Marine Natural Products In Medicinal Chemistry

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Abstract- *arthropods evolved during the Cambrian. within the early period and still today, they comprise the foremost diverse group of animals and also constitute the foremost species amongst animal groups. Marine monographs are only a few when compare to herbal monographs. By considering this case an endeavor has been made to explore knowledge on marine pharmacognosy. This review includes marine sources, their morphological characters, catching techniques, extraction process, isolation techniques and their recent development in drug research.*

I. INTRODUCTION

Oceans cover nearly 70% of earth's surface and possess nearly three lakh deserted species of plants and animals from marine sources, representing 34-36 phyla and a few of them are exclusively of the marine ecosystem.it's reported that the primary living organisms were appeared within the sea over 3500 million years agoand evolutionary development has equipped many marine organisms with the acceptable mechanisms to survive during a hostile milieu in terms of maximum temperatures, changes in salinity and pressure furthermore as overcome the results of mutation, bacterial and viral pathogens. Many marine drugs also been mentioned in Ayurvedic texts like Sankha (Conch), Pravala (Coral), Sukti (Pearl Oyester), Mukta (Pearl), Agnijara (Amber) etc.,for various ailments.Ancient maritime people, notably the Chinese and Japanese, ate a spread of iodine rich seaweeds that undoubtedly accounted for his or her low incidence of goitre.

Biological Diversity in Marine Environments :

Marine environments are considered more biologically diverse than terrestrial environments.Thirty-two different animal phyla are represented within the oceans of the 33 recognized phyla. Fifteen different phyla are represented only in marine environments, while only one is exclusively terrestrial. Marine phyla also contain functionally unique organisms like filter feeders and sessile organisms which haven't any terrestrial counterpart.

Sample Collection Technological Requirements :

Collecting marine samples can range from very simple and cheap to very complicated expensive. Samples from near or on shores are readily accessible via beach combing,wadingorsnorkeling.Sample collection from problem is completed via dredging however, this can be a really invasive technique which destroys the local habitat, doesn't afford repeated sampling from the identical location and compromises sample integrity. Corers is used for sediment sample collection from deep locations quickly, easily and inexpensively. skin diving was introduced within the 1940s however,it had been not widely used until it became popular within the 1970s. skin-dive is proscribed within the duration that divers can spend underwater when conducted from the surface. If prolonged dives were necessary, an underwater laboratory may well be used. Aquarius is that the only underwater laboratory dedicated to marine science.For sample collection from depths that can't be achieved by skin diving, submersibles could also be used. Sample collection by submersibles is extremely expensive with costs for a submersible, support ship, technicians and support staff ranging between $10,000 to $45,000 per day.

Chemical Compound Isolation :

For the isolation of biologically active compounds from organisms, several different steps have to be completed. the various steps required to get a biologically active compound are: Extraction, chromatographic purification, dereplication, structure elucidation and bioassay testing. The steps don't should follow that individual order and lots of steps is also completed simultaneously. within the opening, the sample is also triturated and extracted with an appropriate solvent or macerated.the aim is to get rid of organic compounds that have a medium polarity which are considered more "drug-like". Ideally, polar compounds like salts, peptides, sugars additionally as very non-polar compounds like lipids are left behind to simplify chromatography since they're not generally considered "drug-like". Drying of the sample may be completed before extraction by lyophilisation to get rid of any excess water and so limit the number of highly polar compounds extracted.Common side effects include bone marrow suppression, vomiting, diarrhea, liver problems, rash, ulcer formation within the mouth, and bleeding.Other serious side effects include loss of consciousness, lung disease, and sensitivity.Use during pregnancy may harm the baby.Cytarabine is within the antimetabolite and nucleoside analog families of medication.It works by blocking the function of DNA polymerase. Cytarabine was patented in 1960 and approved for medical use in 1969.it's on the planet Health Organization's List of

Essential Medicines. Cytarabine is especially employed in the treatment of acute myeloid leukaemia, acute lymphocytic leukaemia (ALL) and in lymphomas,where it's the backbone of induction chemotherapy. Cytarabine also possesses antiviral activity, and it's been used for the treatment of generalised herpesvirus infection. However, cytarabine isn't very selective during this setting and causes bone marrow suppression and other severe side effects. Therefore, ara-C isn't a useful antiviral in humans due to its toxic profile. Cytarabine is additionally utilized in the study of the systema nervosum to regulate the proliferation of glial cells in cultures, the quantity of glial cells having a crucial impact on neurons.

Side effects :

One of the unique toxicities of cytarabine is cerebellar toxicity when given in high doses, which can result in ataxia. Cytarabine may cause granulocytopenia and other impaired body defenses, which can cause infection, and thrombocytopenia, which can result in hemorrhage. When employed in protocols designated as high dose, cytarabine can cause cerebral and cerebellar dysfunction, ocular toxicity, pulmonary toxicity, severe GI ulceration and peripheral neuropathy (rare). To prevent the side effects and improve the therapeutic efficiency, various derivatives of those drugs (including aminoalkanoic acid, peptide, carboxylic acid and phosphates) are evaluated, still as different delivery systems.

Compounds from Marine Sources in Clinical Level :

Clinical Status	Compound Name	Marine Organism	Chemical Class	Disease Area
FDA-Approved	Cytarabine	Sponge	Nucleoside	Cancer
	Vidarabine	Sponge	Nucleoside	Antiviral
	Ziconotide	Cone Snail	Peptide	Analgesic

1.CYTARABINE :

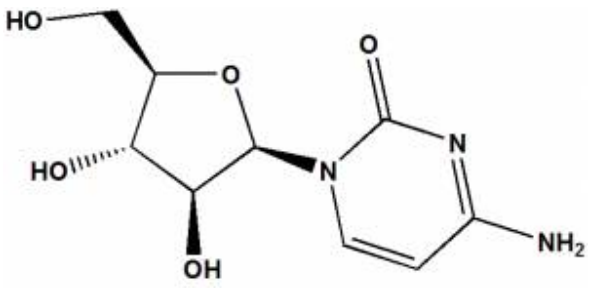
IUPAC nomenclature :
4-amino-1-[(2R,3S,4S,5R)-3,4-dihydroxy-5-(hydroxymethyl)oxolan-2-yl] pyrimidin-2-one

Classification :

Cytarabine falls under the category of pyrimidine antagonist antimetabolite.

Physiochemical Properties :

Molecular weight	243.22 g/mol
Appearance	Colorless crystalline powder
Melting point	212.5 °C
Solubility	It is freely soluble in water
Presence of ring	Pyrimidine & Tetrahydrofuran ring.

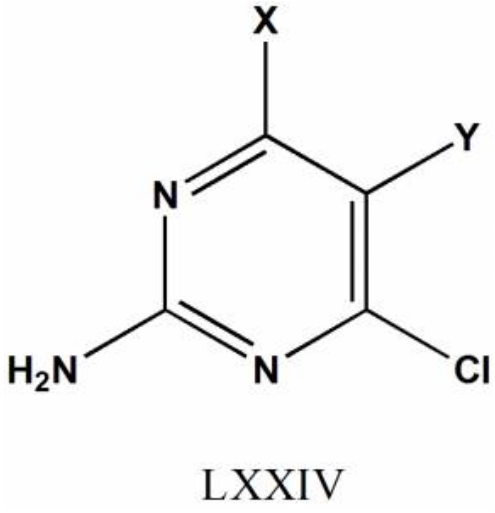


Cytarabine

Mechanism of Action :

i. Cytarabine gets converted into active form cytarabine triphosphate by the action of deoxycytidine kinase within the cell.
ii. Competition of cytarabine triphosphate for the DNA polymerase enzyme inhibits the synthesis of DNA.
iii. Further, the drug produces cytotoxicity in the cell through incorporation into DNA and RNA.
iv. Cytarabine produces its effects mainly on the cell which are actively dividing by blocking the progression of the cell from G-1 phase to the S phase.
v. These overall results in the death of the actively dividing cells.

Structural Activity Relationship :



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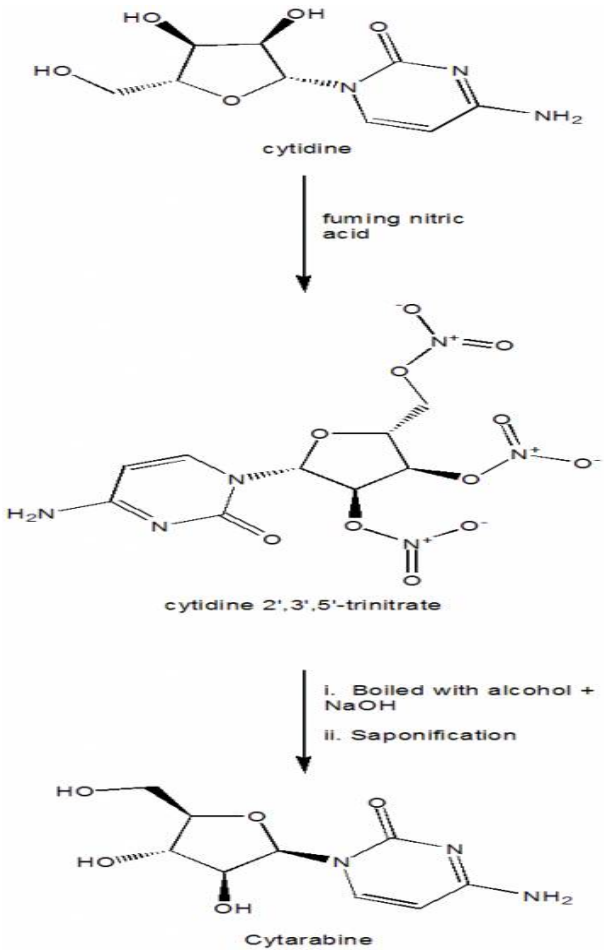
1. The molar refractivity of the Y substituent will produce increase in the activity of drug.
2. Substituent at Y with (CH2)3NRiR2 with R2 = COCH3, COC6H5, or COOCeH5 will produce a negative effect on the activity of the drug.
3. SH at 4th position will increase the activity of drug.
4. Substituent which are bulky in nature at Y position will produce negative effect on activity due to steric hindrances.
5. Electron withdrawing groups at 5th position will increase the activity of drug.

Methods of Synthesis :

1. Cytidine and fuming nitric acid are reacted to form cytidine 2',3',5'-trinitrate.
2. 2',3',5'-trinitrate is boiled in alcohol containing dilute NaOH which results in the formation of inverted 2'-hydroxy compound.
3. The compound undergoes saponification for the removal of extra nitrate groups.



Therapeutic Uses :

1) Acute myelogenous leukemia
2) Chronic mylogenous leukemia
3) Acute lymphocytic leukemia
4) Acute promyelocytic leukemia
5) Hodgkin's lymphoma
6) Meningeal leukemia
7) Cancers found in the lining of brain and spinal cord.

Side Effects/Adverse event :

1) Common side effects includes diarrhea, nausea, vomiting, headache, mouth sores and low blood counts.
2) Some other side effects which the patient may experience includes Diarrhea, Loss of appetite, Skin rashes, Hair thinning or hair loss, Eye pain, Flu-like symptoms, Dizziness, etc.

II. CONCLUSION

Although more research has been done on marine organisms, still not yet familiar among the herbal mineral

drugs. More focus is needed to boost the use of marine organisms in pharmaceutical field.

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