molecules

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Abstract

Bioprospecting for bioactive compounds with potent pharmacological and nutraceutical properties, from an enormous untapped source of marine organisms, represents a formidable millennial challenge. This necessitates a focused, multidisciplinary pursuit of the vast marine biochemical diversity and harnessing it for prospective, as well as proven therapeutic potential. Beyond this frontier lies the ocean sub-seafloor, with marine sediments holding a significant organic carbon reservoir and a phenomenal biodiversity of microorganisms on our planet. An estimate of up to 1/3 of the actively living Biomass on earth thrives beneath the sea floor. Microbial cells were retrieved and recorded to a depth of 1.6 kilometers below the ocean floor, with an age up to 116 million years. As the most diverse and abundant Life forms, marine microbes are key drivers of biochemical cycles. The deep biosphere comprises the last major frontier for biological exploration.

These marine, and deep sub seafloor microbes must survive extreme environmental conditions of very high pressure, temperature, particularly in proximity to 'black smokers', deep ocean volcanic hydrothermal vents, and prolonged starvation and absence of sunlight. Intrinsically generated bioluminescence among organisms even in the deepest ocean depths requires further study and evaluation. This fascinating Biodiversity may yield metabolic potentials, along with functional genes, which could be critical for the new discovery of bio catalytic capacities, or bioactive compounds with practical relevance to understanding and resolving seemingly insurmountable challenges in bio medical sciences, such as the burgeoning dangers of antimicrobial drug resistance, cytotoxicity.

We must continue to forge ahead to promulgate the unlimited potential of Marine Genomics, Biomolecular chemical analysis, with a focus on potent marine toxins which will also contribute to the wealth of secondary metabolites, which may then be synthesized in vitro, without future harm to their original host macro organisms. Case in point, the isolation of apoaeqourin from jellyfish, later synthesized in a terrestrial American Laboratory in Wisconsin, to produce a marine-derived protein used as a supplement to prevent senescent cognitive, human memory decline in middle-aged and older patients. Physiological effects of cascades of metabolites may have possible practical applications, as for example bioactive molecules such as for example, Jorumycin, an isoquinolone alkaloid, exhibiting antitumor activity against cell lines derived from common human solid tumors, as well as a variety of blood dyscrasias and Leukemia. Chronic pain therapy by means of peptide chains derived from conotoxins, and extracted from marine toxins contained in oceanic cone shells (Max Plank Institute – Florida) (Ziconitide-{PRIALT} – a synthetic product identical to *w*-conotoxin used in chronic pain therapy administered via an I.V. infusion pump to patients suffering chronic pain.

Biography

George Schroeder MD is a graduate of the University of Toronto, Faculty of Medicine, Toronto, Ontario, Canada, in addition to having earned a M.S. in Healthcare Management from the University of Texas School of Graduate Management, affiliated with the South Western Medical School, Dallas, Texas. He is a member of the Beta Gama Sigma International Honor Society 2008. Currently he serves as Executive Director of Medical Affairs for the American Academy of Urgent Care Medicine, as well as a member of the Board of Directors of the American Board of Urgent Care Medicine. He is a Clinical Assistant Professor of Emergency Medicine at the University of Central Florida College of Medicine, in Orlando, Florida. He has published and lectured on Marine Toxins and Aquatic Hazards. He is President & CEO of Global Renaissance Enterprises Corp. He was appointed by the Executive Department of the Governor of the State of Florida to the State Pharmaceutical & Therapeutics Committee in September 2009.