EuroSciCon

13th Edition of International Conference on

NANOMEDICINE AND ADVANCED DRUG DELIVERY

August 29-30, 2019 | London, UK

AGENDA

Day 1, Agenda

General Session

08:00 AM — INTRODUCTION

09:00 AM — PLENARY

10:00 AM — KEYNOTE

Networking & Refreshments Break @ Foyer

	HALL 01	HALL 02	HALL 03
11:00 AM	Talks On: **Cancer And Nanotechnology**	Talks On: **Nanomedicine**	Talks On: **Design Of Nanodrugs**
	Talks On: **Drug Targeting And Design**	Talks On: **Novel Drug Delivery Systems**	Talks On: **Routes Of Drug Administration**
	SESSION DISCUSSION	**SESSION DISCUSSION**	**SESSION DISCUSSION**
02:00 PM	Panel Over: **Pharmaceutical Nanotechnology**	Panel Over: **Nanomaterials For Drug Delivery**	Panel Over: **Nanotechnology And Biomedical Applications**
	Workshop On: **Personalized Nanomedicine**	Workshop On: **Drug Delivery Research**	Workshop On: **Drug Delivery Equipments And Machinery**
	Lunch Break @ Restaurant	***Lunch Break @ Restaurant***	***Lunch Break @ Restaurant***
04:00 PM	Talks On: **Smart Drug Delivery Technology**	Talks On: **Regenerative Medicine And Tissue Engineering**	Talks On: **Regulatory Aspects Towards Approval Of Nanomedicine**
	Lectures on: **Vaccine Design And Delivery Technology**	Lectures on: **Drug Delivery And Device Development**	Lectures on: **Recent Advances In Drug Delivery**
06:00 PM	Session On: **Major Challenges In Drug Delivery**	Session On: **Drug Delivery Companies And Markets**	Session On: **Nano Pharmaceutical Industry And Market**
	NETWORKING	**NETWORKING**	**NETWORKING**

Day 2, Agenda

General Session

08:00 AM — INTRODUCTION

09:00 AM — PLENARY

10:00 AM — KEYNOTE

Networking & Refreshments Break @ Foyer

	HALL 01	HALL 02	HALL 03
11:00 AM	Talks On: **Biomedical Engineering**	Talks On: **Drug Delivery Technology**	Talks On: **Nano Pharmaceuticals**
	Talks On: **Business Opportunities in Drug Delivery**	Talks On: **Nanomedicine and Nanotechnology**	Talks On: **Novel Bio therapeutics and Drug Delivery Systems**
	SESSION DISCUSSION	**SESSION DISCUSSION**	**SESSION DISCUSSION**
02:00 PM	Panel Over: **Nanomedicine**	Panel Over: **Cancer And Nanotechnology**	Panel Over: **Design Of Nanodrugs**
	Workshop On: **Routes Of Drug Administration**	Workshop On: **Pharmaceutical Nanotechnology**	Workshop On: **Novel Drug Delivery Systems**
	Lunch Break @ Restaurant	***Lunch Break @ Restaurant***	***Lunch Break @ Restaurant***
04:00 PM	Talks On: **Nucleic Acid Based Drug Delivery**	Talks On: **Peptide and Protein Drug Delivery**	Talks On: **Smart Drug Delivery Systems**
	Lectures on: **Synthesis of Nanoparticles for Drug Delivery**	Lectures on: **Personalized Nanomedicine**	Lectures on: **Nanotechnology And Biomedical Applications**
06:00 PM	Session On: **Regenerative Medicine And Tissue Engineering**	Session On: **Vaccine Design And Delivery Technology**	Session On: **Drug Delivery And Device Development**
	NETWORKING	**NETWORKING**	**NETWORKING**

Abstract

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Chitosan-based colloidal polyelectrolyte complexes: Safe and green drug/vaccine nano-delivery systems

Thierry Delair
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France

Drug delivery systems (DDS) prove essential for a better efficacy and safety of the chemotherapies and that fights diseases and improve the quality of life of patients. The efficiency of DDS lies in their capabilities at delivering the right amount of an Active Pharmaceutical Ingredient (API), at the right location in the body, in the safest manner and more comfortable way for the patients. Moreover, DDS should be efficiently manufactured via robust, green and low cost processes involving the use of raw materials complying with a sustainable development. Hence, new generations of DDS will need a global and multidisciplinary approach, addressing the above-mentioned challenges. Here, we report on our strategy of DDS elaboration, using polyelectrolyte complexes (PECs) of bio-sourced polysaccharides leading to tailored and multifunctional Nano delivery systems. PECs result from the self-assembly of oppositely charged polymers in water. In that sense, polyelectrolyte complexation is a safe and green process. When this process is used with bio-sourced polysaccharides, generally regarded as safe, we have at hand a formulation process that meets many of the above requirements.

Development, characterisation and in vitro evaluation of disulfiram loaded PEGylated nanoparticles for breast cancer treatment

Mohammad Najlah
Anglia Ruskin University
UK

Disulfiram (DSF), an anti-alcoholism drug, has shown a selective cytotoxicity towards a wide range of cancer cells. The anti-cancer activity of DSF is copper (Cu^{+2}) dependent as the reaction between both yields cancer-targeting reactive oxygen species (ROS) and diethyldithiocarbamate (DDC) complex with Copper (DDC-Cu) owning a strong NFκB-inhibiting activity leading to cancer cell death. However, the clinical use of DSF as an anti-cancer drug is limited by its biological instability in the blood ($t_{1/2}$ < 4 min). The aim of this study is to design, formulate and characterize PEGylated nanoparticles of DSF to improve stability and provide a proposed long circulation to target cancer cells. Several formulations of PEGylated PLGA/PCL nanoparticles (NPs) loading DSF have been manufactured by direct nanoprecipitation using two water-miscible organic solvents, acetone/methanol (3:1). The resulting NPs were fully characterized; size analysis, zeta potential measurements were performed using Laser Doppler Velocimetry.

Delivering nucleic acids to CD44-expressing cancer cells: From hyaluronic acid- to aptamer-decorated nanocarriers

Hervé Hillaireau
Unversité Paris-Sud
France

Downregulation of genes involved in cancer progression using therapeutic nucleic acids remains a promising alternative to conventional chemotherapy. This approach however necessitates an appropriate delivery system allowing not only intracellular delivery but also the targeting of cells involved in cancer progression. To this end, CD44 has been characterized a major biomarker, being overexpressed by many tumors including lung, breast, colon, pancreatic, head, and neck cancers. Our group has developed over the past years hyaluronic acid (HA)-decorated Nano carriers able to deliver small interfering RNA (siRNA) and DNA plasmids [1] to CD44-expressing lung cancer cells. In particular, HA-decorated lipoplexes exhibited a lamellar structure able to deliver nucleic acids in vitro to the CD44-expressing A549 lung cancer cells through CD44-mediated endocytosis, and inhibited the expression of the luciferase (luc) reporter gene [2]. In vivo, these lipoplexes significantly inhibited luc after intravenous administration to mice bearing an A459-based lung cancer. After intravenous administration to mice bearing an orthotopic model of MDA-MB-231-based breast cancer, Apt1-targeted liposomes successfully inhibited luc in the tumor cells, in a specific and targeted manner. These results show the potential of aptamers to selectively target oncogenes to CD44-expressing cancer cells in vivo.

SPEAKER SLOTS AVAILABLE

Abstract

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In vitro studies of the release of doxorubicin and other amphiphilic drugs from microgels: Improved mechanistic understanding

Per Hansson
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Sweden

Statement of the Problem: Micro gels have the capacity to store large amounts of amphiphilic, peptide and protein drugs. This makes them interesting as delivery systems for drugs needing protection against degradation, and as components of slow-release and depot formulations for parenteral administration. Despite the fact that micro gels are used clinically, e.g., to deliver doxorubicin in the treatment of liver cancer little attention has been given to how the drug self-assembly inside micro gels affects the release properties. The purpose of this study is to show that that the release of amphiphilic drugs is strongly influenced by self-assembly [2] and its effect on the swelling of the micro gel network. Methodology & Theory: Loading and release of cationic amphiphilic drugs are investigate by means of micropipette-assisted microscopy of single micro gels [2, 3] (Fig. 1) and µDiss apparatus studies. We have developed and evaluated two new models combining transport dynamics and thermodynamics of drug self-assembly, one for non- swelling responsive micro gels based on the Nernst-Planck equation [2], and one for responsive networks handling coexisting phases with different degrees of network swelling.

Diagnostics and therapy using iron oxide nanoparticles– The SEON-Concept

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Nanoparticles offer promising new possibilities for a multiplicity of medical applications including therapy and diagnosis of various diseases. Especially iron oxide nanoparticles provide a broad application spectrum as contrast agents, magnetic transporters, or heat carriers in hyperthermia treatment. While particles used for imaging should circulate for extended periods of time in the vascular system, nanoparticles designed for use as drug carriers should be efficiently taken up by the target cells. Importantly, nanoparticles for medical (and several other) applications must be biocompatible, meaning that after contact with cells no adverse effects are elicited. To translate basic findings into clinical trials several requirements such as detailed synthesis and characterization of the nanoparticles, Nano toxicological testing', ex vivo models to simulate in vivo conditions for appropriate adjustment of the necessary parameters and pre-clinical animal studies have to be addressed. These results are of pivotal importance to start with respective GMP production and approval, which is essential for translating these products into clinical trials (scheme). SEON (Section of Experimental Oncology and Nanomedicine) addresses these issues with a special focus on drug delivery in oncology and their promising potential applications in cardiovascular, regenerative medicine, imaging and infections.

Enhanced Stability of Novel Chitosan-Based Nanoparticles and its Application as an Anticancer Drug Delivery System

Isra Dmour
Ahliyya Amman
University, Jordan

Chitosan-based nanoparticles prepared by ionotropic gelation are prone to stability issues. The aim of this work is to chemically modify chitosan by grafting to succinate, phthalate, glutarate and phenylsuccinate moieties and to investigate the suitability of the resulting polymers as covalently-crosslinked Nano carriers. Corresponding nanoparticles (NPs) were formulated by ionotropic gelation using tripolyphosphate (TPP) anion then they were covalently crosslinked using 1-ethyl-3-(3-dimethylaminopropyl)-carbodiimide. Infrared and thermal analysis confirmed the formation of phosphoramide bonds within the NPs indicating the involvement of TPP in covalent crosslinking. This is the first time to report phosphormide covalent crosslinking within nanoparticles matrices. The resulting NPs were found to resist drastic pH and calcium ion conditions. Size analysis indicated the NPs to be spherical and less than 500 nm in diameter. Loading studies using Safranine O showed enhanced NPs drug loading upon covalent crosslinking compared to ionotropic gelling. Doxorubicin-loaded NPs were of superior cytotoxic properties compared to free doxorubicin.

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Abstract

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Contact lenses loaded with vitamin E and ionic surfactants for extended drug delivery

Cesar Torres
University of Maryland
USA

Statement of the problem: Ophthalmic diseases are most commonly treated with eye drops due to the low costs and self-administration. However, it has been reported that eye drops could deliver only about 5% of functional ingredients contained in a burst dosage since they suffer from tear drainage in addition to corneal and sclera barriers. To address the limitations of eye drops, researchers have explored the use of therapeutic contact lenses. Nevertheless, a major limitation of contact lenses in drug delivery is that most of the drug absorbed is released within the first few hours, fact that limits the use for extended release. The purpose of this study is to demonstrate the application of vitamin E diffusion barriers with ionic surfactants into contact lenses, in order to achieve controlled release of non-steroidal-anti-inflammatory drugs (NSAIDs). Methodology: Silicone-hydrogel commercial contact lenses were soaked in ethanol solutions containing vitamin E and an ionic surfactant. Secondly, a NSAID was added to each lens by soaking the lenses in drug solutions for determined periods of time. The in vitro release experiments were carried by immersing the drug-containing contact lenses in phosphate buffer saline at physiological pH. Results: Contact lenses containing vitamin E extend drug delivery up to a factor of 50, depending on the amount of vitamin E loaded.

Multiantigenic peptide-based therapeutic vaccine against cervical cancer

Waleed M. Hussein
University of Queensland
Australia

Conjugation of multiple peptides by their N-termini is a promising technique to produce branched multi-antigenic vaccines. We established a double conjugation strategy that combines a mercapto-acryloyl Michael addition and a copper-catalysed alkyne-azide 1,3-dipolar cycloaddition (CuAAC) reaction to synthesize self-adjuvanting branched multi-antigenic vaccine candidates. These vaccine candidates aim to treat cervical cancer and include two HPV-16 derived epitopes and a novel self-adjuvanting moiety. This is the first report of mercapto-acryloyl conjugation applied to the hetero conjugation of two unprotected peptides by their N-termini followed by a CuAAC reaction to conjugate a novel synthetic lipoalkyne self-adjuvanting moiety. In vivo experiments showed that the most promising vaccine candidate completely eradicated tumors in 46% of the mice (6 out of 13 mice).

Carbon-integrated mesoporous silica nanoparticles for Doxorubicin adsorption and release

NH Nazirah Kamarudin
Universiti Kebangsaan
Malaysia

The mesostructured silica nanoparticles (MSN) have been extensively studied for the purpose of drug delivery application due to their unique properties such as biocompatibility, high stability, porous structure to withhold the bulky drugs, high and tailorable internal and external surface area, as well as functionalizable surface. However, MSN is hydrophilic while most anti-cancer drugs are hydrophobic. The purpose of this study was to modify the MSN with activated carbon (AC) which is expected to produce more efficient adsorption and release medium for the anticancer drug doxorubicin (DOX) as the drug model. MSN was modified with AC through co-condensation (CMSCN) and post-grafting (PMSCN) method. MSCN has been characterized using X-Ray Diffraction, Nitrogen gas physisorption, Fourier Transform Infrared, Transmission Electron Microscope, and Field Emission Scanning Electron Microscope-Energy Dispersive X-Ray, while adsorption and release of drugs was observed using UV Spectrophotometer. The characterization demonstrated that the MSN produces relatively higher number of pores with larger diameters while addition of AC led to the decrease in the crystallization, surface area and diameter of the pores. This study recommends carbon-functionalized MSN to be further studied for drug delivery application.

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Abstract

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Pt(II)-metallosurfactants and metallosomes for chemotherepautic drug delivery

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Universitat Autònoma de Barcelona, Spain

Metallosurfactants (MTS) are tensioactive metal complexes that gather properties of both constituents: the surfactant and the metal ion.1,2 These molecules exhibit self-assembly properties and, when mixed with phospholipids, are able to form stable vesicles, known as metallosomes, which size ranges from nanoparticles to microns. They have been proposed as reliable and efficient tools for drug delivery systems in cancer treatment. Although platinum drugs are widely used in the treatment of several types of solid tumors, the inclusion of Pt chemotherapeutic agents in such vesicles is reported to enhance their biocompatibility and allows reducing immunogenicity and non-specific toxicity, diminishing side-effects in front of the free drug. Tensioactive ligands have not shown a suitable hydrophilic/hydrophobic moieties ratio to form aggregates by themselves. However, the coordination of some of these ligands to Pt(II) moiety allows their assembly in the micron-range Mixed vesicles of Pt(II)-MTS and phospholipids at different concentrations have been obtained in aqueous media to study the Pt internalization in the phospholipid bilayer and the metallosomes size.8 Finally, preliminary cytotoxic studies have shown the potentiality of these compounds to be used as promising anticancer lipodrug candidates.

Organometallic nanogels for the delivery of nucleotide analogues

Hervé Hillaireau
Unversité Paris-Sud, France

Nanomedicines have brought tremendous hope of targeted and personalized medicine. In particular, they have improved the bioavailability of poorly soluble drugs, reduced side effects of several drugs, and enabled drug targeting to diseased tissues, especially in the field of cancer treatment. However, a widespread use of nanomedicine still faces several important impediments, especially in the case of hydrophilic drugs for several reasons. (i) Despite variable drug encapsulation efficiencies into Nano carriers, the drug loading achieved is generally low, which limits the drug dose and/or requires the administration of high amounts of excipients (e.g. lipids or polymers forming the Nano carrier). (ii) The drug release is often poorly controlled and prone to the 'burst release' effect, and the stability of Nano carriers in physiological media may be unsatisfying, therefore limiting the targeting potential of nanomedicine. (iii) Each drug often requires a specific Nano carrier system, which is often challenging to scale-up, which dramatically limits the applicability into the industry and the clinics. Our group has first demonstrated the ability of triphosphate group-containing drugs to induce ionotropic gelation of chitosan. These results highlight the potential of metal association to chitosan to form Nano gels with tunable stability and drug release profile.

Emulsified spray dried alginate microparticles: A novel carrier for the dually acting drug roflumilast

Nermeen A. Elkasabgy
Cairo University, Egypt

Roflumilast is a selective inhibitor of phosphodiesterase-4 isoenzyme in lung cells. Roflumilast causes severe psychiatric side effects when taken orally which affects negatively the patients' adherence to the drug. Hence, this study aimed to deliver the drug through the pulmonary route. Emulsified spray dried alginate micro particles were prepared. Sodium alginate was utilized as the micro particle-forming material, isopropyl myristate as an oil and Tween® 80 as an emulsifying agent. In order to enhance the mechanical properties of the particles, calcium beta-glycerophosphate was used as a cross-linking agent. Micro particles were characterized for their entrapment efficiency, particle size and in-vitro drug release. Different carriers were used to prepare a free flowing powder. From the investigated carriers, beta-cyclodextrin (CD) was selected as it succeeded in producing a formulation with smaller particle size and more prolonged drug release. Anderson cascade impactor was used to investigate the inhalation profile of CD-based micro particles. Results of the aerosolization profile suggested the efficacy of the prepared CD-based micro particles to deliver the drug deep in the lung. CD-based micro particles proved to be a good carrier for inhaled drugs like roflumilast in human.

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Abstract

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Nanoparticle-infused-biodegradable-microneedle technology for skin cancer treatment

Rachel Sully
University of Kent
UK

Melanoma affects over 200,000 people in the UK alone, with survival rates of around 86%. Over the last decade melanoma skin cancer incidence rates for males and females combined increased by 50%. The current main treatments of skin-cancer are surgery to remove the affected area, as well as chemotherapy/radiotherapy and immunotherapy to kill the tumor cells. However, around 33,000 people still die within the first five years after diagnosis and treatment. The purpose of this study is to explore the possible development of a new nanomedicine technology that uses anti-cancer drug doped-nanoparticles to kill tumor cells. Nanoparticles1 are held in solution which can lead to aggregation, making them undesirable as drug delivery systems. The proposed solution to this is to formulate the nanoparticles into a microneedle array made from methylcellulose gels. In solution, nanoparticles are subject to Brownian motion and tend to aggregate however when formulated into a gel-like microneedle patch the aggregation is prevented. Methylcellulose is used specifically because it is biodegradable and will degrade by enzymatic reaction in the epidermis, thus releasing nanoparticles into the microenvironment. Microneedle patches have been used widely in cosmetics, as well as for insulin delivery.

Optimization of thermally and enzymatically cross-linked gelatin films properties for drug delivery

MZOUGHI Jihane
Mulhouse Materials Science Institute, France

Our study investigates the influence of thermal and enzymatic crosslinking methods on the mechanical, thermal and physiochemical properties of gelatin which is known for its good properties in pharmaceutical application namely as a media of drug delivery. Initially, focus is given first to thermal crosslinking optimization in terms of temperature and heating time. It is found that, in a specific range of these parameters, this treatment decreases the surface polarity and the hydrophilicity of the film. The films treated during less than 5 hours at 150°C exhibited a decrease in water absorption rate measured by Goniometry (~0.13 µL/min) comparing to untreated films (~0.18 µL/min) and films treated overnight (~0.33 µL/min) (The thickness of the film is 50 µm and the volume of the water drop deposited is 3 µL). Differential scanning calorimetry showed decrease in crystallinity after thermal treatment which can be explained by an increase of cross-linking bridges number favoring an amorphous structure. The polymer became insoluble in aqueous medium at 37°C. Swelling capacity is reduced and contact angle is increased. Tensile testing showed an increase in Young's Modulus of the film after thermal crosslinking , thus, enhanced mechanical stability.

Cyclodetrin-based nanoaggregates for eye drop formulations

Blanca Lorenzo-Veiga
University of Iceland
Iceland

Statement of the Problem: Topical eye drops are the most common and convenient dosage form of the drug to the eye. Nevertheless, due to eye barriers, poor drug absorption and low bioavailability make the development of an optimal formulation a challenge. Different strategies have been proposed to address these problems. Cyclodextrin-based nanoaggregates have emerged in recent years as a new platform for drug delivery to the anterior and even posterior segment of the eye. Cyclodextrins are natural cyclic oligosaccharides that have the ability to form water-soluble inclusion complexes holding in their cavities lipophilic drug molecules as guests. The purpose of this study was to investigate the effect of three water-soluble polymers (PVP, PVA, and tyloxapol) widely used in eye drops formulations on the solubility of complexes containing a single CD(gamma-CD) or a mixture of CDs(gammaCD/HPBetaCD) and nepafenac as a model drug. Methodology & Theoretical Orientation: The effect of these polymers on apparent solubility of the complex was analyzed by UHPLC. Moreover, size, osmolarity, and viscosity of these systems were analyzed. Findings: the addition of PVA led to the greatest increase in solubility in both single and mixture CDs.

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Abstract

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PCSK9 conjugated paclitaxel loaded liposomes to target the cancer cells

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Pontifical Catholic
University Of Chile, Chile

There is an unmet need for anti-cancer drugs to be directed at tumors to kill cancer cells selectively. We need systems that target cancer cells to reduce the side effects seen with conventional treatments. Anti-cancer drugs may be packaged within nanoparticle-based drug-delivery vectors that transport them towards their therapeutic targets. In this research, we have developed a Proprotein convertase subtilisin/kexin type 9(PCSK9) conjugated Paclitaxel-loaded Liposomes (PCSK9-PTX-liposomes) for targeting cancer cells. This work is based on the hypothesis that liposomes linked to PCSK9 will recognize LDL-receptors (LDLR) on cancer cells. PCSK9 is expressed in several organs, particularly the liver and also the intestines and the kidney. PCSK9 acts on the LDLR primarily as a secreted factor and promotes the reduction of LDLR protein concentrations. Cells internalize cholesterol from circulating LDL through the LDLR on the cell surface. Increased LDLR expression to support the continuous proliferation of the cancer cells has been linked with poor patient survival. Elevated LDLR expression on tumor cells ensures site-specific delivery of the drugs via PCSK9-Linked-Liposomes. On recognition, the liposomes will deliver the drugs to the cell interior where their targets lie.

Modulation of tumor microenvironment by tumor vascular network reconstruction for improved anti-tumor effect

Jing Yao
China Pharmaceutical
University, China

Tumor vascularity plays an important regulatory role in supporting the proliferation of tumor cells and constructing tumor microenvironment. The once-popular strategy of “starving tumors” by blocking neovascularization was proved to increase the risk of mutation and metastasis, which resulted from the aggravated hypoxia and insufficient drug delivery by the blocked vascular access. While the theory of vessel normalization required a timespan (window) characterized by the balance between pro- and anti-angiogenic factors, in which the structurally and functionally normalized vessels were expected to increase oxygen supply and drug delivery. However, the window is normally transient, difficult to monitor and utilize. The dilemma of the two established theory concerning vascular issues is urgently needed to be addressed. Through the recovery of tumor vessels, these Nano drugs reconstructed tumor microenvironment and thus yielded remarkable tumor growth suppression. Owing to the intimate crosstalk between tumor cells and endothelial cells, LGC and LKD Nano drugs could improve the tumor microenvironment by accurately balancing the pro- and anti- vascular factors, which benefited for restoring oxygen supply, improving Nano drug distribution and curbing the tumor progression.

Enhancing nano drug delivery using precision therapeutic approaches for the treatment of chronic diseases

Andrew D. Miller
King’s College Londo
London

Precision Medicine is considered by many to be a necessary future for the treatment for all diseases. Fundamentally, this can be divided into two subsections, namely personalized medicine and precision therapeutics. With personalized medicine, the aim is to understand the genetic, immunological and/or metabolic individuality of patients in order to match individual patients with the most appropriate active pharmaceutical ingredients (APIs) for treatment of their particular disease(s). With precision therapeutics, the aim is to take control of the delivery of APIs to disease target tissue, by means of nanomedicine, and/or make use of select APIs that have extreme target specificity. The focus of this lecture is in precision therapeutics, as demonstrated by several worked examples of precision therapeutic approaches (PTAs) that are currently being taken forward in my laboratories and in the laboratories of key collaborators for the treatment of chronic diseases. Chronic diseases of interest are chronic pain, epilepsy, cancer, non-alcoholic fatty liver disease (NAFLD) /diabetes type II, and infectious diseases such as HBV. Such potential step changes in disease treatment explain why precision therapeutics should be an indispensable part of future medicine.

SPEAKER SLOTS AVAILABLE

Abstract

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Antitumor performance regulation of drug-conjugated gold nanoparticles: Structure-efficacy relationship studies

Ya Ding
China Pharmaceutical University, China

Drug-conjugated nanoparticle is a uniquely structured drug delivery system. In each conjugate, the nanoparticle acts as a core to crosslink more than 100 prodrug molecules and prodrug is composed of its parent drug molecules covalently connected on the surface of nanoparticles via proper spacers. This system can be seen the assembly of prodrugs in the nanoscale and show the advantages of both prodrug and nanoparticles. To investigate the structure-efficacy relationship of this system, gold nanoparticles (GNPs) and Doxorubicin (Dox) are selected as the demonstrations to construct Dox-conjugated GNPs. Polyethylene glycol (PEG) is used as the spacer to improve the solubility, biocompatibility, and body circulation of the system. Here, the position of Dox, size of gold core, and molecular weight of PEG are adjusted to regulate the in vitro properties and in vivo performance of Dox-conjugated GNPs systematically. According to the structure-efficacy relationship studies of Dox-conjugated GNPs, it allows to reveal the internal mechanism that guides therapy of tumor treatment, explore physicochemical and material science approaches to improve the therapy efficacy of Nano conjugates, and promote the theoretical and practical researches of nanoparticle-based drug delivery system as the candidate for tumor treatment.

Pharmaceutical nanotechnology approach to improve the aqueous solubility and antioxidant properties of *Curcumin*

Lalduhsanga Pachuau
Assam University, India

Over the years, curcumin has been demonstrated to exhibit potent pharmacological effects such as in the treatment of cancers, diabetes, obesity, Alzheimer's disease and inflammatory disorders. However, this polyphenolic phytochemical suffers from the extremely low absorption rate in vivo which has restricted its oral bioavailability. The low bioavailability of curcumin has been attributed to the problems of low aqueous solubility, poor dispensability and extensive first pass metabolism. Nano-pharmaceutics approach has been applied to help solve the bioavailability problems of curcumin and to enhance its antioxidant activity. Ethyl cellulose coated curcumin nanoparticles were prepared by following nanoprecipitation method. The surface morphology of the nanoparticle, its size distribution and zeta potential were analyzed along with drug release mechanism and antioxidant activities. Release of curcumin follows Fickian diffusion and was sustained for over 12 hours. Antioxidant activity and inhibition of lipid peroxidation was also improved by the Nano particulate formulation. The solubility of poorly aqueous soluble curcumin was significantly increased by the Nano particulate formulation and the colloidal dispersion also improves the curcumin's antioxidant activity as well as the inhibition of lipid peroxidation inhibition.

Evaluation of medicine distribution, regulatory privatisation, social welfare services and liberalisation

Abdeen Omer
Ministry of Health and Social Welfare, Sudan

Improving effectiveness of the public pharmacy is by switching resources towards areas of need, reducing inequalities and promoting better health. Unless there are clear incentives for pharmacists, they can move away from public sector. The public sector is rigid, bureaucratic personnel-management practices, low incentives, poor job satisfaction and unsupportive work environment compared to the private sector. Such situation demoralized pharmacists and encourages them to join the private sector. Many (65%) of surveyed private-sector pharmacists claimed they were public sector pharmacists migrated to the private sector. Although information on migration is sparse, anecdotal evidence persuasively underscores the problem. An internal flow of pharmacists plagues all states, since pharmacists move from poorer states to wealthier ones and from the public sector to the private. Strategies to meet current and future challenges in pharmacy human resources are urgently needed. Approaches that focus on the training of individuals, which do not take into account the job satisfaction (i.e. the nature of the work itself) and pharmacists' mobility, can enjoy only limited success. Increased production alone cannot compensate for weak motivation, high attrition and increasing mobility.

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Abstract

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Hydrophilic p(HEMA) nanoparticles via inverse miniemulsion polymerization technique : Synthesis and characterizations

Noor Aniza Harun
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Terengganu, Malaysia

This study highlights on the development of polymer nanoparticles with improved hydrophilicity prepared via inverse miniemulsion polymerization, a robust technique to prepare hydrophilic and aqueous-soluble polymeric nanoparticles. 2-hydroxyethyl methacrylate (HEMA) is excellent candidate for homo-polymerization due to its biocompatibility and biodegradability characteristic with high hydrophilicity properties. The influence of synthesis parameters including the effects of sonication time and amplitude towards the particles size and morphology of p(HEMA) nanoparticles are investigated. The formation of p(HEMA) nanoparticles are confirmed by Fourier transform infrared (FTIR). The morphology of polymer nanoparticles have been determined using scanning electron microscope (SEM) and transmission electron microscopy (TEM). Dynamic light scattering (DLS) indicates the mean diameters of p(HEMA) nanoparticles were in a range of 100 – 200 nm. The hydrophilic polymer nanoparticles obtained are expected to be further utilized in the fabrication of inorganic-polymer composite nanoparticles especially in biological applications.

Gold-Aryl nanoparticles coated with polyelectrolytes for adsorption and protection of DNA against nuclease degradation

Seema Panicker
University of Sharjah
UAE

Binding DNA on nanoparticles was pursued to form nanoplatform for formation of non-viral gene system. Carboxyl derivatized gold-aryl nanoparticles can bind with biodegradable cationic polyelectrolytes such as polydiallyldimethylammonium chloride (PDADMAC). In our study, we used gold-aryl nanoparticles (AuNPs) treated with PDADMAC to form conjugates with non-thiol or non-disulfide modified oligonucleotide DNA. Both AuNPs-DNA and PDADMAC-AuNPs-DNA biomaterials were characterized using UV–Vis, dynamic light scattering (DLS), atomic force microscopy (AFM), transmission electron microscopy (TEM) and agarose gel electrophoresis. UV–Vis showed a red shift in the Plasmon peak as compared with unconjugated AuNPs. DLS measurements also showed difference in the size of AuNPs-DNA and PDADMAC-AuNPs-DNA. AFM and TEM results showed proper conjugation of DNA with AuNPs. Gel electrophoresis proved the presence of interaction between PDADMAC-AuNPs and negatively charged DNA. The binding of DNA in the described bio conjugate enhanced its protection against nuclease degradation and prolonged its presence in the digestive environment of DNase-I. From the results we expect that these biomaterials can be used in nanomedicine with emphasis on non-viral gene system

Nano drug delivery parametric simulation through MATLAB Fuzzy Logic

Muhammad Javaid Afzal
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Lines, Pakistan

The emergent technology of drug delivery use nanoneedles for the diffusion in cell membranes to examine and control the biomedical processes in human cells. This paper shows a simulational procedure of Fuzzy logic for volumetric rate of flow through nanoneedles for medicinal delivery. The volumetric rate of flow is measured as 0.33 µL/min in Fuzzy simulation. These parameters are confirmed by Mamdani's model and the earlier investigations. The simulational outcomes presented here that the Fuzzy logic provides an effective demonstration by giving an agreement with parametric quantities. Consequently, Fuzzy approach is an alternative technique to obtain volumetric rate of flow for nanoneedles drug delivery. This is the dominant and versatile technology. It can determine biomedical processes with novel biophysical features of human cells.

SPEAKER SLOTS AVAILABLE

Abstract

EuroSciCon

Biosynthesis and anticancer effects against colon cancer cells of silver nanoparticles using *Jurenia macrocephala dc.* whole extract

Madhulika Bhagat
University of Jammu
India

Metal nanoparticles, particularly silver nanoparticles (AgNPs), are developing more important roles as diagnostic and therapeutic agents for cancers with the improvement of eco-friendly synthesis methods. This study demonstrates the biosynthesis, antibacterial activity, and anticancer effects of silver nanoparticles using Jurenia macrocephala DC. (Family Compositae) whole aqueous extract. The AgNPs were characterized by UV-vis absorption spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM), and Fourier transform infrared spectroscope (FTIR). The cytotoxicity effect was explored on human colon cancer cells in vitro by MTT assay. The expressions of phosphorylated stat 3, bcl-2, survivin, and caspase-3 were examined by Western blot analysis. The whole extract acted as a strong reducing and stabilizing agent during the synthesis. AgNPs also showed dose-dependent cytotoxicity against colon cancer cells through a decrease of stat 3, bcl-2, and survivin, as well as an increase in caspase-3. These findings confirm the potential anticancer application of AgNPs for colon cancer therapy. Further research should be focused on the comprehensive study of molecular mechanism and in vivo effects on the colon cancer.

Characterization and disintegrant potential of phosphorylated Tiger nut (*Cyperus esculentus*) starch in immediate release ibuprofen tablet formulation

Chukwuemeka P. Azubuike
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There is a growing interest in continued explorations of novel pharmaceutical excipients with unique physicochemical and functional properties. This has resulted in the search of these excipients from different sources and modifications of existing ones. Moreover, attention is being shifted to excipients from natural sources. Native starch, starch isolated from its botanical source with minimal treatment, has limited industrial applications due to certain undesirable physicochemical properties. Studies have shown that a phosphate group in starch prevents crystallization, increases hydration capacity and improves the functional properties. The study was aimed at evaluating the physicochemical properties of Tiger nut phosphate starch (TNP) and its disintegrant properties in immediate release ibuprofen tablets. Tiger nut starch (TNS) was modified by phosphorylation with disodium hydrogen orthophosphate at 130oC and its physicochemical properties were evaluated. Ibuprofen tablets were formulated with TNP and sodium starch glycolate (SSG) at concentrations of 5, 7.5, 10 and 15% as disintegrants. Phosphorylation of TNS led to improved flow properties and swelling and hydration capacities among other changes in the physicochemical properties. TNP had comparable properties with SSG. FTIR study confirmed modification and also showed that TNP is compatible with ibuprofen powder.

Pixeria, a mirikuru towards human health

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The date palm (Phoenix dactylifera L) is one of the oldest fruit plants that identical with people's lives in the Middle East including The Kingdom of Saudi Arabia since ancient times. The date palm is known and consumed by most of people in the form of fruit flesh; while its seed is discarded tough it is rich in nutrient Therefore, need to be exploring the potential of date seed through product innovation of medicinal use with a high nutritional value of Dates. Nanoceria has a broad range of applications in different domains, especially biological sciences. As a matter of research, it has a major impact on the human health and environment .The aim of this study is to address the nanoceria preparation by green synthesis method and characterization and the applications of pixeria for antioxidant, anticancer, antibacterial activity of pixeria.

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Abstract

EuroSciCon

Green synthesis of amino acid functionalized gold nanoparticles as fluorescence sensor for the detection of ranitidine hydrochloride and cellular imaging

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Nanoparticles have exposed applicability in an extensive range of medical applications including diagnostics and therapeutics and are real research tools for studying biological conjugation on the cellular and molecular level. . In the present study we synthesized amino acid (Tyrosine, tryptophan and cysteine) based fluorescent gold nanoparticles by using these amino acids as reducing and stabilizing agents. The kinetics of the AuNPs synthesis in a quantitative manner elucidated and also explored its fluorescent properties. . The amino acid based nontoxic gold nanoparticles were synthesized in aqueous alkaline media by the reduction of aryl diazonium gold salt and characterized by UV-spectrophotometer, FT-IR, FL-spectrofluorimeter, XRD, DLS, Agarose gel electrophoresis and HRTEM. Additionally describing the use of amino acid functionalized GNPs as FL probes with a spectrofluorometric detection system for ranitidine hydrochloride (RNH) quantification based on FL quenching of amino acid capped nanoparticles induced by RNH in aqueous solution. Present study clearly demonstrates the unique capabilities of label free cysteine capped AuNPs fluorescence based cell imaging.

Functionalized magnetic nanoparticles as candidates for Alzheimer's disease

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Central nervous system (CNS) disorders remain one of the most dominant challenges faced by modern medicine with Alzheimer's disease (AD) being the most prevalent and incurable cause of dementia owning to very few available drugs and ineffective drug delivery strategies. The idea of having a "doctor" inside a body is a good metaphor for nanomedicine while the ability to carry out diagnosis and therapy simultaneously (termed as theranostics) is gaining popularity thanks to unique features of advanced nanosystems. Magnetic nanoparticles (MNPs) are protagonists in various bioapplications, one of them being effective T2 imaging agents in magnetic resonance imaging (MRI) with many in clinical trials as well as commercial products (e.g. Ferridex). MNPs functionalized with AD drugs in the form of nanocarriers can emerge as the next generation AD theranostics via 'smart' surface chemistry architecture to overcome issues of inadequate Blood Brain Barrier (BBB) crossing and poor pharmacokinetics of AD drugs. Structural and physicochemical characterization was carried out for primary MNPs. Drug loading efficiency, release mechanism, hydrodynamic size, surface charge and MRI imaging ability were estimated for the fabricated nanocarriers. The ultimate goal is to present an inorganic organic hybrid multimodal Nano-formulation as a new AD theranostic.

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