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NANO DRUG DELIVERY SYSTEM - A MINI REVIEW

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Editorial Article

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INTRODUCTION

Delivering therapeutic compound to the target site is a noteworthy issue in treatment of numerous diseases. A conventional application of drugs is characterized by limited effectiveness, poor bio distribution, and lack of selectivity [1 - 5]. These confinements and draw backs can be overcome by controlling drug delivery In controlled drug delivery systems [DDS] the drug is transported to the place of action, thus, its influence on vital tissues and undesirable side effects can be minimized.[6 - 10]

Also, DDS shields the medication from quick degradation or clearance and improves drug concentration in target tissues, along these lines, lower dosages of medication are obliged.[11 - 15] This advanced type of therapy is particularly critical when there is a discrepancy between a dose or centralization of a medication and its therapeutic results.[15 - 20]

Cell - specific targeting can be accomplished by appending drugs to individually designed carriers. Late improvements in nanotechnology have demonstrated that nanoparticles [structures smaller than 100 nm in at least one dimension] have an incredible potential as drug carriers.[20 - 23] Because of their small sizes, the nanostructures show unique physicochemical and biological properties [e.g., an enhanced reactive area as well as an ability to cross cell and tissue barriers] that make them a favorable material for biomedical application.[20 - 25]

NANO CARRIERS & THEIR APPLICATIONS

Different Nano forms have been endeavored as drug delivery systems, changing from natural substances, for example, albumin, gelatin and phospholipids for liposomes, to synthetic substances, for example, different polymers and strong metal - containing Nanoparticles [24 - 28]. Polymer–drug conjugates, which have high size variety, are typically not considered as Nanoparticles. Be that as it may, since their size can at present be controlled inside of 100 nm, they are additionally included in these nanodelivery systems.[25 - 30] These Nano delivery systems can be intended to have medications absorbed or conjugated onto the molecule surface, typified inside the polymer/lipid or dissolved inside of the particle lattice. As an outcome, medications can be shielded from a discriminating situation.[29 - 33]

What's more, Nano carriers can be amassed specially at tumor, inflammatory and irresistible destinations by prudence of the enhanced permeability and retention [EPR] impact. The EPR impact includes site - particular qualities, not connected with ordinary tissues or organs, consequently bringing about expanded specific focusing on. In light of those properties, nanodrug delivery systems offer numerous points of advantages including. [34 - 39] Enhancing the stability of hydrophobic medications, rendering them suitable for organization; Enhancing bio distribution and pharmacokinetics, bringing about enhanced efficacy These are accumulate at target site so Diminishing adverse effects of drug. Diminishing harmfulness by utilizing biocompatible nanomaterial.[40 - 45]

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TYPES OF TARGEING

Passive targeting

Passive targeting on exploits the unique pathophysiological characteristics of tumor vessels, empowering nanodrugs to accumulate in tumor tissues. Regularly, tumor vessels are exceptionally disarranged and expanded with a high number of pores, bringing about broadened crevice gap junctions between endothelial cells and compromised lymphatic drainage.[46 - 49] The "leaky" vascularization, which alludes to the EPR impact, permits migration of macromolecules up to 400 nm in distance across into the encompassing tumor region.[50 - 55] Additionally, the EPR impact, the microenvironment encompassing tumor tissue, is not the same as that of healthy cells, a physiological phenomenon that likewise bolsters passive targeting on. Taking into account the high metabolic rate of quickly developing tumor cells, they require more oxygen and supplements. Hence, glycolysis is stimulated to get additional energy, bringing about an acidic environment [56 - 60].Taking point of interest of this, pH - delicate liposomes have been intended to be stable at physiological pH 7.4, however corrupted to release drug molecules at the acidic ph. [61 - 66]

Universally focusing on cells inside of a tumor is not generally plausible because a few medications can't diffuse efficiently, and the irregular way of the methodology makes it hard to control the procedure.[56 - 59] The passive targeting is restricted in light of the fact that certain tumors don't show an EPR impact, and the penetrability of vessels may not be the same all through a single tumor.[67 - 72]

Active Targeting

One approach to overcome the restrictions of passive targeting on is to append affinity ligands [antibodies,[73 - 75] peptides, aptamers or little molecules[76 - 80] that just tie to particular receptors on the cell surface] to the surface of the Nano carriers by a variety of conjugation chemistries.[81 - 86] Nano carriers will perceive and bind to target cells through ligand–receptor interactions by the epitopes on the cell surface.[87 - 90] So as to accomplish high specificity, those receptors ought to be exceedingly expressed on tumor cells, however not on normal cell. [26, 91 - 96]

FACTORS EFFECT ON DRUG DELIVERY

For effective drug delivery Nano carriers must have effective circulation time to prevent the elimination of drugs before reaching their target cell.[97 - 100]

particle size

Assumes a key part in particle capacities, for example, targeting, uptake mechanisms, clearance, degradation. Depend on particle size the diffusion, adhesion properties will alter resulting in different uptake efficiencies.[101 - 104] The extent of nanoparticles utilized in a drug delivery system should be large enough to prevent their rapid leakage into blood capillaries but small enough to escape capture by fixed macrophages that are lodged in the reticuloendothelial system [liver and spleen]. The size of the sinusoid in the spleen and fenestra of the Kuffer cells in the liver fluctuate from 150 to 200 nm [105 - 109] and the size of gap junction between endothelial cells of the leaky tumor vasculature may fluctuate from 100 to 600 nm [110 - 113]. Consequently, the size of nanoparticles should be up to 100 nm to reach tumor tissues by passing through these two particular vascular structures.[44 - 48, 114 - 119]

Surface Characteristics

Along with their size, the surface characteristics of nanoparticles are also an important factor. these are determine circulation time of nanoparticles. Nanoparticles should ideally have a hydrophilic surface to escape macrophage capture [46,120]. This can be accomplished by coating the surface of nanoparticles with a hydrophilic polymer, such as PEG, protects them from opsonization by repelling plasma proteins.[89,92,121 - 125]

NANO CARRIERS

Nano Crystals

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A standout amongst the most clear and vital nanotechnology tools for product advancement is the chance to change over existing medications with poor water solubility and dissolution rate into promptly water - dissolvable dispersions by changing over them into Nano sized drugs.as such, the medication itself may be defined at a nano scale such that it can work as its own 'carrier'. [126 - 129]Many methodologies have been considered, yet the most reasonable technique includes diminishing the medication molecule size to nanometer range and balancing out the medication NP surface with a layer of nonionic surfactants or polymeric macromolecules. By diminishing the particle size of the active pharmaceutical ingredient, the drug's surface range is expanded significantly, subsequently enhancing its solvency and disintegration and therefore expanding both the greatest plasma concentration and area under the curve.[12,130 - 132] When the medication is nano sized, it can be formulated into various dosage forms, for example, oral, nasal and injectable. These nano crystal medications may have advantages over association colloids [micelle arrangements] because the level of surfactant per measure of medication can be incredibly minimized, utilizing just the sum that is important to stabilize the solid–fluid interface.[133 - 138]

Besides, late studies have demonstrated that external agents, for example, surfactants, for nanocrystal drug delivery can be eliminated. For instance, a strategy was as of recently created for the conveyance of a hydrophobic photosensitizing anticancer medication in its pure form utilizing nanocrystals.[17,139 - 142] Synthesized by the reprecipitation technique, the subsequent medication nanocrystals were stable in aqueous dispersion, without the need of any extra stabilizer.[143] An *in vivo* study of the nanocrystal drug also showed significant efficacy compared with the conventional surfactant - based delivery system.[61 - 64, 144 - 149]

Inorganic Nanoparticles

Inorganic nanoparticles can be characterized as particles of metal oxide or metallic composition having no less than one length scale in the nanometer range.[65 - 69] These nanostructures show altogether novel and particular chemical, physical, and natural properties, and usefulness because of their nanoscale size, have evoked much interest.[70, 150 - 156]

Au Nanoparticles

Au Nanoparticles Noble metal Nanoparticles, for example, Au Nanoparticles, have developed as a promising platform for medication and quality conveyance in that they give a valuable supplement to more traditional delivery vehicles.[71 - 75,157 - 160] The blend of inertness and low toxicity, simple union, substantial surface area, entrenched surface functionalization [by and large through thiol linkages] and tunable solidness furnish Au Nanoparticles with remarkable credits to empower new delivery methodologies. Besides, excess loading of pharmaceuticals on Nanoparticles permits 'medication stores' to gather for controlled and maintained discharge, in this way keeping up the medication level inside of the therapeutic window.[76 - 78, 161 - 166]

Superparamagnetic Nanoparticles Magnetic Nanoparticles

The superparamagnetic properties of iron [II] oxide particles can be utilized to guide microcapsules set up for conveyance by external magnetic fields. Another favorable position of utilizing magnetic Nanoparticles is the capacity to warmth the particles after internalization, which is known as the hyperthermia impact.[89 - 92, 167 - 169] Other than being used for focusing on and raising temperature, magnetic Nanoparticles can likewise influence the porousness of microcapsules by applying external oscillating magnetic fields and discharging exemplified materials.[83 - 86] for instance, ferromagnetic Au - covered cobalt Nanoparticles [3 nm in breadth] were fused into the polymer walls of microcapsules. Accordingly, use of external alternating magnetic fields of 100–300 Hz and 1200 Oe quality irritated the capsule wallstructures and drastically expanded their porousness to macromolecule.[87 - 90 170 - 173]

Clay Nanoparticles Ceramic Nanoparticles

Clay Nanoparticles Ceramic Nanoparticles are particles manufactured from inorganic mixes with permeable attributes, for example, silica, alumina and titania.[91] Among these, silica Nanoparticles have pulled in much research consideration as a consequence of their biocompatibility and simplicity of blend, and surface modification.[92 - 95, 174 - 179] Furthermore, the entrenched silane science encourages the cross - connecting of medications to silica particles.[180]

Carbon - based Nanomaterials

Carbon - based nanomaterials have pulled specifically intrigue in light of the fact that they can be surface functionalized for the joining of nucleic acids, peptides and proteins. Carbon nanotubes [CNTs], fullerene, and nanodiamonds[96 - 99, 181 - 186] have been widely concentrated on for medication conveyance applications.[100] The size, geometry and surface qualities of single - divider nanotubes [SWNTs], multiwall nanotubes and C60 fullerenes make them engaging for medication bearer utilization.[187 - 190]
However, the essential downside of carbon - based nanomaterials seems, by all accounts, to be their harmfulness. Investigations have demonstrated that CNTs can prompt cell expansion hindrance and apoptosis. [85,191 - 193] In spite of the fact that they are less harmful than carbon strands and Nanoparticles, the poisonous quality of CNTs increments altogether when carbonyl, carboxyl and/or hydroxyl utilitarian gatherings are available on their surface However, the essential disadvantage of carbon - based nanomaterial seems, by all accounts, to be their danger. Analyses have demonstrated that CNTs can prompt cell expansion restraint and apoptosis. Despite the fact that they are less dangerous than carbon strands and Nanoparticles, the lethality of CNTs increments essentially when carbonyl, carboxyl and/or hydroxyl utilitarian gatherings are available on their surface.[106 - 108, 194 - 199]

Liposomes .

Liposomes are the most clinically established Nano systems for drug delivery. Their efficacy has been demonstrated in reducing systemic effects and toxicity, as well as in attenuating drug clearance. [109 - 111, 200 - 204] Modified liposomes at the nanoscale have been shown to have excellent pharmacokinetic profiles for the delivery of DNA, antisense oligonucleotide, siRNA, proteins and chemotherapeutic agents. Doxorubicin is an anticancer medication that is generally utilized for the treatment of different sorts of tumors. It is an exceptionally dangerous compound influencing tumor tissue, as well as heart and kidney, a truth that restrains its restorative applications.[112 - 116, 205 - 209] On the other hand, the advancement of doxorubicin encased in liposomes finished in an affirmed nanomedical medication conveyance system. This novel liposomal definition has brought about decreased conveyance of doxorubicin to the heart and renal framework, while hoisting the amassing in tumor tissue[23,24] by the EPR impact. Moreover, various liposomal medications are presently being explored, including anticancer specialists, for example, camptothecin [25] and paclitaxel [PTX],[26] and also anti - toxins, for example, vancomycin[27] and amikacin.[210 - 214]
Liposomes are also subject to some limitations, including low encapsulation efficiency, fast burst release of drugs, poor storage stability and lack of tunable triggers for drug release. [117 - 120] Furthermore, since liposomes cannot usually permeate cells, drugs are released into the extracellular fluid.[215 - 218]

Polymeric Nanoparticles

Polymeric Nanoparticles are colloidal particles with a size scope of 10–1000 nm, and they can be round, extended or core–shell structures. They have been manufactured utilizing biodegradable engineered polymers, for example, polylactide–polyglycolide copolymers, polyacrylates and polycaprolactones, or common polymers, for example, egg whites, gelatin, alginate, collagen and chitosan.[42] Various routines, for example, dissolvable dissipation, unconstrained emulsification, dissolvable dissemination, salting out/emulsification - dispersion, utilization of supercritical CO_2 and polymerization, have been utilized to set up the Nanoparticles.[121 - 125, 219 - 222]
Polymeric Nano carriers can be classified in light of three medication consolidation components. The primary incorporates polymeric transporters that utilization covalent science for direct medication conjugation [e.g., straight polymers]. The second gathering incorporates hydrophobic collaborations in the middle of medications and Nano carriers [e.g., polymeric micelles from amphiphilic piece copolymers].[126] Polymeric Nano carriers in the third gathering incorporate hydrogels, which offer a water - filled warehouse for hydrophilic medication exemplification.[127 - 130,223 - 224]

Polymer–Drug Conjugates [Prodrugs]

Many polymer–drug conjugates have been produced subsequent to the first mix reported in the 1970s.[44,45] Conjugation of macromolecular polymers to medications can altogether upgrade the blood course time of the medications. Particularly, protein or peptide drugs, which can be promptly processed inside the human body, can keep up their action by conjugation of the water - dissolvable polymer PEG [PEGylation].[131 - 134] For instance, it was accounted for that PEGylated L - asparaginase expanded its plasma half - life by up to 357 h.[225] Without PEG, the half - existence of normal L - asparaginase is just 20 h. Notwithstanding PEGylation of proteins, little sub - atomic anticancer medications can likewise be PEGylated to enhance their pharmacokinetics for cancer therapy. For example, PEG - camptothecin [PROTHECAN®] has entered clinical trials for cancer therapy.[135 - 138]

Polymeric Micelles

Polymeric micelles are formed when amphiphilic surfactants or polymeric molecules spontaneously associate in aqueous medium to form core–shell structures. The inner core of a micelle, which is hydrophobic, is surrounded by a shell of hydrophilic polymers, such as PEG.[139] Their hydrophobic core serves as a reservoir for poorly water - soluble and amphiphilic drugs; at the same time, their hydrophilic shell stabilizes the core, prolongs circulation time in blood and increases accumulation in tumor tissues.[140 - 142]

Hydrogel Nanoparticles

Hydrogel Nanoparticles as of late, hydrogel Nanoparticles have increased impressive consideration as a standout amongst the most encouraging nano particulate drug conveyance frameworks inferable from their remarkable properties. Hydrogels are cross - connected systems of hydrophilic polymers that can retain and hold more than 20% of their weight in water, while in the meantime, keeping up the particular 3D structure of the polymer system. Swelling properties, system structure, porousness or mechanical steadiness of hydrogels can be controlled by outside boosts or physiological parameters.[74–78] Hydrogels have been broadly contemplated for controlled arrival of therapeutics, jolts responsive discharge and applications in organic implants.[75,79–81] However, the hydration reaction to changes in boosts in most hydrogel frameworks is too moderate for helpful applications. To conquer this constraint, further improvement of hydrogel structures at the small scale and nano - scale is require. Late reports demonstrated some advancement in miniaturized scale and nanogels of poly - N - isopropylacrylamide with ultrafast reactions and appealing rheological properties.[83,84] Ding et al. exhibited that cisplatin - stacked polyacrylic corrosive hydrogel Nanoparticles could be embedded and put on tumor tissue.[226] This hydrogel framework displayed unrivaled adequacy in hindering tumor development and delaying lifespan in mice. [143 - 144] The in vivo biodistribution test likewise exhibited that the hydrogel insert brings about high focus and maintenance of the medication. A multifunctional crossover hydrogel was produced by consolidating the attractive properties of Nanoparticles and the run of the mill qualities of the hydrogel. These crossover hydrogels could be utilized to load an expansive number of medications and transport them to the objective site by the utilization of an outer attractive field.[227 - 229]

Dendrimers

Dendrimers are engineered, fanned macromolecules that shape a tree - like structure. Dissimilar to most straight polymers, the compound organization and sub - atomic weight of dendrimers can be absolutely controlled; consequently, it is moderately simple to anticipate their biocompatibility and pharmacokinetics.[95] Dendrimers are exceptionally uniform with to a great degree low polydispersities, and they are normally made with measurements incrementally developed in rough nanometer ventures from 1 to more than 10 nm.[145] Their globular structures and the vicinity of inward holes empower medications to be epitomized inside of the macromolecule inside and are utilized to give controlled discharge from the internal core.[96] Although the little size [up to 10 nm] of dendrimers points of confinement broad medication consolidation, their dendritic nature and fanning permits medication stacking onto the outside surface of the structure[97] through covalent tying or electrostatic communications.[146,230]

CONCLUSION

Nano carriers as drug delivery systems are intended to enhance the pharmacological and therapeutic properties of conventional drugs. The incorporation of drug molecules into nanocarrier can secure a medication from degradation and in addition offers possibilities of targeting and controlled release. Because of small dimensions, Nano carriers are able to cross the blood - brain - barrier[BBB] and operate on cellular level. In correlation with the conventional type of medications, nanocarrier - drug conjugates are more effective and selective. They can reduce the toxicity and other adverse side effects in normal tissues by accumulating drugs in target sites. In consequence, the required doses of drugs are lower. A conceptual understanding of biological responses to nanomaterials is needed to develop and apply safe nanomaterials in drug delivery later on. Moreover a close collaboration between those working in drug delivery and particle toxicology is necessary for the exchange of ideas, systems and ability to go places with this issue.

REFERENCES

1. Omprakash V, Sharada S Green Synthesis and Characterization of Silver Nanoparticles and Evaluation of their Antibacterial Activity using Elettaria Cardamom Seeds. J Nanomed Nanotechnol 2015; 6:266.

2. Hungund BS, Dhulappanavar GR, Ayachit NH Comparative Evaluation of Antibacterial Activity of Silver Nanoparticles Biosynthesized Using Fruit Juices. J Nanomed Nanotechnol 2015; 6:271.
3. Ramdani L, Bourboulou R, Belkouch M, Jebors S, Tauran Y, et. al. Multifunctional Curcumin - Nanocarriers Based on Host - Guest Interactions for Alzheimer Disease Diagnostic. J Nanomed Nanotechnol 2015; 6:270.
4. Nia Y, Millour S, Noeumll L, Krystek P, de Jong et. al. Determination of Ti from TiO2 Nanoparticles in Biological Materials by Different ICP - MS Instruments: Method Validation and Applications. J Nanomed Nanotechnol 2015; 6:269.
5. Aparna Mani KM, Seethalakshmi S, Gopal V Evaluation of In - vitro Anti - Inflammatory Activity of Silver Nanoparticles Synthesised using Piper Nigrum Extract. J Nanomed Nanotechnol 2015; 6:268.
6. Thuy Le DT, Minh Dang LT, My Hoang NT, Thi La H, Minh Nguyen HT et. al. Anti - Tumor Activity of Docetaxel PLGA - PEG Nanoparticles with a Novel Anti - HER2 scFv. J Nanomed Nanotechnol 2015; 6:267.
7. Matilda A, Oskari E, Topias S, Matilda O A Review on Ophthalmology using Nanotechnology. J Nanomed Nanotechnol 2015; 6:272.
8. Bhambere D, Shirivastava B, Sharma P, Gide P Effect of Polymer and Formulation Variables on Properties of Self - Assembled Polymeric Micellar Nanoparticles. J Nanomedine Biotherapeutic Discov. 2014.
9. Lee J, Ivkov R, Blumenthal R Magnetically Triggered Drug Release from Liposome Embedded Gel. J Nanomedine Biotherapeutic Discov 2014.
10. ElDeeb NM, ElSherbiny IM, ElAassara MR, Hafez EE Novel Trend in Colon Cancer Therapy Using Silver Nanoparticles Synthesized by Honey Bee. J Nanomed Nanotechnol 2015, 6:265.
11. Wu C, Lin CH, Chen YC Using Glucose - bound Fe3O4 Magnetic Nanoparticles as Photothermal Agents for Targeted Hyperthermia of Cancer Cells. J Nanomed Nanotechnol 2015; 5:264.
12. Thanighaiarassu RR, Sivamai P, Devika R, Nambikkairaj B Green Synthesis of Gold Nanoparticles Characterization by using Plant Essential Oil Menthapiperita and their Antifungal Activity against Human Pathogenic Fungi. J Nanomed Nanotechnol 2014; 5:229.
13. Yu L Estimate the Population Density of Gold Nanoparticles in Suspensions from Experimental Data. Biochem Physiol 2012; 1:e111.
14. Abdel Halim MAK The Influence of Size and Exposure Duration of Gold Nanoparticles on Gold Nanoparticles Levels in Several Rat Organs In vivo. J Cell Sci Ther 2012; 3:129.
15. Abdelhalim MAK Lung Tissue Alterations were Size - dependent with Smaller Ones Induced More Effects and Related with Time Exposure of Gold Nanoparticles. J Cancer Sci Ther 2012; 4: 170 - 173.
16. Ruozi B, Belletti D, Vandelli MA, Pederzoli F, Veratti P, et al. AFM/ TEM Complementary Structural Analysis of Surface - Functionalized Nanoparticles. J Phys Chem Biophys 2014; 4:150.
17. Brinson C, Bogner JR, Nelson M, Podzamczer D, Quinson AM, et. al. Verxve 144 - Week Results: Nevirapine Extended Release (NVP XR) Qd Versus NVP Immediate Release (IR) Bid with FTC/TDF in Treatment - Naive HIV - 1 Patients. J AIDS Clin Res 2013; 4: 233.
18. Vivero - Escoto JL Nanovehicles for Intracellular Protein Delivery. J Biotechnol Biomater 2013; 3:e117.
19. Qiu L Rational Design of Synthetic Polymers as Drug Carriers for Cancer Therapy. J Mol Pharm Org Process Res 2013; 1:e101.
20. Vashist SK Dendrimers: Prospects for Bioanalytical Sciences. J Nanomed Nanotechnol 2013; 4:e131.

21. Anusha PN, Siddiqui A Nanomedical Platform for Drug Delivery. J Nanomedic Nanotechnol 2011; 2:122.
22. Fathalla D, Ghareb M, Soliman, Fouad EA Development and in vitro/in vivo Evaluation of Liposomal Gels for the Sustained Ocular Delivery of Latanoprost. J Clin Exp Ophthalmol 2015; 6: 390.
23. Nerome K, Kuroda K, Sugita S, Kawasaki K, Iinuma H et. al. The Usefulness of an Influenza Virus - Like Particle (VLP) Vaccine Produced in Silkworm Pupae and Virosomes and Liposomes Prepared by Chemical Means: From Virosome to VLP and the Future of Vaccines. J Gastrointest Dig Syst 2015; 5: 256.
24. Gortzi O, Athanasiadis V, Lalas S, Chinou I, Tsaknis J (2014) Study of Antioxidant and Antimicrobial Activity of Chios Mastic Gum Fractions(Neutral, Acidic) Before and After Encapsulation in Liposomes. J Food Process Technol 5: 355.
25. Mijan Mc, Longo JPF, Melo LND, Simioni AR, Tedesco AC, Azevedo RB et. al. Vascular Shutdown and Pro - inflammatory Cytokine Expression in Breast Cancer Tumors after Photodynamic Therapy Mediated by Nano - sized Liposomes Containing Aluminium - Chloride - Phthalocyanine. J Nanomed Nanotechnol 2014; 5:218.
26. Venturini M, Mazzitelli S, Mieti I, Benini C, Fabbri J et. al. Analysis of Operating Conditions Influencing the Morphology and In vitro Behaviour of Chitosan Coated Liposomes. J Nanomed Nanotechnol 2014; 5:211.
27. Tangutoori S, Ohta A, Gatley S, Campbell RB Repurposing an Erstwhile Cancer Drug: A Quantitative and Therapeutic Evaluation of Alternative Nanosystems for the Delivery of Colchicine to Solid Tumors. J Cancer Sci Ther 2014; 6: 236 - 246.
28. Watarai S, Sasaki Y Evaluation of Stearylamine - Modified Liposomes for the Oral Vaccine Adjuvant. J Infect Dis Ther 2014; 2:141.
29. Gowda R, Jones NR, Banerjee S, Robertson GP Use of Nanotechnology to Develop Multi - Drug Inhibitors for Cancer Therapy. J Nanomed Nanotechnol 2013; 4:184.
30. Komizu Y, Yukihara M, Matsumoto Y, Ueoka R Cell Cycle Arrest by Hybrid Liposomes for Human Lung Carcinoma Cells. J Carcinog Mutagen 2014; 5: 157.
31. Costa PM, Pedroso MC Viral and Non - Viral Gene Therapy for Glioblastoma: New Insights into the Treatment of Malignant Brain Tumors. J Genet Syndr Gene Ther 2013; 4: 161.
32. Sancini G, Gregori M, Salvati E, Cambianica I, Re F et. al. Functionalization with TAT - Peptide Enhances Blood - Brain Barrier Crossing In vitro of Nanoliposomes Carrying a Curcumin - Derivative to Bind Amyloid - B Peptide. J Nanomed Nanotechnol 2013; 4:171.
33. Renuka Devi SK Immunotherapy Monitoring Through Liposomes - An Altered Form of Bio - Sensing. J Allergy Ther 2012; 3:122.
34. Templeton NC, Senzer N Optimization of Non - Viral Gene Therapeutics Using Bilamellar Invaginated Vesicles. J Genet Syndr Gene Ther 2011; S5 - 002.
35. Vaghasia N, Federman N Liposomes for Targeting Cancer: One Step Closer to the Holy Grail of Cancer Therapeutics?. J Nanomedine Biotherapeutic Discov 2011; 1:105e.
36. Krishnaiah SR Pharmaceutical Technologies for Enhancing Oral Bioavailability of Poorly Soluble Drugs. JBB 2010; 2: 028 - 036.
37. Afergan E, Najajreh Y, Gutman D, Epstein H, Elmalak O, Golomb G et. al. 31P - NMR and Differential Scanning Calorimetry Studies for Determining Vesicle's Drug Physical State and Fraction in Alendronate Liposomes. JBABM 2010; 2: 125 - 131.
38. Khan RD The Use of Nanocarriers for Drug Delivery in Cancer Therapy. JCST 2010; 2: 058 - 062.

39. Dhar P, Kumar SPV, Tiwari P, Kumar A, Katiyar V Thermal Degradation Kinetics of Poly (3 - hydroxybutyrate)/Cellulose Nanocrystals based Nanobiocomposite. J Thermodyn Catal 2014; 5:134.
40. Nadana Shanmugam, Balan Saravanan, Rajaram Reagan, Natesan Kannadasan, Kannadasan Sathishkumar and Shanmugam Cholan, et. al. Effect of Thermal Annealing on the Cd(OH)2 and Preparation of Cdo Nanocrystals. Mod Chem Appl 2014; 2: 124.
41. Tagaya M, Ikoma T, Takemura T, Migita S, Okuda M et. al. Initial Adhesion Behavior of Fibroblasts onto Hydroxyapatite Nanocrystals. Bioceram Dev Appl 2011.
42. Tagaya M, Yamazaki T, Migita S, Hanagata N, Ikoma T et. al. Hepatocyte Adhesion Behavior on Modified Hydroxyapatite Nanocrystals with Quartz Crystal Microbalance. Bioceram Dev Appl 2011.
43. Esfandyari M, Kooliv M, Salooki, Sheikhi ZM, Ahmadpour A ANFIS Modeling for Synthesis and Characterization of Cu Doped Cobalt Oxide Nanocrystals for Methane Gas Sensor. J Chem Eng Process Technol 2012; 3:124.
44. Basavaraj K, Nanjwade, Ganesh K. Derkar,. Bechra HM, Nanjwade KV, Manvi FV Design and Characterization of Nanocrystals of Lovastatin for Solubility and Dissolution Enhancement. J Nanomed Nanotechnol 2011; 2:107.
45. Friedrich C, Ramati E, Dagan A, Goranda L, Segal G, et. al. Fever of Unknown Origin and a Splenic Mass: When Infection and Incidental Findings Coalesce. J Clin Case Rep 2014; 4: 463.
46. Latifynia A, Gharagozlou MJ, Mohebali M, Hajjaran H and Khansari N Th1, Th2 Serum Cytokines and Spleen White Pulp Changes Against Preliminary L. Major Vaccine Injection and Challenge With Live L. Major Promastigotes in Balb/C Mice. J Clin Cell Immunol 2015; 6: 281.
47. Mera T, Heimfeld S, Faustman DL The Spleen Contributes Stem Cells to Peripheral Blood Stem Cell Transplants. J Stem Cell Res Ther 2014; 4: 253.
48. Pemberton H, Sultan M, Chalhoub W, Morales S, Al - Bugeay M, et al. Lymphangioma Presents as Peripancreatic Cystic Neoplasm: The Utility of Endoscopic Ultrasound. J Clin Trials 2015; 5:215.
49. Gharagozlou MAL, Khamesipour A, Mohammadi MA and Khansary N Primary Effects of New Leishmania major Antigen on Balb/c Mice Spleen. J Vaccines Vaccin 2014; 5: 253.
50. Conroy M, Dolan J Granulomatous Disease with Hepatic and Splenic Infiltration: A Case Report. J Gastrointest Dig Syst 2014; 4:210.
51. Chlupac J, Filova E, Riedel T, Brynda E, Pamula E, et al. Endothelial Cell Lining of PET Vascular Prostheses: Modification with Degradable Polyester - based Copolymers and Adhesive Protein Multi - layers. J Tissue Sci Eng 2014; 5:139.
52. Mohamed AM, El - Ella GAA, Nasr EA, Soliman YA Evaluation of Fibronectin - Binding Protein Ag85 - B as Target for Serodiagnosis of Swine Mycobacteriosis in Living Animals. J Mycobac Dis 2012; 3: 124.
53. Henare K, Ching LM The Potential of STING Agonists for Re - Polarizing Macrophages as an Approach to Cancer Therapy. J Clin Cell Immunol 2015; 6:325.
54. Thomsen LH, Rosendahl A Polarization of Macrophages in Metabolic Diseases. J Clin Cell Immunol 2015; 6:313.
55. Dutry I, Li J, Li PH, Bruzzone R, Peiris JSM, et al. The Effects of Macrophage Polarity on Influenza Virus Replication and Innate Immune Responses. J Clin Cell Immunol 2015; 6:297

56. Ahmed I, Ahmad U, Keong YY, Manna NA, Othman F Induction of Nitric Oxide and TNF - Î‘ in Newcastle Disease Virus (NDV) AF2240 Infected RAW 264.7 Macrophages and their Cytotoxic Activity on MDA - MB - 231 Breast Cancer Cell Line. J Cancer Sci Ther 2014; 6:478 - 482.
57. Korbelik M, Banáth J, Zhang W, Wong F, Bielawski J, et al. Ceramide and Sphingosine - 1 - Phosphate/Sphingosine act as Photodynamic Therapy - Elicited Damage - Associated Molecular Patterns: Release from Cells and Impact on Tumor - Associated Macrophages. J Anal Bioanal Tech 2014; S1:009.
58. Isidro RA, Bonilla FJ, Pagan H, Cruz ML, Lopez P, et al.The Probiotic Mixture VSL#3 Alters the Morphology and Secretion Profile of Both Polarized and Unpolarized Human Macrophages in a Polarization - Dependent Manner. J Clin Cell Immunol 2014; 5:227.
59. Dutry I, Li J, Li PH, Bruzzone R, Peiris JSM, et al. The Effects of Macrophage Polarity on Influenza Virus Replication and Innate Immune Responses. J Clin Cell Immunol 2015; 6: 297
60. Mizejewski GJ Alpha - Fetoprotein (AFP) and Inflammation: Is AFP an Acute and/or Chronic Phase Reactant?. J Hematol Thrombo Dis 2015; 3:191.
61. Nosáľ R, Drábiková K, Jančinová V, Perečko T Molecular Pharmacology of Antihistamines in Inhibition of Oxidative Burst of Professional Phagocytes. Biochem Physiol 2014; 3:129.
62. FranÃ§a EL, Pernet Hara CC, Gomes Fagundes DL, Peixoto Lima NA, Bilotti Ratto SH, et al. Fluctuation in the Functional Activity of Human Colostrum Phagocytes to Streptococcus pneumoniae and Enteropathogenic Escherichia coli.J Medical Microbiol Diagnosis 2012; 1:104.
63. BackesJM, Ruisinger JF, HarrisKA, Gibson CA, Harris WS and Moriarty PM et. al. Evaluating the Effects of Prescription Fish Oil, Supplemental Fish Oil and a Krill Oil Blend on Serum Lipids/Lipoproteins and the Omega - 3 Index: A Pilot Study. J Glycomics Lipidomics 2014; 4: 121.
64. Vine DF, Wang Y, Shi D, Proctor SD Insulin and Testosterone are Associated with Elevated Intestinal Secretion of Lipids and Lipoproteins in a Rodent Model of the Metabolic and Polycystic Ovary Syndrome. J Diabetes Metab 2014; 5:391.
65. Voloshyna I, Godoy IG, Littlefield MJ, Leon JD, Magana MC, Reiss AB et. al. Advanced Glycation End Products Promote Pro - Atherogenic Changes in Cholesterol Transport: A Possible Mechanism for Cardiovascular Risk in Diabetes. Intern Med 2014; S11: 005.
66. Yu JY, Lyons TJ Modified Lipoproteins in Diabetic Retinopathy: A Local Action in the Retina. J Clin Exp Ophthalmol 2013; 4: 314.
67. MO Ebesunun, HU Eruvulobi, T Olagunju, OA Owoeye Elevated plasma homocysteine in association with decreased vitamin B12, folate, serotonin, lipids and lipoproteins in depressed patients. Afr J Psychiatry 2012; 15: 25 - 29.
68. Zhao YF, Guo ZM, Lin XH, Zhou LC, Okoro EU et. al. Apolipoprotein E - Deficient Lipoproteins Induce Foam Cell Formation by Activation of PERK - EIF - 2α Signaling Cascade. JBABM 2010; 2: 113 - 12.
69. Mortara L, Zanellato S, Bassani B, Imperatori A, Rotolo N et. al. Polarization of Tumor Infiltrating Leukocytes from Innate Immunity and their role in the Pro - angiogenic Phenotype in NSCLC. J Clin Cell Immunol 2015; 6: 312.
70. Kumar S, Ahmad MK, Waseem M, Pandey AK Drug Targets for Cancer Treatment: An Overview. Med chem 2015; 5: 115.

71. Benedetto PD, Liakouli V, Carubbi F, Ruscitti P, Berardicurti O et. al. Decreased Expression of Angiopoetin 1 on Perivascular Mesenchymal Stem Cells from Ssc Patients Induces an Anti Angiogenetic Effect, when Co - cultured with Endothelial Cells. J Stem Cell Res Ther 2015; 5:26.
72. Ichihara H, Yamasaki S, Hino M, Ueoka R, Matsumoto Y Hybrid Liposomes inhibit the Growth and Angiogenesis in Human Breast Cancer Model. J Carcinog Mutagen 2015; 6: 207.
73. Gavalas NG, Trachana SP, Dimopoulos MA, Bamias A Angio - Inhibitors in Ovarian Cancer. J Cancer Sci Ther 2014; 6: 460 - 467.
74. Yang L, He W, Qu H, Jia C, Wang Y et. al. Phytochemical Isoliquiritigenin Inhibits Angiogenesis Ex Vivo and Corneal Neovascularization in Mice. Altern Integr Med 2014; 4: 176.
75. Tatiana Lopatina, Aurora Mazzeo, Stefania Bruno, Ciro Tetta, Natalia Kalinina, et. al. The Angiogenic Potential of Adipose Mesenchymal Stem Cell - derived Extracellular Vesicles is modulated by Basic Fibroblast Growth Factor. J Stem Cell Res Ther 2014; 4:245.
76. Francois M, Shayan R and Karnezis T Ordered Chaos: Harnessing Developmental Pathways in Tumor - Induced Lymphangiogenesis. J Clin Cell Immunol 2014; 5: 270.
77. Merlano MC, Russi EG and Denaro N Angiogenesis in Head and Neck Cancer. J Cancer Sci Ther 2014; 6: 455 - 459.
78. Otto W, Krol M, Maciaszczyk M, Najnigier B, Sierdzinski J, Krawczyk M et. al. Levels and Values of Circulating Hematopoietic and Endothelial Progenitor Cells in Patients with Hepatocellular Carcinoma. J Liver 2014; 3: 167.
79. Fujita Y, Kawamoto A Cell - Based Therapies for Peripheral Arterial Disease. J Stem Cell Res Ther 2014; 4:234.
80. Elit L, Hirte H Novel Targeted Therapies in Ovarian Cancer. J Cancer Sci Ther 6: 350 - 362.
81. Ahmed AH, Sims M, Jones TS, Patil R, Patil R et. al. (2014) EDL - 360: A Potential Novel Antiglioma Agent. J Cancer Sci Ther 2014; 6: 370 - 377.
82. Gresta LT, Juacutenior IAR, Cabral MM Microvessel Density Quantification in Gastric Cancer: Comparing Methods for Standard Measures. J Cancer Sci Ther 2014; 6: 401 - 405.
83. Chauhan SK, Dohlman TH, Dana R Corneal Lymphatics: Role in Ocular Inflammation as Inducer and Responder of Adaptive Immunity. J Clin Cell Immunol 2014; 5: 256
84. Jason Seewoodhary Novel Approaches to Vasculopathies: The Role of Stem Cells and Regenerative Medicine. J Cardiovasc Dis Diagn 2014; 2: 166.
85. Vranova M and Halin C Lymphatic Vessels in Inflammation. J Clin Cell Immunol 2014; 5: 250.
86. Xu G, Zhou Y, Zhang S, Ma S, Xu F, et al. Synthesis and Biological Evaluation N - (6,7 - dimethoxynaphthalen - yl) sulfamide Derivatives as Novel Inhibitors of Angiogenesis and Tumor Growth. Med Chem 2014; 4: 598
87. Nakamura T, Suzuki Y, Takahashi Y, Satomi S, Sato Y Paradoxical Augmentation of Tumor Angiogenesis Combined with Down - Regulation of IP - 10 after Adenovirus - Mediated Transfer of Vasohibin - 1 Gene in Cancer Cells. J Cancer Sci Ther 2014; 6: 289 - 297
88. Onuigbo WIB Lymphangiogenesis in Cancer: A Review. Biochem Physiol 2014; 3: 138
89. Lesiak A, Narbutt J, Kwiatkowska IS, Danilewicz M, Anna Wozniacka Impairment of Angiogenesis in Patients with Granuloma Annulare and Necrobiosis Lipoidica. J Clin Exp Dermatol Res 2014; 5: 226

90. Ray PE, Attar AA, Liu XH, Das JR, Tassi E, Anton Wellstein, et al. Expression of a Secreted Fibroblast Growth Factor Binding Protein - 1 (FGFBP1) in Angioproliferative Kaposi Sarcoma. J AIDS Clin Res 2014; 5: 309
91. Yin Y, Sanders AJ, Feng L, Jiang WG Knockdown of AAMP Impacts on HECV Cell Functions In Vitro and Affects the Expression of VE - Cadherin. Angiol 2014; 2:125
92. M Sefidgar, M Soltani, H Bazmara, M Mousavi, M Bazargan, et al. Interstitial Flow in Cancerous Tissue: Effect of Considering Remodeled Capillary Network. J Tissue Sci Eng 2012; S4 - 003
93. Shudo Y, Miyagawa S, Fukushima S, Kainuma S, Saito A, et al. Promising Therapeutic Effects of Cell Sheet Implantation with a Pedicle Omentum Flap to Enhance the Angiogenic Response to Ischemic Cardiomyopathy. J Stem Cell Res Ther 2014; 4:159
94. Kadioglu O, Seo EJ, Efferth T Targeting Angiogenesis By Phytochemicals. Med Aromat Plants 2013; 2: 134
95. Semeraro F, Forbice E, Morescalchi F, Donati S, Azzolini C, et al. Erythropoietin and Diabetic Retinopathy. J Diabetes Metab 2013; 4:283
96. Fratini P, Alcantara D, Rodrigues MN, de Oliveira e Silva FM, Franciolli ALR, et. al. Osteogenesis in Chicken (Gallus gallus domesticus) and Expression of VEGF in this Process between 5 to 19 Days of Incubation.J Cytol Histol 2013; 4: 178
97. Abdelouahab C, Abderrahmane B, Amina B, Soulef HK, Mokrani El Hassen Research of New Molecules Able to Starve the Tumors by Molecular Docking\'s Method. Biochem Pharmacol 2013; 2: 117
98. Lin Wang, Juxiang Huang and Hong Lin ALK Folic Acid Transport and Integrin Signal Induced - Angiogenesis Network in Human Hepatocellular Carcinoma (HCC) by Systems - Theoretical Analysis. Molecular Biology 2011, 1:102.
99. D J S Kelly, A C Morton, N D Arnold, J Mecinovic, C Schofield, et. al. Activation of Hypoxia - Inducible Factor by Di - Methyl Oxalyl Glycine (DMOG) Increases Neovascularization within Ischaemic Myocardium in a Porcine Coronary Artery Occlusion Model. J Clinic Experiment Cardiol 2011, 2:148.
100. Paula JS, Shinsato RN, Queiroz WS, Ribeiro JAS, Jorge R Long - term Intraocular Pressure Control in a Case of Neovascular Glaucoma Treated with Repeated Intravitreal Bevacizumab Injections. J Clin Exp Ophthalmol 2011; 2: 170.
101. Markou KB Two Cases - Report of Mild Graves?Disease Following Subacute Thyroiditis: More Evidence of the Role of Thyroglobulin in The Pathogenesis of Autoimmune Thyroid Disease?. Thyroid Disorders Ther 2015; 4:184.
102. Kashyap S and Solanki A Pulmonary Manifestations of Scrub Typhus: Wisdom May Prevail Obstacles. J Pulm Respir Med 2015; 5: 251.
103. Vaillant AAJ, Mohammed W, Vuma S, Anderson N Autoimmunity in Neurological and Psychiatric Disorders: Participation of Antibodies and Cytokines in the Immunopathogenesis of these Diseases. Immunome Res 2015; 11: 089.
104. Sahoo A, Lerman B, Alekseev A, Nurieva R E3 Ligases in T Helper 2 - mediated Pathogenesis. Immunome Res 2015; 11: 086.
105. Ziaei A, Tanhaei AP, Mazrouei S, Kharaji M, Keyhanian K, Salehi M et. al. Livin Expression by Semi - quantitative Immuno - flourecent Staining in Hodgkin Lymphoma: A Promising Marker or a Leading Role in Pathogenesis?. J Cytol Histol 2015; 6: 299.
106. Maina EK Bukusi EA, Martha S, Lartey M and Ampofo WK The Relative Balance between Th17 and Regulatory T cell subsets is Critical for Progression of HIV Infection. J AIDS Clin Res 2014; 5: 395.

107. Neelapu NRR, Nammi D, Pasupuleti ACM and Surekha C Helicobacter Pylori Induced Gastric Inflammation, Ulcer, and Cancer: A Pathogenesis Perspective. Interdiscip J Microinflammation 2014; 1: 113.

108. Kim N, Song Y W, Park K A Potential Role of Autoantibodies against Muscarinic Type 3 Receptor in Pathogenesis of Sjogren's Syndrome. J Clin Cell Immunol 2014; 5: 275.

109. Karagiannidou A, Botskariova S, Farmaki E, Imvrios G and Mavroudi A Atopic Dermatitis: Insights on Pathogenesis, Evaluation and Management. J Allergy Ther 2014; 5:195.

110. Lewis M, Merched AJ Tumor - Associated Macrophages, Inflammation and Pathogenesis of Hepatocellular Carcinoma. J Mol Genet Med 2014; 8: 132.

111. LipinskaGediga M Endothelium as A Part of Septic Multiple Organ Dysfunction Syndrome (Mods) - Is Endocan an Answer?. J Clin Cell Immunol 2015; 6: 304.

112. Jackson DG Lymphatic Regulation of Cellular Trafficking. J Clin Cell Immunol 2014; 5: 258.

113. Sriharshan A, Kraemer A, Atkinson MJ, Moertl S, Tapio S Radiation - Induced Crosstalk between MicroRNAs and Proteins of the Endothelium: In silico Analysis. J Proteomics Bioinform 2014; 7: 327 - 331.

114. Satoh H, Nishida S Cardio - Electopharmacology and Vasodilating Mechanisms of Quercetin. Med chem 2014; 4: 523.

115. Julian PJ Halcox, Muhiddin A Ozkor, Mekonnen G Arshed AQ Coronary Endothelial Dysfunction, Obesity and Metabolic Syndrome. J Diabetes Metab 2014; 5:362.

116. Wang D, Melancon JK, Verbesey J, Hu H, Liu C, et. al. Microvascular Endothelial Dysfunction and Enhanced Thromboxane and Endothelial Contractility in Patients with HIV. J AIDS Clin Res 2013; 4: 267

117. Parekha M, Graceffa V, Bertolin M, Elbadawy H, Salvalaio G, et. al. Reconstruction and Regeneration of Corneal Endothelium: A Review on Current Methods and Future Aspects. J Cell Sci Ther 2013; 4: 146

118. Kennedy JR Senescent Sickle Erythrocytes and Endothelial Adhesion via Band 3 Peptides. J Blood Disord Transfus 2013; 4: 159

119. Rabczyski M, Dumas AF, Adamiec R, Borowicz MP Connection between Heat Shock Proteins 60/65 and Diabetic Vascular Complications. J Diabetes Metab 2013; S13 - 001

120. Norbiato G Cross - Talk among Glucocorticoids, Glucocorticoid Receptors and Cytokines Pilots Inflammatory, Endocrine, Immune and Metabolic Responses in HIV Infection. J AIDS Clin Res 2013; S5: 007

121. Chukwuemeka R. Nwokocha, Daniel U. Owu, Kelece Kinlocke, JeAnn Murray, Rupika Delgoda, et. al. Possible Mechanism of Action of the Hypotensive Effect of Peperomia pellucida and Interactions between Human Cytochrome P450 Enzymes. Med Aromat Plants 2012; 1:105

122. Lucijan Mohorovic Impacts of Exogenously Derived Nitrogen Oxide and Sulfur Compounds on the Structure and Function of the Vascular Endothelium Link Pregnancy Hypertension with Later Life Hypertension. J Hypertens 2012; 1: 103

123. Hernan Cohen Arazi Soluble Thrombomodulin Levels are Related to Inflammation after Coronary Bypass Surgery. J Clinic Experiment Cardiol 2011; 2:165

124. Ersoy O, Tasargol O Skin Necrosis in an ICU - Patient due to Accidental Extravasation of Parenteral Nutrition Solution via a Peripheral Intravenous Catheter - A Case Report. J Anesth Clin Res 2015; 6:522

125. Fernandes DS, Reis D, Martins MF, Cavadas V, Machado HS Systemic Inflammatory Response Syndrome after Massive Extravasation into the Pleural Space of Contrast Medium during Supracostal Percutaneous Nephrolithotomy. J Anesth Clin Res 2015; 6:502

126. Ab`Saber A, Borges ER, Kawano - Dourado L, Barbas CS A Confocal Microscopy Image of The Extravasation of Plasma 2015; 5: i102

127. Moore BD, Cockrell CH, Shah S, Tang Y Right Ventricular Rupture and Active Contrast Extravasation on MDCT in a Trauma Patient: A Case Report. J Radiology 2013; 3:153

128. Kim YH, Kim YD A Case of Skin Necrosis after Extravasation of Intravenous Immunoglobulin. Pediat Therapeut 2012; 2:136

129. Elias EG, Sharma BK A Role for Intralesional (Intratumoral) Therapy with Two Cytokines in the Management of Some High Risk Patients with Cutaneous Melanoma. Surgery Curr Res 2015; 5:226

130. Kunnath AP, Kamaruzman NI, Chowdhury EH Nanoparticlefacilitated Intratumoral Delivery of Bcl - 2/IGF - 1R siRNAs and p53 Gene Synergistically Inhibits Tumor Growth in Immunocompetent Mice. J Nanomed Nanotechnol 2014; 6:278

131. Chang AJ, Dehdashti AJ, Siegel BA, Welch MJ, Schwarz JK, et al. Intratumoral Heterogeneity of 64Cu - ATSM Uptake is a Prognostic Indicator in Patients with Cervical Cancer. OMICS J Radiology 2013; 2:130

132. Zaets S Normal Dimensions of Cardiac Valves: What do Normative Bases Tell us? Anatom Physiol 2012; 2:e113

133. Tai HC, Chen CJ, Chen CM , Chen WL, Chen PY Ossified Metaplastic Meningioma with Intratumoral Hemorrhage. J Cytol Histol 2010; 1:102.

134. Levitt D, Slim J, Slim JN, Boulmay B, Galliano G Albumin - Linked Doxorubicin (Aldoxorubicin) as Treatment for Relapsed Glioblastoma: A Case Report. J Nucl Med Radiat Ther 2015; 6:216

135. Kunnath AP, Kamaruzman NI, Chowdhury EH Nanoparticlefacilitated Intratumoral Delivery of Bcl - 2/IGF - 1R siRNAs and p53 Gene Synergistically Inhibits Tumor Growth in Immunocompetent Mice. J Nanomed Nanotechnol 2014; 6:278

136. Chang PEJ, Purushotham S, Rumpel H, Kee IHC, Ng RTH, et al. Novel Dual Magnetic Drug Targeting and Hyperthermia Therapy in Hepatocellular Carcinoma with Thermosensitive Polymer - Coated Nanoparticles. J Gastroint Dig Syst 2014; 4:198

137. Tripodo G, Mandracchia D, Collina S, Rui M, Rossi D New Perspectives in Cancer Therapy: The Biotin - Antitumor Molecule Conjugates. Med chem 2014; S1:004

138. Yuldasheva GA, Zhidomirov GM, Ilin AI The Antitumor Activity of Molecular Iodine Complexes with Lithium Halogenides and Bioorganic Ligands when Applied in Combination with Doxorubicin. J Antivir Antiretrovir 2014; 6:050 - 053

139. Nehoff H, Parayath NN, Taurin S, Greish K The Influence of Drug Loading on Caveolin - 1 Mediated Intracellular Internalization of Doxorubicin Nanomicelles in vitro. J Nanomed Nanotechnol 2014; 5:197

140. Kunnath AP, Tiash S, Fatemian T, Morshed M, Mohamed SM Intracellular Delivery of ERBB2 siRNA and p53 Gene Synergistically Inhibits the Growth of Established Tumor in an Immunocompetent Mouse. J Cancer Sci Ther 2014; 6: 099 - 104

141. Yasuno F, Taguchi A, Kikuchi - Taura A, Yamamoto A, Kazui H, et al. Possible Protective Effect of Regulatory T cells on White Matter Microstructural Abnormalities in Stroke Patients. J Clin Cell Immunol 2014; 5:221

142. Qian Z, Shi - man W, Juan L, Zhi - Fang L The Expression and Significance of CD4+T Lymphocyte in the Peripheral Blood of Patients with Asthma. J Aller Ther 2013; S11:005

143. Banete A, Achita P, Harding K, Mulder R, Sameh Basta Immortalized Murine Macrophage Cell Line as a Model for Macrophage Polarization into Classically Activated M(IFNγ+LPS) or Alternatively Activated M(IL - 4) Macrophages. J Clin Cell Immunol 2015; 6: 318

144. Sherkhane AS, Changbhale SS, Gomase VS Prediction of MHC Class Binding Peptide and High Affinity TAP Binders to Design Synthetic Peptide Vaccine of Long Neurotoxin 3 from Naja Naja. J Mol Genet Med 2015; 9: 150

145. Gomase VS and Kale KV Information of Surface Accessibility of the Peptide Fragments of Coat Protein from Alfalfa mosaic virus (AMV) at the Physicochemical and Immunochemical Levels. Drug Des 2015; 4: 119

146. Mohamed Jahromi, Adel Ahmed, Kazem Behbehani and Anwar Mohammad Critical Association Study of Olfactory Receptor Gene Polymorphism in Diabetic Complications. Immunome Res 2014; 10: 79

147. Gomase VS and Chitlange NR Sensitive Quantitative Predictions of MHC Binding Peptides and Fragment Based Peptide Vaccines From Trichinella spiralis. Drug Design 2012; 1: 101

148. Gomase V.S., Kale K.V., Shyamkumar K Prediction of MHC Binding Peptides and Epitopes from Groundnut Bud Necrosis Virus (GBNV). J Proteomics Bioinform 2008; 1: 188 - 205

149. Sarika, Mohd. Akram, Iquebal MA, Naimuddin K Prediction of MHC Binding Peptides and Epitopes from Coat Protein of Mungbean Yellow Mosaic India Virus - Ub05. J Proteomics Bioinform 2010; 3: 173 - 178

150. Sinnathamby G, Zerfass J, Hafner J, Block P, Nickens Z, et. al. EDDR1 is a Potential Immunotherapeutic Antigen in Ovarian, Breast, and Prostate Cancer. J Clin Cell Immunol 2011; 2:106

151. Matsuzaki K, Tomioka M, Watabe Y Expression of the Sortilin Gene in Cultured Human Keratinocytes Increases in a Glucose - free Medium. Clin Res Foot Ankle 2014; S3:004

152. Udensi UK, Tackett AJ, Byrum S, Avaritt NL, Sengupta D, et al. Proteomics - Based Identification of Differentially Abundant Proteins from Human Keratinocytes Exposed to Arsenic Trioxide. J Proteomics Bioinform 2014; 7: 166 - 178

153. Bölck B, Ibrahim M, Lu - Hesselmann J, Steinritz D, Suhr F Detection of Free Radical Reaction Products and Activated Signalling Molecules as Biomarkers of Cell Damage in Human Keratinocytes upon Lead Exposure. J Mol Biomark Diagn 2014; 5:179

154. Metral E, Santos MD, Thépot A, Rachidi W, Mojallal A, et al. Adiposederived Stem Cells Promote Skin Homeostasis and Prevent its Senescence in an In vitro Skin Model. J Stem Cell Res Ther 2014; 4: 194

155. Rasmussen CA, Schlosser SJ, Allen - Hoffmann BL Morphogenesis of Biologically Active Interfollicular Epidermis from Human Embryonic Stem Cell - derived Keratinocytes. J Stem Cell Res Ther 2014; 4: 163

156. Anjos FAC, Barrionuevo MVF J Proteomics Prediction of Protein - Ligand Binding Sites for Cisplatin and Transplatin based on Hydrogen Bonds. Bioinform 2015; 8:015 - 022

157. Kunnath AP, Kamaruzman NI, Chowdhury EH Nanoparticle facilitated Intratumoral Delivery of Bcl - 2/IGF - 1R siRNAs and p53 Gene Synergistically Inhibits Tumor Growth in Immunocompetent Mice. J Nanomed Nanotechnol 2014; 6:278

158. Donmez and Bozdogan Effect of Sodium Selenite on Testicular Damage Induced by Cisplatin in Adult Male Rats. Biol Med 2014; 6:209

159. Bedada SK, Yakkanti SA, Neerati P Resveratrol Enhances the Bioavailability of Fexofenadine in Healthy Human Male Volunteers: Involvement of P - Glycoprotein Inhibition. J Bioequiv Availab 2014; 6:158 - 163

160. Valenzuela - Muñoz V, Nuñez - Acuña G, Gallardo - Escárate C Molecular Characterization and Transcription Analysis of P - Glycoprotein Gene from the Salmon Louse Caligus rogercresseyi J Aquac Res Development 2014; 5:236

161. Sainio A, JÃ¤rvelÃ¤inen H Extracellular Matrix Macromolecules in Tumour Microenvironment with Special Reference to Desmoplastic Reaction and the Role of Matrix Proteoglycans and Hyaluronan. J Carcinogene Mutagene 2013; S13:002

162. GarcÃ-a B, FernÃ¡ndez - Vega I, GarcÃ-a - SuÃ¡rez O, CastaÃ±Ã³n S, QuirÃ³s LM, et al. The Role of Heparan Sulfate Proteoglycans in Bacterial Infections. J Med Microb Diagn 2014; 3:157

163. Jung Maughan MN, Bliss TW, Chung I, Suarez DL, Keeler CL Jr Detection and Identification of Avian Influenza Virus by cDNA Microarray. J Microb Biochem Technol 2014; S2:005

164. Olmos J, Gómez R, Rubio VP Apoptosis Comparison Effects Between Synthetic and Natural B - Carotene from Dunaliella salina on MDA - MB - 231 Brest Cancer Cells. J Microb Biochem Technol 2015; 7:051 - 056

165. Luo LG, Luo JZQ Anti - apoptotic Effects of Bone Marrow on Human Islets: A Preliminary Report. J Stem Cell Res Ther 2015; 5:274

166. Andrès E, Mourot R, Keller O, Serraj K, Vogel T Drug - Induced Agranulocytosis in Elderly Patients: Diagnosis and Management of Life - Threatening Infections and Septic Shock . J Infect Dis Ther 2014; 2:191

167. Ballas SK, Singh P, Adams - Graves P, Wordell CJ, Idiosyncratic Side Effects of Hydroxyurea in Patients with Sickle Cell Anemia. J Blood Disorders Transf 2013; 4:162

168. Banerjee BD, Mustafa MD, Sharma T, Tyagi V, Ahmed RS, et al. Assessment of Toxicogenomic Risk Factors in Etiology of Preterm Delivery. Reprod Syst Sex Disord 2014; 3:129

169. Liu F, Guo L Toxicogenomics in the Evolution of Toxicology. J Pharmacogenomics Pharmacoproteomics 2012; 3: e123

170. Rim KT, Yu IJ Toxicogenomic Approach to Risk Assessment of Welding Fumes. J Clinic Toxicol 2012; S5:004

171. Taboureau O, Hersey A, Audouze K, Gautier L, Jacobsen UP, et al. Toxicogenomics Investigation Under the eTOX Project. J Pharmacogenomics Pharmacoproteomics 2012; S7:001

172. Yun Y, Conforti L, Muganda P, Sankar J Nanomedicine - based Synthetic Biology. J Nanomedine Biotherapeutic Discov 2011; 1:102e

173. Elgindy N, Elkhodairy K, Molokhia A, ElZoghby A Biopolymeric Nanoparticles for Oral Protein Delivery: Design and In Vitro Evaluation. J Nanomed Nanotechnol 2011; 2: 110

174. Douroumis D Mesoporous silica Nanoparticles as Drug Delivery System. J Nanomed Nanotechnol 2011; 2:102e

175. Mehrotra A, Nagarwal RC, Pandit JK Fabrication of Lomustine Loaded Chitosan Nanoparticles by Spray Drying and in Vitro Cytostatic Activity on Human Lung Cancer Cell Line L132. J Nanomedic Nanotechnol 2010; 1:103

176. Havele S and Dhaneshwar S Estimation of Metformin in Bulk Drug and in Formulation by HPTLC. J Nanomedic Nanotechnol 2010; 1:102

177. Mizuno K, Zhiyentayev T, Huang L, Khalil S, Nasim F, et. al. Antimicrobial Photodynamic Therapy with Functionalized Fullerenes: Quantitative Structure - activity Relationships. J Nanomed Nanotechnol 2011; 2:109

178. Lu C, Yu P Biological and Solid - State Nanopores for DNA Sequencing. Biochem Pharmacol (Los Angel) 2012; 1:e109

179. Shroff K, Vidyasagar A Polymer Nanoparticles: Newer Strategies towards Targeted Cancer Therapy. J Phys Chem Biophys 2013; 3:125

180. Rogers JV, Choi YW Preliminary Evaluation of Mycobacterium tuberculosis Detection in Culture and Artificial Sputum Using a BioNanoPore Membrane and Real - time PCR. J Microb Biochem Technol 2012; 4: 147 - 151

181. Ruozi B, Belletti D, Vandelli MA, Pederzoli F, Veratti P, et al. AFM/ TEM Complementary Structural Analysis of Surface - Functionalized Nanoparticles. J Phys Chem Biophys 2014; 4:150

182. Scoutaris N, Douroumis D AFM in Advanced Pharmaceutical Technology. Pharmaceut Anal Acta 2012; 3:e131

183. Brafman DA Bioengineering of Stem Cell Microenvironments Using High - Throughput Technologies. J Bioeng Biomed Sci 2012; S5:004

184. Perry M, Hansen JS, Stibius K, Vissing T, Pszon - Bartosz K, et al. Surface Modifications of Support Partitions for Stabilizing Biomimetic Membrane Arrays. J Membra Sci Technol 2011; S1:001

185. Saas P, Gaugler B, Perruche S Can Allogeneic Hematopoietic Cell Transplantation Outcome be Improved by Intravenous Apoptotic Cell Infusion? J Cell Sci Ther 2011; S7:001

186. Kolitz - Domb M, Margel S Engineered Narrow Size Distribution High Molecular Weight Proteinoids, Proteinoid - Poly(L - Lactic Acid) Copolymers and Nano/Micro - Hollow Particles for Biomedical Applications. J Nanomed Nanotechnol 2014; 5:216

187. Sahoo A, Lerman B, Alekseev A, Nurieva R E3 Ligases in T Helper 2 - mediated Pathogenesis. Immunome Res 2014; 11:086.

188. Thakur G, Kim S, Prashanthi K, Thundat T Investigation of Ph - Assisted Human Serum Albumin (HSA) - Cobalt (Co) Binding Using Nanomechanical Deflection and Circular Dichroism. J Nanomed Nanotechol 2014; S5:008

189. Bhat G Polymeric Nanofibers: Recent Technology Advancements Stimulating their Growth. J Textile Sci Eng 2015; 5:186

190. Satyanarayana KG Recent Developments in Green Composites based on Plant Fibers - Preparation, Structure Property Studies. J Bioprocess Biotech 2015; 5:206

191. Gollapudi S, So CS, Formica M, Agrawal S, Agrawal A Safety and Efficacy of Polydioxanone Nano - Fibers as Anti - Inflammatory Agents. J Nanomedine Biotherapeutic Discov 2014; 4: 127

192. Adibkia K Preparation of Pharmaceutical Nanobeads and Nanofibers via Electrospinning Method. J Mol Pharm Org Process Res 2014; 2:e112

193. Abdulrazzak FH, Hussein FH Effects of Nanoparticle Size on Catalytic and Photocatalytic Activity of Carbon Nanotubes - Titanium Dioxide Composites. J Environ Anal Chem 2015; 2:e110

194. Mubarak NM, Faridah Y Protein Purification in Chromatographic Media using Multiwall Carbon Nanotubes. J Bioprocess Biotech 2015; 5:214

195. Kamil AM, Abdalrazak FH, Halbus AF, Hussein FH Adsorption of Bismarck Brown R Dye Onto Multiwall Carbon Nanotubes. J Environ Anal Chem 2014; 1:104

196. Mungra C, Webb JF Free Vibration Analysis of Single - Walled Carbon Nanotubes Based on the Continuum Finite Element Method. Global J Technol Optim 2015; 6:173

197. Simate GS, Yah CS The use of Carbon Nanotubes in Medical Applications - Is It a Success Story? Occup Med Health Aff 2014; 2:147

198. Al - Mayouf AM, Saleh MSA, Aouissi A, Al - Suhybani AA Catalytic Performance of Carbon Nanotubes Supported 12 - Tungstosilicic Acid in the Electrooxidation of Cyclohexane to Cyclohexanone and Cyclohexanol. J Chem Eng Process Technol 2014; 5:183

199. Huang G, Deng B, Xi Q, Tao C, Ye L Surface Modification of Superparamagnetic Magnetite Nanoparticles and Its Application for Detection of Anti - CEA Using Electrochemiluminescent Immunosensor. Med chem 2015; 5:050 - 057

200. Plassat V, Renoir JM, Autret G, Marsaud V, Ménager C, et al. Systemic Magnetic Targeting of Pure - Antiestrogen - Loaded Superparamagnetic Nanovesicles for Effective Therapy of Hormone - Dependent Breast Cancers. J Bioanal Biomed 2011; 05: 028

201. Benyettou F, Milosevic I, Olsen JC, Motte L, Trabolsi A Ultra - Small Superparamagnetic Iron Oxide Nanoparticles Made to Order. J Bioanal Biomed 2012; S5: 006

202. Khandai M, Chakraborty S, Ghosh AK Losartan Potassium Loaded Bioadhesive Micro - Matrix System: An Investigation on Effects of Hydrophilic Polymeric Blend on Drug Release. Pharm Anal Acta 2013; S8:001

203. Mastropietro DJ, Nimroozi R, Omidian H Rheology in Pharmaceutical Formulations - A Perspective. J Develop Drugs 2013; 2:108.

204. Yukawa H, Tsukamoto R, Kano A, Okamoto Y, Tokeshi M, et al. Quantum Dots Conjugated with Transferrin for Brain Tumor Cell Imaging. J Cell Sci Ther 2013; 4: 150

205. Dhyani H, Dhand C, Malhotra BD, Sen P Polyaniline - CdS Quantum Dots Composite for Mediator Free Biosensing. J Biosens Bioelectron 2011; 3:112

206. Li Y, Hu M, Qi B, Wang X, Du Y Preparation and Characterization of Biocompatible Quaternized Chitosan Nanoparticles Encapsulating CdS Quantum Dots. J Biotechnol Biomaterial 2011; 1:108

207. Chen MS, Liu CY, Wang WT, Hsu CT, Cheng CM Probing Real - Time Response to Multitargeted Tyrosine Kinase Inhibitor 4 - N - (3′ - Bromo - Phenyl) Amino - 6, 7 - Dimethoxyquinazoline in Single Living Cells Using Biofunctionalized Quantum Dots. J Nanomedic Nanotechnol 2011; 2:117

208. Jain T, Kumar S, Dutta PK Theranostics: A Way of Modern Medical Diagnostics and the Role of Chitosan. J Mol Genet Med 2015; 9: 159

209. Ruozi B, Belletti D, Vandelli MA, Pederzoli F, Veratti P, et al. AFM/ TEM Complementary Structural Analysis of Surface - Functionalized Nanoparticles. J Phys Chem Biophys 2014; 4:150.

210. Vashist SK Dendrimers: Prospects for Bioanalytical Sciences. J Nanomed Nanotechnol 2013; 4:e131.

211. Naga Anusha P, Siddiqui A Nanomedical Platform for Drug Delivery. J Nanomedic Nanotechnol 2011; 2:122

212. Kong KV, Goh D, Olivo M Dual Trigger Crosslinked Micelles Based Polyamidoamine for Effective Paclitaxel Delivery. J Nanomed Nanotechnol 2014; 5:212

213. Soliman GM, Sharma A, Cui Y, Sharma R, Kakkar A, et al. Miktoarm Star Micelles Containing Curcumin Reduce Cell Viability of Sensitized Glioblastoma. J Nanomedine Biotherapeutic Discov 2014; 4:124

214. Nehoff H, Parayath NN, Taurin S, Greish K The Influence of Drug Loading on Caveolin - 1 Mediated Intracellular Internalization of Doxorubicin Nanomicelles in vitro. J Nanomed Nanotechnol 2014; 5:197

215. Al - Achi A, Jonathan Lawrence BS Micelles: Chemotherapeutic Drug Delivery. Clin Pharmacol Biopharm 2013; 2:e114

216. Leonhard V, Alasino RV, Bianco ID, Beltramo DM Selective Binding of Albumin to Gm1 Ganglioside Micelles Containing Paclitaxel. J Nanomed Nanotechol 2013; 4: 159

217. Chung E, Pineda F, Nord K, Karczmar, Lee SK, et al. Fibrin - Targeting, Peptide Amphiphile Micelles as Contrast Agents for Molecular MRI. J Cell Sci Ther 2014; 5:181.

218. Danquah M Polycarbonate Micelles for Cancer Therapy. J Cancer Sci Ther 2014; 6:310 - 313

219. Yang L, Meng H, Zong Y, Qian J, Jing Y et al. Photothermal Targeting Therapy of A20 Mouse Lymphoma Model using Anti - CD138 Antibody - conjugated Gold Nanospheres. J Hematol Thrombo Dis 2014; 2:137

220. Cendrowski K, Peruzynska M, Markowska - Szczupak A, Chen X, Wajda A, et al. Mesoporous Silica Nanospheres Functionalized by Tio2 as a Photoactive Antibacterial Agent. J Nanomed Nanotechnol 2013; 4:182

221. Mohamed MB, Adbel - Ghani NT, El - Borady OM, El - Sayed MA 5 - Fluorouracil Induces Plasmonic Coupling in Gold Nanospheres: New Generation of Chemotherapeutic Agents. J Nanomed Nanotechol 2012; 3:146

222. Fathalla D, Soliman GM, Fouad EA Latanoprost Liposomes for Glaucoma Treatment Development and in vitro/in vivo Evaluation of Liposomal Gels for the Sustained Ocular Delivery of Latanoprost. J Clin Exp Ophthalmol 2015; 6:390.

223. Nerome K, Kuroda K, Sugita S, Kawasaki K, Iinuma H, et al. The Usefulness of an Influenza Virus - Like Particle (VLP) Vaccine Produced in Silkworm Pupae and Virosomes and Liposomes Prepared by Chemical Means: From Virosome to VLP and the Future of Vaccines. J Gastrointest Dig Syst 2015; 5:256

224. Ichihara H, Yamasaki S, Hino M, Ueoka R, Matsumoto Y Hybrid Liposomes inhibit the Growth and Angiogenesis in Human Breast Cancer Model. J Carcinog Mutagen 2015; 6:207

225. Gortzi O, Athanasiadis V, Lalas S, Chinou I, Tsaknis J Study of Antioxidant and Antimicrobial Activity of Chios Mastic Gum Fractions (Neutral, Acidic) Before and After Encapsulation in Liposomes. J Food Process Technol 2014; 5:355.

226. Mijan MC, Longo JPF, Melo LND, Simioni AR, Tedesco AC, et al. Vascular Shutdown and Pro - inflammatory Cytokine Expression in Breast Cancer Tumors after Photodynamic Therapy Mediated by Nano

- sized Liposomes Containing Aluminium - Chloride - Phthalocyanine. J Nanomed Nanotechnol 2014; 5:218.

227. Venturini M, Mazzitelli S, Mičetić I, Benini C, Fabbri J, et al. Analysis of Operating Conditions Influencing the Morphology and In vitro Behaviour of Chitosan Coated Liposomes. J Nanomed Nanotechnol 2014; 5:211

228. Kaur S, Harikrishnan VS, Shenoy SJ, Radhakrishnan NS, Uruno A, et al. Transfection of Endothelial Nitric Oxide Synthase Gene Improves Angiogenic Efficacy of Endothelial Progenitor Cells in Rabbits with Hindlimb Ischemia. J Clinic Experiment Cardiol 2011; 2:140.

229. Eshita Y, Higashihara J, Onishi M, Mizuno M, Yoshida J, et al. Mechanism of the Introduction of Exogenous Genes into Cultured Cells Using DEAE - Dextran - MMA Graft Copolymer as a Non - Viral Gene Carrier. II. Its Thixotropy Property. J Nanomedic Nanotechnol 2011; 2:105

230. KoÃ§ ZP, Temelli B, KiliÃ§ L, Simsek FS Transfection with Sodium Iodine Symporter Gene (NIS) and Future Applications with Radioiodine Treatment. Endocrinol Metab Syndr 2014; 3:139.