Subject **RE: Registration for Pharma-2017**
From Pharma-2017 <pharma@colossalfacet.com>
To <drkhosravani@tums.ac.ir>
Date 2017-02-13 14:30
Priority Highest

Dear Dr. Masood Khosravani,

Greetings from Pharma-2017

Hope you find this mail in the best of your moods and blithe spirits.
As we are aware of your busy schedule we would like to contact you again with this mail regarding Pharma-2017 conference to be held during May 3-5, 2017 in Madrid, Spain
We are glad to inform you that your abstract has been accepted for poster presentation.
We request you to register online as soon as possible as we need to update the final program soon.
For Online Registration details, please visit:
http://colossalfacet.com/pharma-conference/#cbx-register

waiting your response.

Yours Sincerely,
Dr.Glenn Aristotle
Pharma-2017 Organizing Committee

-----Original Message-----
From: drkhosravani@tums.ac.ir [mailto:drkhosravani@tums.ac.ir]
Sent: Tuesday, February 7, 2017 12:57 PM
To: pharma@colossalfacet.com
Subject: Abstract Received from : Dr. Masood Khosravani

Title : Dr. Masood Khosravani
Country : Iran
E-mail : drkhosravani@tums.ac.ir
Phone Number : drkhosravani@tums.ac.ir
Interested in : Poster Presentation
Organization :
Session : Nano Medicine and NanoTechnology

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Date: February 27, 2017

Letter of Invitation

To,
Dr. Masood Khosravani
Tehran University of Medical Sciences
Iran

Colossal Facet cordially invites you to attend the **"World Congress on PHARMACEUTICAL AND CHEMICAL SCIENCES"**, going to be held during May 3-5, 2017 at Madrid, Spain. We welcome you to join us and share your knowledge and view on the theme "**Current trends and concepts in the field of pharmaceutical and Chemical Sciences**". In this regard, on behalf of the Organizing Committee, we are pleased to welcome you to join us for Poster presentation.

The **"World Congress on PHARMACEUTICAL AND CHEMICAL SCIENCES"** will offer you an unforgettable experience in exploring new opportunities.

We look forward to seeing you in Madrid, Spain.

For more details about Pharma-2017 please visit: http://colossalfacet.com/pharma-conference/

With our best wishes,

Glenn Aristotle

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Disclaimer: This invitation is to attend Pharma-2017 only

World Congress on
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Co-delivery of therapeutic agents using nanomaterials to Glioblastoma

Masood Khosravani[1]*, Mahdi Adabi*
*Department of Medical Nanotechnology, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran

Chemotherapy, as a conventionl method, has not been efficient enough for glioblastoma in clinics. Nanotechnology-based drug delivery is proposed as an efficient methods for enhanced chemotherapy. The benefits of nanomaterials with, at least one dimension in the size less than 100 nm in drug delivery systems can be noted to decrease the adverse side effects, penetration into blood brain barrier (BBB), and transport of therapeutic agents to the brain. Co-delivery of therapeutic agents are proposed to have synergic effect and higher therapeutic efficacy in comparison with individual drugs. Therefore, nanocarriers based drug-codelivery can be suggested as a high potential approach for the treatment of glioblastoma.

Biography

Dr. Masood Khosravani is the Assistant Professor in the Department of Medical Nanotechnology, School of Advanced Medical Technologies, Tehran University of Medical Sciences. He has completed his PhD from I.M. Sechenov First Moscow State Medical University, Moscow. His studies mainly focused on nanocancer and targeted drug co-delivery to cancer tissues particulalry brain tumors. He has published about 10 papers in reputed journals and a textbook about nanocancer.

drkhosravani@tums.ac.ir

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Co-delivery of therapeutic agents using nanomaterials to glioblastoma

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INTRODUCTION

Different techniques targeting cancer cells and survival pathways have also been suggested for treatment of glioblastoma. A common entity among the proposed solutions for improved chemotherapy efficiency and efficacy are multifunctional nanotechnology-based drug delivery systems.
While several review studies have been performed on nanotechnology based brain drug delivery systems, to the best of our knowledge, there is no comprehensive review regarding nanomediated co-delivery of anti-glioma therapeutics. Thus the aim of this work is to present the current status and trends in nano-mediated codelivery with different therapeutic agents for glioblastoma treatment.

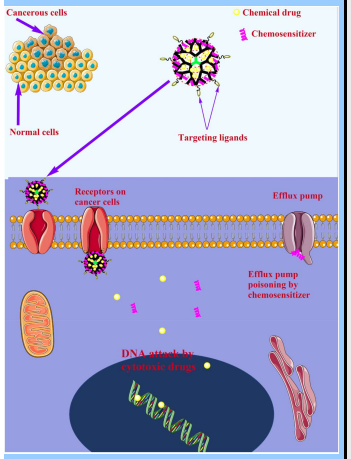

Fig. 1. The illustration of a multifunctional nanocarrier co-loaded with a chemical drug and a chemosensitizer.

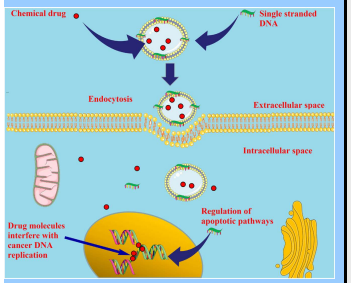

Fig. 2. The illustration shows a liposome co-loaded with a chemical drug and a therapeutic gene.

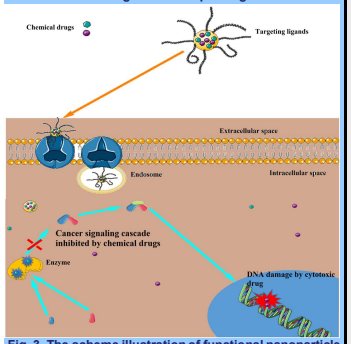

Fig. 3. The scheme illustration of functional nanoparticle loaded with two different chemical drugs

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DISCUSSION

The three nano-mediated co-delivery strategies discussed herein consist of:
1. Chemo-sensitizer/chemical drug: In order to avert indiscriminate drug toxicity, various research groups are developing nanocarriers which can co-deliver both drugs and chemosensitizers (Table 1). Chemosensitizers should be adsorbed or conjugated on the nanocarrier whilst drug molecules are encapsulated or dispersed in the nanocarrier (Fig. 1).
2. Genetic plasmid/chemical drug: Gene therapy provides avenues to regulate some critical pathways (Table 2), such as angiogenesis and metastasis, which usually evade chemical interference. Thus a combination of gene therapy and chemotherapy can interfere with multiple cancer pathways simultaneously. Under this scheme, gene therapy halts angiogenesis and metastasis, whilst chemotherapy thwarts cell proliferation (as seen in Fig. 2).
3. Multiple chemical drugs: Several combinations of chemotherapeutic agents are being prescribed for the treatment of various cancers. In the UK for example, concoctions such as docetaxel/cisplatin (Taxotere®), Gemcitabine/capecitabine (GemCap) and Irinotecan/cetuximab are being used for treating breast, pancreatic and bowel cancers respectively. However, a persistent concern over the use of these drugs in their native form is their likely cumulative toxicity on healthy cells. Fig. 3 shows functional nanoparticle loaded with two different chemical drugs. Therefore in order to avert these potential side effects investigations on nano-mediated co-delivery of various chemo agents for the treatment of glioblastoma (Table 3) are currently in different stages of development.

Table 1
Different chemosensitizers, their targeted glioma regulation molecules.

Chemotherapeutic agent	Chemosensitizer	Sensitizer regulation	Formulation	Administration route	Ref
Doxorubicin (dose 0.1 nm–100 μM)	Tamoxifen (dose n/a)	MDR inhibitor	Co-delivery using dendrimer NPs	**	[77]
Paclitaxel (dose 5 mg/kg*)	Borneol (dose 5 mg/kg*)	P-gp inhibitor	Co-delivery using lipid/Albumin NPs	i.v	[78]
Carmustine (dose 19.29 mg/kg body weight)	O^6-benzylguanine (dose 6.43 mg/kg body weight)	MGMT depletion	Co-delivery using PLGA/Chitosan NPs	i.v	[86]
Temozolomide (dose 100 mM)	SiRNA (dose 475 pmol/ml)	MGMT silencing	SiRNA delivered by magnetic NPs plus free temozolomide solution	**	[85]
Teniposide (dose 22.5 μg/ml)	Antisense oligonucleotide (dose 5 ng/μl)	MiR-21 suppression	ASO delivered by EGFP vector plus free VM	**	[87]
Temozolomide (dose 7.5–75 mg/m^2)	Wild type p53 gene (dose 30 μg)	MGMT down-regulation	wt p53 delivered by cationic liposome plus free temozolomide solution	i.v	[84]
Temozolomide (dose 160 μl)	SiRNA (dose 80 pmol)	MGMT down-regulation	SiRNA delivered by liposome plus free temozolomide solution	i.p, intratumor	[88]
Arsenite (dose 2–20 μM)	ShRNA (dose 1–3 μM)	Cathespin L silencing	Lentviral vector delivery of ShRNA plus free Arsenite solution	**	[89]
Carmustine (dose 12.5 mg/kg body weight)	SiRNA (dose 1.5 μg)	H-ferratin silencing	SiRNA delivered by a cationic liposome plus free carmustine solution	intratumor	[90]
Temozolomide (dose 30 μM)	Decitabine (dose 50 nM)	p53 and p21 activation	PLGA-PEG NPs plus free temozolomide solution	**	[83]

* Unit amount containing both chemical drug and chemosensitizer was measured.
** Experiments were performed in vitro.

Table 2
Co-delivery of gene and drug using a single nanoparticle and the molecular targets for gene therapy induced apoptosis.

Nanoparticle	Size (nm)	Zeta (mV)	Drug (chemo agent)	Gene	Mode of action of gene therapy	Ref
PEI-PCL	184	+5.1	Doxorubicin	SiRNA	Down-regulating Bcl-2 and up-regulating Bax	[98]
Liposome	150	+29.2	Docetaxel	SiRNA	Anti-angiogenic, VEGF gene silencing	[99]
Dendrimer	173	+3.2	Doxorubicin	TRAIL	i. Activation of caspase 8 and 3 ii. Activation of Bcl-2 inhibitor iii. Activation of Bax and Bak	[100]
Block copolymers	93	+10.4	Doxorubicin	miR-21i	Down-regulating Bcl-2 and pAKT and up-regulating caspase 3	[101]
PEI nanoparticles/PLGA micro fibers	50	+3.05	Paclitaxel	RNAi	Anti-metastasis and anti-angiogenic Inhibit matrix metalloproteinases	[102]
Dendrimer	–	–	Doxorubicin	SiRNA	Model for luciferase gene silencing in glioma cells	[103]
NLC	179	+23	Temozolomide	DNA	–	[104]

Table 3
Several nanoparticles used to co-deliver two different drugs and the cytotoxicity of each drug in cancer cell.

Nanoparticle	Drug 1 (chemo agent 1)	Pathway	Drug 2 (chemo agent 2)	Pathway	Ref
Magnetic	Temozolomide	DNA methylation O^6–methylguanine [91]	Curcumin	Inhibition of nuclear factor kappa B (NFκB) [112]	[110]
Chitosan	Temozolomide	–	Doxorubicin	Topoisomerase 2 mediated DNA cleavage [92]	[108]
Polymeric liposomes	Temozolomide	–	Quercetin	Bcl-2 down-regulation, Bax up-regulation [113]	[114]
PLGA/silica	Paclitaxel	Induction of multipolar divisions in cells entering mitosis [94]	Doxorubicin	–	[109]
Magnetic	Doxorubicin	–	Curcumin	–	[111]
Micelles	Rapamycin	Inhibition of mammalian target of rapamycin (mTOR) [115]	Curcumin	–	[116]
mPEG-PLGA	Temozolomide	–	Paclitaxel	–	[117]

CONCLUSIONS

The synergism between nano-mediated co-delivered therapeutic agents provide superior anti-glioma cytotoxicity when compared to traditional combinational therapy using the same drugs. several fundamental challenges regarding co-delivery needs to be addressed before the techniques can realize their clinical potential.
Firstly, some therapeutic agents are incompatible due to their physiochemical properties, such as difference in hydrophilicity/hydrophobicity or likely chemical reactions between the two therapeutic agents. Secondly, it is difficult to obtain an ideal release pattern of the two agents. If the nanoparticle fails to release its payload in an ideal manner the entire formulation may not yield the anticipated efficacy. Extensive research on various combinations of drugs and appropriate nanocarriers are critical for the success of co-delivered therapeutic agents in the fight against glioblastomas.

REFERENCES

1. Basil Mujokoro, Mahdi Adabi, Masood Khosravani, Nano-structures mediated co-delivery of therapeutic agents for glioblastoma treatment: A review, Materials Science and Engineering C 69 (2016) 1092–1102.