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Mini Review

Nanotheranostics-Novel Modality for Integrating Diagnosis and Therapy for Oral Cancer

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Abstract

One of the most fatal health problems faced by the mankind is oral cancer. Sixth most common cancer in the world today is oral cancer including pharyngeal carcinoma. Tobacco and tobacco related products, alcohol, genetic predisposition and hormonal factors are proved as possible causative factors. Therapy which are initiated at different stages and are started selectively. Above mentioned treatment have various drawbacks, it may be at the level of diagnosis, assessment of various surrounding vital structure and treatment planning. To overcome these difficulties a novel way of treating oral cancer -Nanotheranostics will be introduced in these article.

Keywords: Nanotheranostics; Oral Cancer

Introduction

Theranostic nanomedicine is that which combines therapeutics and diagnostics in a nanocarrier. Nanotherapeutics is developing the various nanomedicine strategies such as polymer conjugations, dendrimers, micelles, liposomes, metal and inorganic nanoparticles, carbon nanotubes, nanoparticles of biodegradable polymers for sustained, controlled and targeted co-delivery of diagnostic and therapeutic agents. These concept will, have lesser side effects which is important for any therapy. Theranostic nanomedicine consists of colloidal nanoparticles in the range of 1 to 1000 nm (1 µm). They consist of absorbed, conjugated, entrapped macro molecular materials/polymers/carbon nanomaterials/metals and inorganic nanoparticles in which the diagnostic and therapeutic agents are adsorbed.

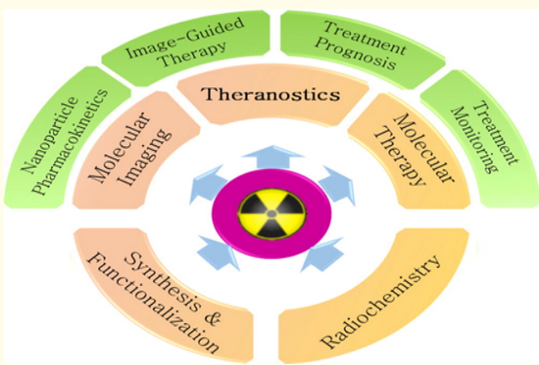

Figure 1: Schematic diagram showing multimodality uses of theranostics.

The diagnostic agents commonly used in theranostic nanomedicine include fluorescent dyes or quantum dots, superparamagnetic iron oxides, radionuclides and heavy elements such as iodine. In advanced theranostic nanomedicines when conjugated with targeting moiety will recognize specific target, which then bind to specific receptors on the targeted cell membrane and be internalized by the diseased cells. It happens with most specific processes called - Receptor Mediated Endocytosis.

The multifunctional capabilities include sustained/controlled release, targeted delivery, higher transport efficiency by endocytosis, stimulus responsive agent release, synergetic performance such as combination therapy and siRNA codelivery, Diagnosis and/or multidirectional therapies, and quality performances such as oral delivery, escape from multidrug resistance (MDR) and intracellular autophagy is the main reasons of successes of theranostics. Multimodality nanotheranostics is thus developed to co-encapsulate multiple diagnostic and therapeutic modes in a single nanomedicine platform. Interestingly. siRNA can also be included in theranostic nanomedicine as an inhibitor of theranostic resistance [1-7].

Conclusions

The advanced nanotheranostic thus becomes an approach of future generation; with the variety of features in nanomedicine. Further, research efforts are needed to explore these concepts on available clinical platform of nanomedicines, towards the development of versatile and smart theranostic applications.

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