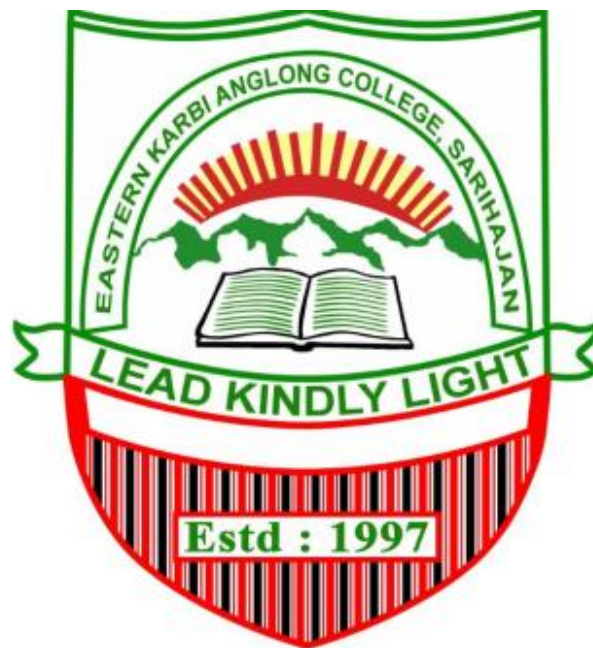


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Metric No. 3.2.2

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Application of Biomedical Engineering in Neuroscience

 Springer


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Biomedical Application of Nanoparticles for Channel Protein Modulation to Control Neural Disorder with Special Reference to Seizure

17

Pankaj Kalita and Manash Barthakur

Abstract


Channel proteins are the regulators of entry and exit of different molecules and ion to and fro from the cells. Regulation of entry and exit of molecules through different channel proteins can control different disorders. Therapeutic agents are used to target the channel protein to regulate ionic entry. Engineered channel proteins are developed to modify the channel protein movement. Epilepsy, which is marked by repeated seizures, is one of the serious neural disorder prevailing worldwide. Epileptic disorder is an electrophysiological alteration in the neuronal level and these electrophysiological changes are regulated by inward and outward movement of sodium, calcium, potassium, chloride ions, etc. Ions move through different channel proteins, and their movements are regulated by different channel proteins. These channel proteins are charge dependent and can be modulated by charged molecules. Nanoparticles are charged molecules and can be used to modulate channel proteins. Besides, nanoparticles have more exceptional properties than its raw materials which are helpful in the drug delivery approach. In the present article, it is targeted to focus and highlight the structural and functional approach of channel proteins and application of nanoparticles to control channel protein regulation which can help control different neural disorders including seizure.

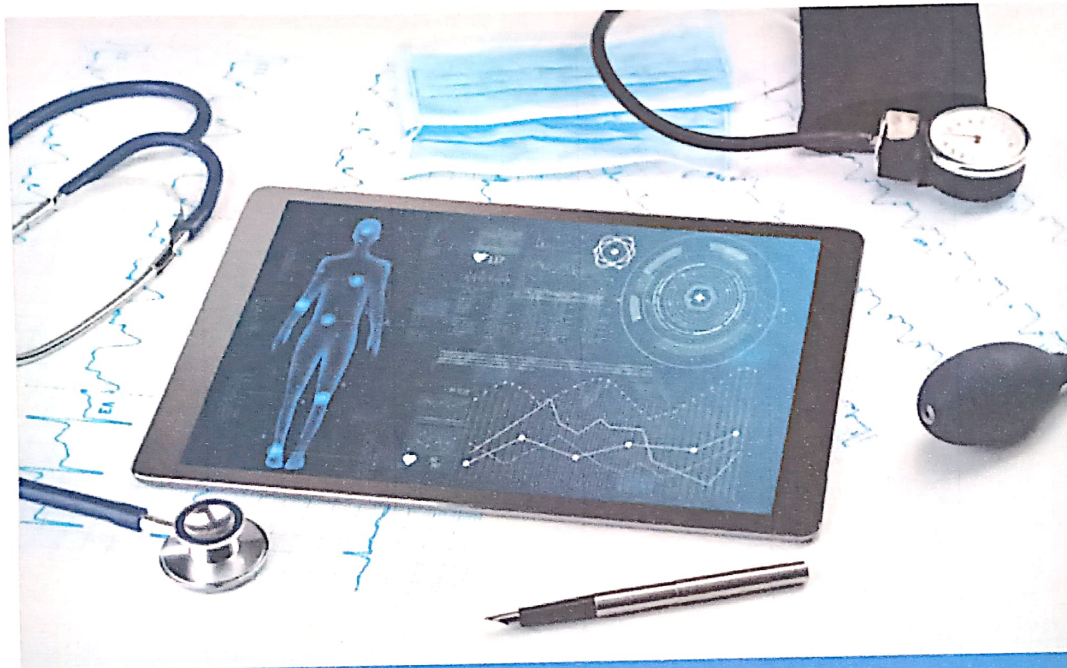
Keywords

Channel protein · Therapeutic agent · Seizure · Nanoparticle

P. Kalita
Department of Biophysics, Pub Kamrup College, Baihata Chariali, Kamrup, Assam, India

M. Barthakur (✉)
Department of Zoology, Pub Kamrup College, Baihata Chariali, Kamrup, Assam, India


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Eastern Karbi Anglong College
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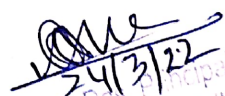
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CHAPTER 5

Preparation and characterization of gold nanoparticles conjugated insulin

Chayanika Devi¹, Pankaj Kalita¹, Devashis Choudhury² and Manash Barthakur³

¹Advanced Level Institutional Biotech Hub, Pub Kamrup College, Kamrup, India

²Physical Science Division, IASST, Guwahati, India

³Department of Zoology, Pub Kamrup College, Kamrup, India

5.1 Introduction

Insulin is an endogenous chemical regulates different physiological activities of the body including regulation of blood glucose level. Beside regulation of blood glucose level, different neurological disorder can be controlled by exogenous administration of insulin. To control the sugar level in a diabetic patient regular administration of insulin is necessary [1]. Insulin is a protein hormone and cannot administer through oral route. The only route of exogenous insulin administration is intramuscular injection. Regular insulin injection is a serious problem for the patient. So, an alternate route of insulin administration is important.

It is believed that insulin in conjugation with other micro and nano particles can be administered through other routes subject to retain the physiological effect of insulin action in conjugated form. So, present work has been designed to conjugate insulin with gold nanoparticles.

5.2 Materials and methods

There are different methods of insulin conjugation with gold nanoparticle. To conjugate insulin with gold nanoparticle, citrate stabilized gold nanoparticles and exogenous insulin was used.

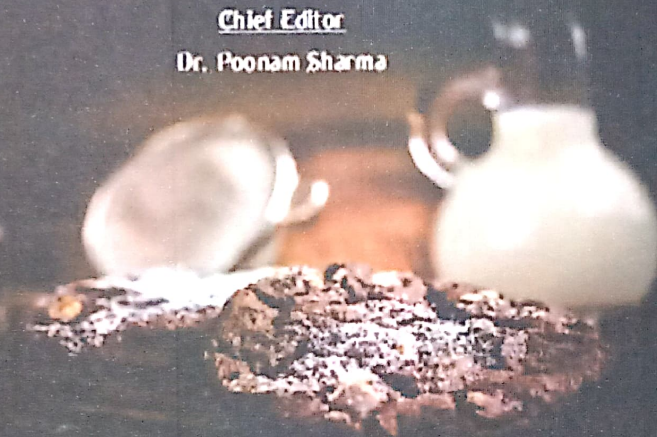
To prepare citrate stabilized gold nanoparticles, gold chloride (chloroauric acid) and sodium citrate was used. 20 mL of Chloroauric acid 1.0 milli molar concentration are prepared and kept at 60 degree centigrade on magnetic stirrer. 2 mL of 1% Sodium citrate was mixed immediately with chloroauric acid. Change in color of gold chloride (Chloroauric acid) indicates the formation of gold nanoparticles.

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Chapter - 6

Rutin: A Promising Phytochemical and Nutraceutical

Rajesh Prasad

Abstract

Phytochemicals are biologically active compounds present in plants that are not 'essential' for life but promote human health. Fruits, vegetables, grains, legumes, nuts, and teas are rich sources of phytochemicals. Nutraceuticals are products derived from food sources that are purported to provide extra health benefits, in addition to the basic nutritional value found in foods. Nowadays, the use of phytochemicals as nutraceutical and functional foods is rapidly growing with regard to human health. The aim of this chapter is to elaborate the role of rutin which is a flavonol-type flavonoid, composed of quercetin and rutinose as a vital phytochemical and nutraceutical. Rutin is widely distributed in nature in various vegetables and fruits such as the passion flower, buckwheat, green asparagus, apples, and tea. The first part of the chapter deals with the classification of phytochemicals and nutraceuticals followed by the description of rutin, dietary sources, the chemistry of rutin, and the biological and pharmacological properties of rutin. The facts and details of rutin described in the chapter provide an insight that rutin is a promising phytochemical and nutraceutical with numerous pharmacological activities. Rutin can be considered as a 'vital nutraceutical' and should be incorporated in human diets to get therapeutic benefits.

Keywords: phytochemical, rutin, nutraceutical, human health

Introduction

Phytochemical is a collective term for plant chemicals with varied structures and functions. In plants, they may serve different functions for protection and reproduction, such as color and odor for protection and insect attraction for pollination, phytoalexins for pathogen defense, hormonal functions for growth and signaling, antifeedants and toxins for insect protection, and allelochemicals for defense against herbivory. Phytochemicals are described as non-essential nutrients (non-essential means they are not required to sustain life) found in plant foods that are beneficial to promote

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Chapter - 5

Rutin: A Type of Flavonoid with Immense Health Benefits

Rajesh Prasad and Surya Bali Prasad

Abstract

Flavonoids are the group of polyphenolic compounds found commonly in plants and make an important component of the human diet. Flavonoids have relatively low toxicity compared to other active plant compounds. Rutin is a type of flavonoid found in many plants and its name comes from the plant *Ruta graveolens*, which contains rutin as its one of the main chemical constituents. Rutin has been shown to have a wide range of biological and pharmacological activities such as antioxidant, anticancer, anti-inflammatory, anti-diabetic, etc. Many ongoing research on the potential health benefits of rutin has revealed that this flavonoid indeed has advantageous and huge therapeutic potential. The details on the sources, chemistry, biosynthesis, biological and pharmacological properties of rutin have been highlighted here in a comprehensive way so that the importance of rutin on health benefits is widely recognized and the food items rich in rutin should be incorporated as a supplement.

Keywords: flavonoid, rutin, pharmacological properties, health benefits

Introduction

The basic food for all organisms is produced by green plants and plant products are essential for human nutrition and health. Plants produce fruits rich in carbohydrates, vitamins, and fiber that are necessary for health maintenance. Different parts of plants serve different purposes in our diet and have been used as a great source of medicine for a variety of diseases. The use of plants as medicine is safer due to their lower chances of side effects and also better compatibility with humans. Some of the medicines derived from plants include vincristine, digitalis, colchicine, reserpine, quinine, morphine, taxol, and aspirin, etc.

Nutritional supplements have been widely used by the general public worldwide as they are the source of different bioactive substances. The bioactive substances derived from plants are generally called phytochemicals.