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Re-infection and Immunological Effect of Corona Virus: A Detailed Review

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Keywords
Reinfection, COVID-19, SARS-CoV-2, Cytokine, Immune response.

ABSTRACT: As the world is seeing the plague of COVID-19, an illness brought about by a novel coronavirus, SARS-CoV-2, developing hereditary qualities and clinical confirmations recommend a comparative way to those of SARS and MERS. Most coronaviruses aren't perilous. COVID-19 is an illness that can cause what specialists call a respiratory tract disease. It can influence your upper respiratory tract (sinuses, nose, and throat) or lower respiratory tract (windpipe and lungs). SARS-CoV-2 is able to stay undetected longer than many flu or coronaviruses and its spike proteins are able to gain entry by unlocking the ACE2 protein on the lung cells. Once in, they hijack the cell's machinery, replicate and multiply and infect adjoining cells. Like the defining ACE2 proteins on the epithelial cells, viruses too have a tell-tale signature on their surface called antigens and spotting these is what kicks the immune system into action by producing antibodies.

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INTRODUCTION

The world encountered the episodes of coronavirus contamination that undermine worldwide pandemic in 2002-2003 by Severe Acute Respiratory Syndrome (SARS) and in 2011 by Middle East Respiratory Syndrome (MERS). In the two cases, the causative specialists (SARS-CoV and MERS-CoV, separately) were recently recognized coronavirus in the class Betacoronavirus with zoonotic starting point. Toward the finish of 2019, episode of another coronavirus that causes respiratory-related ailment was accounted for in Wuhan, Hubei, China, a sickness presently authoritatively called "the Corona Virus Disease 2019; COVID-19". The coronavirus that is the causative operator of this respiratory malady was distinguished and its genome is completely sequenced [1].

Over a long time since the episode of the 1918 flu pandemic, we presently appear to confront another pandemic. The episode of the new coronavirus (SARS-CoV-2) disease is spreading to each mainland, compelling us to live with this infection for may be quite a while. Researchers and clinicians have learned a lot of coronavirus sickness 2019, COVID-19, and its pathogenesis [2]: not all individuals presented to SARS-CoV-2 are contaminated and not every single tainted patient create serious respiratory ailment. In like manner, SARS-CoV-2 disease can be generally isolated into three phases:

Stage I, an asymptomatic brooding period with or without distinguishable infection;

Stage II, non-serious indicative period with the nearness of infection;

Stage III, extreme respiratory suggestive stage with high popular burden [3].

From the perspective of counteraction, people at stage I, the secrecy bearers, are the least reasonable on the grounds that, in any event on certain events, they spread the infection unconsciously: in reality, the main asymptomatic transmission has been accounted for in Germany [4]. The

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The nano-bio interactions of rare-earth doped BaF_2 nanophosphors shape the developmental processes of zebrafish†

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Nanoparticles with biomedical applications should be evaluated for their biocompatibility. Rare-earth doped nanoparticles with unique spectral properties are superior *in vivo* optical probes in comparison with quantum dots and organic dyes, however, studies describing their nano-bio interactions are still limited. Here, we have evaluated the nano-bio interactions of green-synthesized, phase-pure BaF_2 nanoparticles doped with rare-earth (RE^{3+} = Ce^{3+}/Tb^{3+}) ions using larval zebrafish. We found that zebrafish can tolerate a wide concentration range of these nanoparticles, as the maximal lethality was observed at very high concentrations (more than 200 mg L^{-1}) upon five days of continuous exposure. At a concentration of 10 mg L^{-1}, at which Zn^{2+}, Tl^{1+} and Ag^{+} nanoparticles are reported to be lethal to developing zebrafish, continuous exposure to our nanoparticles for four days produced no developmental anomalies, craniofacial defects, cardiac toxicity or behavioural abnormalities in the developing zebrafish larvae. We have also found that the doping of rare-earth ions has no major effect on these biomarkers. Interestingly, the function of acetylcholinesterase (AChE) and the cellular metabolic activity of whole zebrafish larvae remained unchanged, even during continuous exposure to these nanoparticles at 15.0 mg L^{-1} for four days; however, severe developmental toxicities were evident at this high concentration. Based on these results, we can conclude that the biocompatibility of rare-earth doped nanoparticles is concentration dependent. Not all biomarkers are sensitive to these nanoparticles. The high concentration-dependent toxicity occurs through a mechanism distinct from changes in the metabolic or AChE activity. The significance of these findings lies in using these nanoparticles for bioimaging applications and biomarker studies, especially for prolonged exposure times.

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Introduction

Nanoscale materials and nanotechnology have had a remarkable impact in the industrial revolution, and the materials are used in daily life and in many photonic and bio-photonic applications in particular.[1–6] In present-day bio-photonic applications, bio-imaging (both *in vivo* and *in vitro*), magnetic resonance imaging (MRI), drug delivery, Förster resonance energy transfer (FRET)-based and other biological detection methods and so on, are very important.[1–6,7,8] In these endeavors, several types of nanomaterials, such as metallic and rare-earth (RE^{3+})-doped nanophosphors are extensively employed.[2,4,6,9] Lanthanide and Gd based nanoparticles (NPs) were employed as MRI/near infrared (NIR) dual-modality imaging agents in mice to give a high-resolution and depth with greater sensitivity[10] and these NPs were used for lymphangioma and HeLa tumor imaging.[11] Recently, Nd^{3+} doped NPs have been used to study variations in the tumor vasculature in a breast tumor model.[12] Not only this, but RE^{3+} doped NPs have also been used to quantify biochemical entities such as DNA[13] and protein micro-patterns.[14] Interestingly, tracking single cells loaded with RE-doped NPs in the veins of mice or intramuscular microinjection has also been demonstrated.[15] Thus, bio-imaging of life-processes using rare-earth doped nanoparticles is an area that is constantly growing.[16–18]

RE^{3+}-doped nanomaterials have received considerable attention for imaging over other nanomaterials and organic

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†Electronic supplementary information (ESI) available: The chemicals used, the synthesis of ionic liquids, characterization techniques, lattice strain, FESEM images, zeta potential data, hydrodynamic diameter data, excitation PL spectra, and other zebrafish-related experiments are described in the supporting figures and tables. See DOI: 10.1039/d0bm01180c

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Temperature dependent quantum cutting in cubic $BaGdF_5:Eu^{3+}$ nanophosphors†

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A task-specific ionic liquid (IL) is employed as a structure directing agent for the synthesis of quantum cutting $BaGdF_5:Eu^{3+}$ nanophosphors. Herein, IL and temperature dependent quantum cutting is observed. Maximum (160%) and minimum (123%) quantum cutting efficiencies (QCEs) are obtained in the presence and absence of IL, respectively, at room temperature (295 K). However, at low temperature (10 K), the emission spectrum is dominated by Eu^{2+} 5d–4f emission which is further confirmed by X-ray excited luminescence study. It is also observed that decay kinetics recorded for Eu^{2+} 5d–4f emission demonstrate longer (with lifetime from 580 ns to 1.5 μs) and faster (with lifetime from 35 to 50 ns) decay components related to normal and surface quenched emission, respectively. In addition, maximum quantum yield (η = 75.5%) is obtained for the sample prepared in the presence of IL compared to that for the sample prepared without IL (η = 65%). The easy yet highly phase selective green synthesis of the materials is promising for large scale industrial application in nanothermometry as well as in environmentally benign energy efficient lighting.

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Introduction

The demand for electrical energy has increased manyfold over the last few decades while its resources including fossil fuels like coal and petroleum products are very limited and non-renewable. Therefore, it is important to develop new technologies able to utilize cheap and renewable resources like solar energy for the generation of electrical energy.[1–7] For that reason, numerous energy efficient nanomaterials including semiconductors and rare-earth doped inorganic and organic-based materials have been explored.[1–4,8] However, semiconductor and organic based nanomaterials have their inherent limitations like toxicity, mismatch of band gap with the solar spectrum and low photochemical stability.[1,2,8] On the contrary, rare-earth ion doped nanomaterials have already shown various applications including optoelectronic, magnetic, bio-photonic, solar cell *etc.*[1,9–14] However, in last few decades, rare-earth ion doped nanomaterials have drawn tremendous attention for harvesting and converting solar energy from the UV to the NIR region through various photophysical processes like energy transfer, upconversion, quantum cutting, *etc.*[1,10,15] These photophysical processes are substantially dependent on the judicious incorporation of dopant ions into the host matrix.[16]

Almost 20% of the world's energy is consumed for lighting and today we have almost replaced incandescent lamps in lieu of Compact Fluorescent Lamps (CFLs), light emitting diodes (LEDs), *etc.* Like others, in CFLs also, mercury is employed as a sensitizer which is highly toxic and has a harmful effect on the environment. Now it is necessary to prepare mercury-free sensitizing nanomaterials which are not only environmentally benign but also energy efficient.[1,11,17–21] From this perspective, rare-earth ion (Gd^{3+}, Eu^{3+}/Tb^{3+}) doped quantum cutting down-converting (QCD) nanomaterials can be alternative candidates to the mercury-free light emitting sources.[1,9–11,17–21] An interesting feature of these QCD nanomaterials is not only their non-toxicity. They also enhance the energy efficiency by converting a high-energy single photon into two lower energy visible photons. Therefore, it is theoretically predicted that approximately 200% quantum efficiency of nanomaterials can be achieved.[22,23] Liu *et al.* have found 194% quantum cutting efficiency in BaF_2:Gd,Eu.[22] Mudring and

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Role of Ayurveda in Management of Pandemic Covid-19 in Indian Scenario – A Review

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ABSTRACT

Ayurveda is an eternal science of India, which assumed to be originated around 6,000 BC since the Vedic era. Nowadays the whole world is facing a global public health crisis pandemic COVID-19. No effective treatment is available for this epidemic disease. The current article aimed to explore some important facts of Ayurveda which are helpful in boosting our immune system to protect against COVID-19. Protection of human health before the occurrence of the disease is the basic principle of **Ayurveda** i.e. Prevention is better than cure. The Ministry of Health and Family Welfare, Government of India and ICMR (Indian Council of Medical Research) has formulated time to time guidelines and advisories for social distancing, testing, treatment, and other reliable material.

Ayurveda specifies some medicinal herbs in our daily life in the form of spices to boost our immune system and prevention of diseases. It is the reason if we see the graph of COVID-19 infection globally; the infection rate in India is slower than in other countries. Government's efforts of motivating the people to social distancing, taking precaution measures and the guideline of Ayushmantralaya to protect ourselves to boost our immunity are appreciable steps which became helpful to stop the community spread of coronavirus in our country.In this CORONACAL, AYUSH Mantralaya recommended some preventive health measures and self-care guidelines for boosting immunity as well as for maintains respiratory health. Ayurveda can play an important role in fighting and protection against COVID-19.

Key words: Ayurveda; COVID-19; Immunity; Immunomodulators

1. Introduction

Ayurveda is the science of life. Its knowledge originated in India about 5000 years ago in the Vedic Era. It places great emphasis on the maintenance of health by a balanced lifestyle, right thinking, and use of herbs (medicinal plants). Our body is assumed to be consists of five elements i.e. Earth, water, fire, air, and sky. In this reference, this line is taken from the "Ramcharitmanas":-

"ChitiJalPawakGaganSameera, PanchrachetatiadhamshareeraAyurveda enables us to maintain the balance of body mind and consciousness. It helps us to lead a happy and healthy physical-Mental life. Nowadays life is very fast and every moment of life is very challenging. About 30-40% population is facing psychological disorders i.e. anxiety, depressions, and many more mental problems. In this situation, Ayurveda can play a pivotal role in our life.

At present, the whole world is facing the pandemic novel COVID-19. This infectious virus first emerged from the city of Wuhan in China and spread all over the world very fast. Common symptoms of this disease are cough, cold, fever, severe respiratory illness, and pneumonia [1-4]. About 184 countries of the world are

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REGULAR ARTICLE

Special Issue on Materials Chemistry

Influence of ionic liquids and concentration of red phosphorous on luminescent Cu_3P nanocrystals

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Abstract. Highly crystalline, phase pure Cu_3P nanocrystals (NCs) have been successfully synthesized using ionic liquid-assisted solvothermal method at relatively low temperature (200 °C). Herein, ionic liquids (ILs) are used as a structure directing/templating agent. Effect of ILs and precursor concentration on crystal phase, crystallite size, lattice strain, morphology and grain size of Cu_3P NCs is studied. In the presence of IL, crystallite size and lattice strain significantly change with changing the concentration of red phosphorus. For example, smaller crystallite size (38.5 nm) and compressive lattice strain are obtained when 10 times of red phosphorous is used. However, bigger size (41.9 nm) and tensile lattice strains are obtained for the lower concentration of phosphorous (5 times). At higher phosphorus concentration, hexagonal shaped microcrystals with prominent grain are observed. HRTEM images reveal that spherical-shaped particles on further agglomeration through Ostwald ripening process form hexagonal-shaped bigger microstructures. However, on doping the rare-earth ions ($RE^{3+} = Ce^{3+}/Tb^{3+}$) in the Cu_3P NCs show the green luminescence (at 542 nm) which is attributed to the emission of Tb^{3+} ions. To the best of our knowledge, this is the first report on rare-earth doped Cu_3P nanoparticles and shown promise on the luminescence aspect of Cu_3P nanomaterials along with its already existing plasmonic and semiconducting properties.

Keywords. Nanocrystals; rare-earth; copper phosphide; photoluminescence; ionic liquids.

1. Introduction

Recently nanocrystalline transition metal phosphides have been emerged as a promising class of semiconducting nanomaterials for numerous applications.[1–18] For instance, CoP, NiP and FeP nanoparticles have been employed as a electrocatalyst for hydrogen evolution and lithium ion storage.[3,4] However, CdP, InP and Zn_3P_2 nanoparticles have shown prominent optical properties leading to numerous optical applications such as photovoltaic, telecommunication and so on.[5–10] Amongst those, copper phosphide (Cu_3P) is selected due to various reasons which make it a promising candidate for optoelectronic applications due to having both the plasmonic and semiconducting properties. Copper is a very cheap element, non-toxic and has high natural abundance. In addition, Cu_3P has dual properties; it can be used in high efficiency catalysis and also exhibits plasmonic property.[19–22] As a result, it is extensively employed for various applications including superconductivity, potential in magnetic recording media, anode materials in lithium ion battery, showing good electrochemical performances, light emitting, photovoltaic, oxygen reduction reaction, carbon dioxide reduction, methanol/ethanol oxidation, water splitting and so on.[2,13–18] Cu_3P NCs are P-type semiconducting nanomaterials with band gap of about 1.3–1.6 eV. Judicious choice or fabrication of synthesis protocols is utmost important to control the size of Cu_3P NCs which will control the size dependent optical properties.[19–21] Many researchers have synthesized Cu_3P NPs at high

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DRUG RELEASE MECHANISM OF SPARINGLY SOLUBLE ANTI-INFLAMMATORY DRUG FROM PVP LOADED NANOCARRIER

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During the last two decades one of the most important problems in drug formulations has been low aqueous solubility of new molecules. However, numerous technique, such as milling, co-solvent solubilization and solid dispersion have been used conventionally for aqueous solubility enhancement and the rate of solubility. In this study, the effect of surfactants in *in vitro* dissolution and solubility of indomethacin in various fluids such as purified water (pH 6.4), sodium lauryl sulphate (SLS), Cetyl tri methyl ammonium bromide (CTAB), Polyvinylpyrrolidone (PVP 44000) have been determined. Enhanced solubility was observed at 7.2 phosphate buffer and 3×10^{-6} M PVP. In aqueous media, Indomethacin (INMN) exhibits very poor solubility at 37°C (mg/mL). 7.2 phosphate buffer with PVP 44000 (3×10^{-6} M) increased the solubility 7.05 folds, indicating that the incorporation of INMN into the micelle was significant. Scanning Electron Microscopy (SEM) to examine the surface topography morphology of fractured of sectioned surface, to analyze the surface of polymeric drug delivery system that can provide important information about the SEM analysis. Topographical (TEM) image suggested the absence of the chemical interaction between the drug and carrier. Particle size distribution of INMN loaded liquid nanoparticles were determined by dynamic light scattering (Malvern Zetasizer).

Keywords: Indomethacin, nanoparticles, PVP 44000, Dissolution, SEM, TEM.

Introduction

INMN is a number of the non-steroidal anti-inflammatory drugs (NSAIDs) [1]. The drug is described as poorly soluble and highly permeable (class II) drug [2]. Because poorly water soluble drugs often show low absorption and weak bioavailability, improvement in dissolution rate and solubility are important for development of drug preparations [3-4]. It has been established

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Nanotechnology: An Emerging Field of Osteoporosis Treatment and Kinetic Models For Drug Release Studies – A Review

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ABSTRACT

Osteoporosismeans "Porous bone", thisis a skeletal related disease with low BMD(bone mineral density). Bones become morefragile andincreases high risk of bone broking.The most effected bones are the hip, spine,shoulder and wrist bones.Decreasingbone densityis the main cause of Osteoporosis.The hip and spinal fractures are the most dangerous aspect of osteoporosis. It is commonly seen in old age but women have the high risk after menopause. It causes Stooped posture, loss of heightand chronic pain with resultant reduction in mobility.

Common treatments of osteoporosis are changing lifestyles (include exercise and meditation in everyday life), taking orthopaedic drugsand surgical treatment.Biphosphonate medications are mainly used in the treatment of previous broken bones due to osteoporosis. Osteoporosis is a second worldwide disease after cardiovascular diseases. It causes more than9 million fractures per year. Therefore researchers have turned to a new branch of nanotechnology i.e. nanomedicines to create alternative and innovative treatments for osteoporosis.

All treatments of osteoporosis onlymaintain bone density instead of returning it to its former state. Consequently, new at the nanoscalei.e. nanomedicines need to be developed which coincides with nature providing effective generation of bone tissue enabling the treatment of osteoporosis. **Nanotechnology** is the technique of making materials, medicines, devices, and systems in nanoscale i.e. billionth of a meter.

Among the nanomedicines, some drug loaded polymeric nanoparticles or micelles are used as nanocarriers and have provided a promising approach to obtain desirable pharmacokinetic and biopharmaceutical properties for medicines. Thus the outcomes of the current study would help us to shorten the gap between drug discovery and drug delivery by preparing the anti-osteoporotic drug **Bisphosphonates** in the nano-range.

The quantitative analysis of dissolution/release rates becomes easier by using some specific mathematical models. When mathematical formulae are used to describe thedissolution process known as "**Drug release kinetics**". These mathematicalmodels can help to optimize the new dosage of nano-drug formulations to yield information on the efficacy of various release models.

Key words –Drug nanoparticles,Kinetic modelling, Nanotechnology, Osteoporosis, Release kinetics

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REVIEW ARTICLE

Corona Virus: An Immunological Perspective Review

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Abstract

As the world is seeing the plague of COVID-19, an illness brought about by a novel coronavirus, SARS-CoV-2, developing hereditary qualities and clinical confirmations recommend a comparative way to those of SARS and MERS. A course of viral particles enters the body through the nose, eyes or mouth. Breathing conveys a portion of these particles to the lower respiratory tract where the spike proteins of the coronavirus, acting like a key, lock into epithelial cells that line the respiratory tract just as those in the air sacs in the lungs. SARS-CoV-2 can remain undetected longer than numerous influenza or coronaviruses and its spike proteins can pick up passage by opening the ACE2 protein on the lung cells. People might be tainted by and experience the ill effects of various distinctive infections, and in many occasions the disease is settled with or without tissue harm. Reinfection is normally subclinical, and for some infections we have compelling immunizations; exemplary models incorporate measles, mumps, rubella, rotavirus and varicella zoster infections. Different infections, for example, HIV, hepatitis C infection (HCV), hepatitis B infection (HBV) and some herpesviruses, can cause significant tissue harm in a few or all people they contaminate, and sores can get incessant. These infections as a rule have at least one properties that permit them to decrease the viability of host versatile or natural resistance, and we need powerful immunizations against the vast majority of these specialists. Contamination with infections, for example, flu infection and respiratory syncytial infection (RSV) has a variable result. Most people may endure mellow or subclinical contamination, yet others experience serious ailment that can be deadly. Numerous infections taint people and most are controlled agreeably by the resistant framework with restricted harm to have tissues. Some infections, in any case, harm the host, either in segregated cases or as a response that ordinarily happens after disease. The result is affected by properties of the tainting infection, the conditions of contamination and a few variables constrained by the host. A coronavirus is a sort of basic infection that causes a disease in your nose, sinuses, or upper throat. Most coronaviruses aren't perilous. COVID-19 is an illness that can cause what specialists call a respiratory tract disease. It can influence your upper respiratory tract (sinuses, nose, and throat) or lower respiratory tract (windpipe and lungs). It's brought about by a coronavirus named SARS-CoV-2.

Keywords

Corona virus, COVID-19, Immune response, Infection

Introduction

Coronaviruses are a group of related RNA viruses that cause diseases in mammals and birds. In humans, these viruses cause respiratory tract infections that can range from mild to lethal. Mild illnesses include some cases of the common cold (which is caused also by certain other viruses, predominantly rhinoviruses), while more lethal varieties can cause SARS, MERS, and COVID-19. Symptoms in other species vary: in chickens, they cause an upper respiratory tract disease, while in cows and pigs they cause diarrhea. There are as yet no vaccines or antiviral drugs to prevent or treat human coronavirus infections [1-4].

Coronaviruses constitute the subfamily Orthocoronavirinae, in the family Coronaviridae, order Nidovirales, and realm Riboviria [5,6]. They are enveloped viruses with a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry. The genome size of coronaviruses ranges from approximately 26 to 32 kilobases, one of the largest among RNA viruses [7]. They have characteristic club-shaped spikes that project from their surface, which in electron micro-

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REVIEW ARTICLE

Vitamin D: A Review and Proposed Evidence for Treatment or Prevention in COVID-19

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Abstract

WHO declared COVID-19 a worldwide pandemic. The ambitions of this paper are to assess if there is any affiliation between mean levels of diet D in various countries and cases respectively mortality because of COVID-19. Low vitamin D repute in winter allows viral epidemics. During ickness, those who do not take Vitamin D supplements are possibly to have low serum 25-hydroxyvitamin D [25(OH)D] (25-hydroxyvitamin D) concentrations. Vitamin D can reduce the chance of viral epidemics and pandemics in numerous approaches. First, better 25(OH)D concentrations lessen the chance of many continual illnesses, together with cancers, cardiovascular sickness, continual respiratory tract infections (RTIs), diabetes mellitus, and high blood pressure. Patients with continual sicknesses have a drastically higher threat of dying from RTIs than otherwise wholesome human beings. 2d, Vitamin D reduces the risk of rites thru three mechanisms: Keeping tight junctions, killing enveloped viruses through induction of cathelicidin and defenses, and reducing the production of pro-inflammatory cytokines by means of the innate immune machine, thereby decreasing the hazard of a cytokine hurricane leading to pneumonia. Observational and supplementation trials have pronounced higher 25(OH)D concentrations associated with decreased threat of dengue, hepatitis, herpes virus, hepatitis b, and c viruses, human immunodeficiency virus, influenza, breathing syncytial virus infections, and pneumonia. Effects of a community discipline trial pronounced herein indicated that 25(OH)D concentrations above 50 ng/ml (125 nmol/l) vs. < 20 ng/ml have been associated with a 27% discount in influenza-like ailments. From the available evidence, we hypothesize those raising serum 25(OH)D concentrations through Vitamin D supplementation may want to lessen the occurrence, severity, and chance of dying from influenza, pneumonia, and the cutting-edge COVID-19 epidemic.

Keywords

COVID-19, Corona virus, Vitamin D, Cholecalciferol, Calcitriol

Introduction

Vitamin D is a gathering of fat-solvent secosteroids liable for expanding intestinal assimilation of calcium, magnesium, and phosphate, and numerous other organic effects [1]. In people, the most significant mixes in this gathering are Vitamin D3 (otherwise called cholecalciferol) and Vitamin D2 (ergocalciferol) [2].

The significant regular wellspring of the nutrient is a combination of cholecalciferol in the lower layers of skin epidermis through a substance response that is reliant on sun presentation (explicitly UVB radiation) [3,4]. Cholecalciferol and ergocalciferol can be ingested from the eating routine and from supplements [2,5,6]. Only a couple of nourishments, for example, the tissue of greasy fish, normally contain huge measures of Vitamin D [7,8]. In the U.S. what's more, different nations, dairy animals' milk, and plant-inferred milk substitutes are sustained with Vitamin D, as are many breakfast grains. Mushrooms presented to bright light contribute helpful measures of Vitamin D [7]. Dietary proposals normally expect that the entirety of an individual's Vitamin D is taken by mouth, as sun presentation in the populace is variable and suggestions about the measure of sun introduction that is sheltered are questionable taking into account the skin malignant growth risk [7].

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REVIEW ARTICLE

A Review on Remdesivir: An Alternative Antiviral Drug to Fight against COVID-19

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Abstract

Coronavirus contamination that was found in mid-2019 has just hampered the world's motivation up until now. The quantity of irresistible cases has become worldwide to 35 lakhs thus the episode has been portrayed as a pandemic by the planet's wellbeing association, yet there have not been any "particular medications" or antibodies accessible to date. Applicable reports have distinguished a novel coronavirus with 80% homology. So there are not many signs accessible when different nations are utilizing the antiviral medication Remdesivir (anti-toxin). The particular antiviral medication routine for the treatment of patients with intense coronavirus infection 2019 (COVID-19) has not been demonstrated. Remdecivir (GS-5734), effectively pathogenic creature and human coronaviruses including intense respiratory condition coronavirus 2 (COVID-19) in vitro, and Center East respiratory disorder, NIR. - 1, and COVID-19 replication in creature models.

Keywords

Anti-viral drug, Remdesivir, COVID-19, SARS

Introduction

The pandemic of serious intense respiratory condition coronavirus 2 (COVID-19) has prompted in excess of 4692797 cases worldwide as of April 9, 2020. Half of Coronavirus Sickness 2019 (COVID-19) patients requiring negligibly intrusive mechanical ventilation regularly require hospitalization, and over-burden in medicinal services frameworks, particularly consideration units, are pervasive in many influenced nations.

Remdesivir is an anti-toxin created by an American organization known as biopharmaceutical Gilead. Is a nucleotide simple, an immediate simple of adenosine, which is embedded into the viral RNA chains, making its end untimely. Is being concentrated in 2020 as a treatment alternative after COVID-19 disease [1]. Gilead propelled a lab deriver preliminary against COVID-19, expressing that moves were demonstrated to be conflicting with SARS and MERS in creature models [2-4]. In Walk 2020, the a little development of remdesivir in rhesus macaque monkeys with COVID-19 sickness was found to repress ailment movement [3,6]. On January 21, 2020, the Wuhan Foundation of Virology applied for a Chinese patent for "COVID-19" [7]. On 18 Walk 2020 the planet Wellbeing Association (WHO) declared the dispatch of a four-arm wellbeing preliminary that could incorporate one gathering of patients treated with remdesivir [8,9]. While a partner study distributed in April 2020 recognized potential upgrades, seeing if or not this medication is successful requires randomized controlled preliminaries [10].

As of April 2020, remdesivir was seen the light of the fact that the most encouraging treatment for COVID-19 is Johns Hopkins College [11] and there have been a few progressing clinical preliminaries or calendars [12-22].

Gilead has started two Stage 3 clinical examinations to guarantee the wellbeing and adequacy of COVID-19-analyzed grown-ups following the audit and prompt endorsement of the new Gilead Examination (IND) medicate. These randomized, open-finished, multicenter coding considers started selecting patients in Walk 2020 and could enlist roughly 1,000 patients in

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REVIEW ARTICLE

Blood Plasma from Survivors of COVID-19: A Novel and Next Frontier Approach to Fight against Pandemic Coronavirus

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Abstract

Blood from people who have recovered can be a rich source of antibodies, proteins made by the immune system to attack the virus. The part of the blood that contains antibodies, so-called convalescent plasma, has been used for decades to treat infectious diseases, including Ebola and influenza. In the absence of a cure or vaccine for the coronavirus, a group of scientists is searching for a fast solution in an unconventional place: The veins of people who have recovered. Starting in New York City hospitals this week, and soon in dozens of medical centers across the United States, researchers will start drawing blood from COVID-19 survivors, who have antibodies their bodies made to fight the disease. They'll then isolate their plasma, the liquid part of blood that contains antibodies. And in a process called "convalescent plasma therapy," their antibodies will be transferred to others, either to protect them against getting infected or to boost the immune systems of those who are already sick. This highly experimental therapy hasn't been proven to work against the coronavirus, but preliminary research out of China suggests that it has helped a small group of patients recover. It's also seen some success in past infectious disease outbreaks, including in fighting the coronavirus that caused the SARS outbreak.

Keywords

Antibody, Antigen, Plasma, RBCs, SARS-CoV, Chromatography, Precipitation

Introduction

The novel coronavirus 2019-nCoV has recently emerged as a human pathogen in the city of Wuhan in China's Hubei province, causing fever, severe respiratory illness, and pneumonia - a disease recently named COVID-19 [1,2]. According to the World Health Organization (WHO), as of 16 February 2020, there had been > 51,000 confirmed cases globally, leading to at least 1600 deaths. The emerging pathogen was rapidly characterized as a new member of the betacoronavirus genus, closely related to several bat coronaviruses and to severe acute respiratory syndrome coronavirus (SARS-CoV) [3,4]. Compared with SARS-CoV, 2019-nCoV appears to be more readily transmitted from human to human, spreading to multiple continents and leading to the WHO's declaration of a public health emergency of international concern (PHEIC) on 30 January 2020 [1,5,6].

Since 2013, porcine epidemic diarrhea coronavirus (PEDV) has swept throughout the United States, causing an almost 100% fatality rate in piglets and wiping out more than 10% of America's pig population in less than a year [7-9]. In general, coronaviruses cause widespread respiratory, gastrointestinal, and central nervous system diseases in humans and other animals, threatening human health and causing economic loss [10,11]. Coronaviruses are capable of adapting to new environments through mutation and recombination with relative ease and hence are programmed to alter host range and tissue tropism efficiently [12-14]. Therefore, health threats from coronaviruses are constant and long-term. Understanding the virology of coronaviruses and controlling their spread have important implications for global health and economic stability.

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BATTLE AGAINST TWO PANDEMICS COVID-19 AND TUBERCULOSIS

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ABSTRACT

Tuberculosis (TB) is a preventable and curable disease, and its control is a highly cost-effective health intervention. However, diagnostic delay and inadequate treatment contribute to the severity and mortality of the disease as well as the risk of transmission and development of drug resistance. Despite the fact that TB disproportionately impacts low- and middle- income countries, it does not spare any country in the world including those in the European Union/European Economic Area where more than 4000 of people still die for the disease every year. The recent epidemic of COVID-19 highlights how a rapid spread of a serious epidemic could severely affect healthcare systems in the world. Shortages of Personal Protective Devices, mechanical ventilators, and worse, beds in intensive care units are a serious sign that health system cannot adapt rapidly to a health emergency. Risk factors associated with COVID-19, the viral pneumonia originating in Wuhan,China, in Dec 2019, require clarification so that medical resources can be prioritised for those at highest risk of severe COVID-19 complications. Infection with *M. tuberculosis* (MTB), the pathogen that causes TB and latently infects ~25% of the global population, may be a risk factor for SARS-CoV-2 infection and severe COVID-19 pneumonia. On the contrary, TB is a 'silent' epidemic. In this review both pandemics are compared to ensure that while tackling the new one (COVID-19) we should not forget the existing one (tuberculosis).

Keywords: epidemic, Covid-19, tuberculosis.

AIMS AND BACKGROUND

A pandemic is characterised as an infection that spreads across entire nations or the entire world. Tuberculosis and COVID-19 are the two pandemics that show continuous, supported network transmission across mainland's. Undoubtedly, no nation is without tuberculosis and this is probably going to be the situation soon for COVID-19 (Refs 1 and 2).

* For correspondence.

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Biological and biochemical oxidation processes

NANOCARRIER DRUG DELIVERY INVOLVES TARGETING DRUG – A KINETIC APPROACH

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ABSTRACT

Nanotechnology is the study of extremely small structures, having size of 0.1 to 100 nm. Nanomedicine is a relatively new field of science and technology. Brief explanation of various types of pharmaceutical nanosystems is given. Classification of nanomaterials based on their dimensions is given. An application of nanotechnology in various fields such as health and medicine, electronics, energy and environment, is discussed in detail. Applications of nanoparticles in drug delivery, protein and peptide delivery, cancer are explained. Applications of various nanosystems in cancer therapy such as carbon nanotube, dendrimers, nanocrystal, nanowire, nanoshells, etc. are given. The advancement in nanotechnology helps in the treatment of neuro degenerative disorders such as the Parkinson's and Alzheimer's disease. Applications of nanotechnology in tuberculosis treatment, the clinical application of nanotechnology in operative dentistry, in ophthalmology, in surgery, visualisation, tissue engineering, antibiotic resistance, immune response are discussed in this article. Nanopharmaceuticals can be used to detect diseases at much earlier stages.

Keywords: nanodevices, nanomaterial, nanomedicine, nanopharmaceutics, drug delivery.

AIMS AND BACKGROUND

THERAPIES FOR 21st CENTURY

Drug nanocrystals were invented at the start of the 1990s, based on the dates of the first patent filings by nanosystems[1–3]. Pioneering work was performed by Liversidge et al. at nanosystems[4–6]. Initially, companies were reluctant to use nanocrystal technology to formulate poorly soluble drugs. Chemists have attempted to conservatively solve this problem using available, proven technologies instead.

* For correspondence.

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Review

ANTIMALARIAL DRUGS AND THEIR NANOPARTICLES – A SOCIETAL IMPACT

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ABSTRACT

Malaria is an endemic disease caused by a protozoan parasite which is transmitted by female Anopheles mosquitoes around tropical and sub-tropical world. The main factor concerning the spreading of this disease is the increase in the number of drug-resistant parasites. To affect drug resistance, drug delivery systems for biodegradable polymers for the loading of anti-malarial drugs were developed. The formulated polymer loaded anti-malarial drugs nanoparticles are multifunctional features such as good biocompatibility, high percentage drug encapsulation, reduced drug toxicity, targeted drug, controlled release of therapeutic and diagnostic agents. Nanosize particles are expected to reduce the dose of the drug and kinetics of development of resistance in Parasite. Kinetics plays a key role in the study of what the body dose for a drug so these areas of study move towards pharmacokinetics. To evaluate the mechanism of drug release from the matrix tablet data obtained from the drug release studies were analysed according to zero order model, Higuchi model, and Korsmeyer-Peppas model, respectively. Thus obtained biodegradable polymer loaded drug nanoparticles were characterided by using DLS, Zeta analysis, SEM, TEM, AFM and identified by FT-IR, and UV-spectroscopy. In this review, we aim to provide insights into the design and improvement of targeted polymeric drug nanoparticles and to highlight the challenges correlate with the novel class of therapeutics, including the attention of nanoparticles design optimisation, improvement and biopharmaceutical properties. Additionally, we highlight some recent examples from the literature and novel concepts in both the design and use of targeted polymer loaded drug nanoparticles.

Keywords: anophelese, antimalarial drugs, controlled release, diagnostic, encapsulation, pharmacokinetics.

* For correspondence.

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REVIEW ARTICLE

A Systemic Review: Structural Mechanism of SARS-CoV-2A and Promising Preventive Cure by Phytochemicals

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Abstract

The novel coronavirus 2019 has recently emerged as a human pathogen in the city of Wuhan in China's Hubei province, causing fever, severe respiratory illness, and pneumonia disease recently named COVID-19 [1,2].

The world experienced the outbreaks of coronavirus infection that threaten global pandemic in 2002-2003 by Severe Acute Respiratory Syndrome (SARS) and in 2011 by Middle East Respiratory Syndrome (MERS). The genomic sequence of SARS-CoV-2 showed similar, but distinct genome composition of SARS-CoV and MERS-CoV.

Phytochemicals are a powerful group of compounds, belonging to secondary metabolites of plants and including a diverse range of chemical entities such as polyphenols, flavonoids, steroidal saponins, organ Sulphur compounds, and vitamins. The potential biological benefits such as antioxidant, anti-inflammatory, anticancer, antibacterial, antifungal and antiviral activities.

The ideal technology would be vaccine that gives lifelong immunity with a single dose. When whole world community of scientist working hard to find out clinical solution of this problem so mean time we have to work with what we have in hand the best prevention approach and the phytonutrient could be a one of them.

Keywords

COVID-19, Phytochemical, Antiviral, Curcumin, Lock & Key mechanism

Introduction

The novel coronavirus 2019 has recently emerged as a human pathogen in the city of Wuhan in China's Hubei province, causing fever, severe respiratory illness, and pneumonia disease recently named COVID-19 [1,2].

The world experienced the outbreaks of coronavirus infection that threaten global pandemic in 2002-2003 by Severe Acute Respiratory Syndrome (SARS) and in 2011 by Middle East Respiratory Syndrome (MERS). The genomic sequence of SARS-CoV-2 showed similar, but distinct genome composition of SARS-CoV and MERS-CoV [3,4].

The World Health Organization (WHO) also declared a global emergency on January 31st due to increasing concerns over its fast spread, and on March 11th the disease was recognized as a pandemic.

As of today, 26 Apr 2020 around 3 million cases were reported that infected by coronavirus with 200,000 deaths while 840,000 has been recovered. The distribution of total cases and daily projection of cases given in [3] (Figure 1).

On an average corona hit the 1.5% to 2020 global GDP and 0.2% to long-run global GDP. We forecast a muted long-term impact because damage to productive capacity will be small, plus economic confidence should quickly return once the virus subsides [6,7] (Figure 2).

Human pathogenic subtypes of CoV are associated with mild clinical symptoms. However, severe acute respiratory syndrome related coronavirus [SARS-CoV] and Middle East respiratory syndrome coronavirus [MERS-CoV] are the two notable exceptions. In 2012, MERS-CoV was first detected in Saudi Arabia. It was responsible for 2,494 confirmed cases, which led to 858 fatalities [8]. In 2002, a subtype of the beta-COV rapidly spread across Guangdong, China. This outbreak resulted in 8,000 infections and 774 fatalities in 37 countries [9]. The outbreak in 2020 has presented in the form of pneumonia.

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Donepezil loaded PLGA Nanoparticles, from Modified Nano-Precipitation, an Advanced Drug Delivery System to treat Alzheimer Disease

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ABSTRCT- In present works we synthesized Donepezil loaded PLGA nanoparticles (NPs). The approach of our research group was to prove the improvement of drug transport through the Blood Brain Barrier when donepezil was loaded with PLGA. It promoted the uptake of drug into brain endothelium compared with the free drug and play a significant role in the treatment of Alzheimer's disease (AD). The NPs were synthesized by modified Nano precipitation method. These synthesized polymeric nanoparticles were characterized for particle size, Polydispersity index (PDI) and Zeta potential. The average size and PDI of drug loaded polymeric nanoparticle for preferred formulation were found to be 40.8 nm and 0.188 respectively. The Entrapment Efficiency was 74% and Process yield was 78%. The electron microscopic images of polymeric nanoparticles suggested that the particles were spherical in shape. The pharmacokinetics showed that the release behavior of NPs were very much similar to sustained release and follow Hixson Crowell model.

Keywords- Alzheimer, Blood Brain Barrier, Donepezil, Nanoparticles, Pharmacokinetics

Introduction- Alzheimer's Disease (AD) is a neurodegenerative disorder[1]. It is associated with cognitive and behavioral impairment. AD is a common type of dementia[2]. As per "World Alzheimer Report 2019" there were more than 50 million people living with dementia in all over world, a figure set to increase to 152 million people by 2050. The Conventional treatments for AD in currents are acetyl cholinesterase inhibitor drugs which only suppressed the degradation of Acetylcholine but failed to cure AD because of their poor solubility and lower bioavailability[3]. These drugs are also unable to cross the Blood Brain Barrier (BBB)[4]. But nanotechnology provides design, Characterization and medicinal applications for Nano scale drug delivery system. The nanotecnological treatments promising the formation of polymeric NPs and advance delivery of therapeutic devices to the brain via various administrative routes.[5-7]

In the modern era, AD will spread out over world. A large number of drug modifications have been designed, which have focused on 'how to cross the BBB'. The symptoms in AD consist of three stages as mild, moderate and severe. Donepezil, a piperdine derivative approved by USFDA in 1986, is the only drug which is used for the treatment of all stages of AD. Donepezil is an acetyl cholinesterase inhibitor drug used for the treatment of AD[8-9]. Although the therapies have been used presently for treatment of AD still lack of efficacy because of higher concentration of donepezil is prescribed to target the brain. This leads to various side-effects in gastrointestinal alteration. In treatment of AD, BBB is the major issue. The continuous growth in

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Biological and biochemical oxidation processes; medical image processing; neural networks and fuzzy logic techniques

DEVELOPMENT, EVALUATION AND KINETIC MODELLING OF MEMANTINE-LOADED PLGA NANOPARTICLES FOR ALZHEIMER DISEASE

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ABSTRACT

Alzheimer disease is the most common neurodegenerative disease of this century. It is associated with memory and cognitive impairment. There are two types of drugs approved by United State Food and Drug Administration (USFDA) for the treatment of Alzheimer's disease. The major problem with this disease is that the drugs are not able to cross Blood Brain Barrier effectively and higher dosage of the drug results several side effects such as vomiting, nausea, headache, etc. The aim of this work is to prepare Memantine-loaded poly(lactic-co-glycolic acid) (PLGA) nanoparticles to reduce side effects. The approach of our research group is to improve drug transportation through the Blood Brain Barrier. The Memantine-loaded PLGA nanoparticles were prepared by modified nanoprecipitation method and characterised for Photo correlation spectroscopy (PCS) particle size distribution, Zeta potential, Entrapment efficiency. The average size and polydispersity index of polymeric nanoparticles was 83.7 nm and 0.328, respectively. The electron microscopic results of polymeric nanoparticles suggested that the particles are spherical in shape, smooth morphology and the preferred formulation follows the Hixson-Crowell model. The longer term clinical trial and attempts to increase their impact in treatment of anti-Alzheimer drug are highly needed.

Keywords: blood brain barrier, Memantine, PCS, pharmacokinetics, Zeta potential.

AIMS AND BACKGROUND

As per "World Alzheimer Report 2019" there were over 50 million people living with dementia globally, a figure set to increase to 152 million by 2050. Alzheimer's disease is a neurological disorder that results in cognitive and behavioural impair-

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