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## Comparative assessment of plasmid DNA delivery by encapsulation within or adsorbed on poly (D, L-lactide-co-glycolide) nanoparticles

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TROPICAL JOURNAL OF PHARMACEUTICAL RESEARCH

Volume: 17 Issue: 1 Pages: 1-10

DOI: 10.4314/tjpr.v17i1.1

Published: JAN 2018

Document Type: Article

[View Journal Impact](#)

### Abstract

Purpose: To compare the gene delivery effectiveness of plasmid DNA (pDNA) encapsulated within poly (D, L-lactide-co-glycolide) (PLGA) nanoparticles with that adsorbed on PLGA nanoparticles.

Methods: PLGA nanoparticles were prepared using solvent-evaporation method. To encapsulate pDNA within the particles, it was first complexed with cetyltrimethylammonium bromide (CTAB) and then added to the oil phase during the synthesis. For the adsorption, PLGA nanoparticles were first modified with either CTAB or chitosan and then pDNA was adsorbed on the particle surface by electrostatic interaction.

Results: Nanoparticles encapsulating pDNA exhibited better plasmid loading and protection with significantly lower burst release ( $p < 0.05$ ) compared to that of the nanoparticles with adsorbed plasmid. Cell uptake of chitosan-modified nanoparticles by murine neuroblastoma (N2a) cells was significantly ( $p < 0.05$ ) higher than that of chitosan-free nanoparticles. Nanoparticles encapsulating pDNA showed higher transfection efficiency ( $p < 0.05$ ) in N2a cells.

Conclusion: Encapsulation of pDNA within PLGA nanoparticles presents a potential strategy for gene delivery that is superior to pDNA adsorbed on the nanoparticle surface. In addition, encapsulation keeps the particle surface free for further modifications such as the addition of targeting ligands.

### Keywords

**Author Keywords:** Poly (D,L-lactide-co-glycolide); Plasmid DNA; Encapsulation; Adsorption; Cellular uptake; Gene therapy; Targeting ligands

**KeyWords Plus:** NIGELLA-SATIVA OIL; GENE DELIVERY; CHITOSAN; TRANSFECTION; MICROSPHERES; EFFICIENCY; PARTICLES; STABILITY; RELEASE; MEDIA

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### Funding

Funding Agency	Grant Number
IIUM Research Initiative Grant Scheme	RIGS15-092-0092

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	RIGS16-325-0489
Ministry of Science, Technology & Innovation of Malaysia (MOSTI)	02-01-08-SF0101

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- Colloidally stable novel copolymeric system for gene delivery in complete growth media** Times Cited: 25

By: Agarwal, Ankit; Vilensky, Rita; Stockdale, Anne; et al.

JOURNAL OF CONTROLLED RELEASE Volume: 121 Issue: 1-2 Pages: 28-37 Published: AUG 16 2007
- Serum as a modulator of lipoplex-mediated gene transfection: dependence of amphiphile, cell type and complex stability** Times Cited: 98

By: Audouy, S; Molema, G; de Leij, L; et al.

JOURNAL OF GENE MEDICINE Volume: 2 Issue: 6 Pages: 465-476 Published: NOV-DEC 2000
- Preparation, characterization, cytotoxicity and transfection efficiency of poly(DL-lactide-co-glycolide) and poly(DL-lactic acid) cationic nanoparticles for controlled delivery of plasmid DNA** Times Cited: 72

By: Basarkar, Ashwin; Devineni, Dilip; Palaniappan, Ravi; et al.

INTERNATIONAL JOURNAL OF PHARMACEUTICS Volume: 343 Issue: 1-2 Pages: 247-254 Published: OCT 1 2007
- High loading efficiency and tunable release of plasmid DNA encapsulated in submicron particles fabricated from PLGA conjugated with poly-L-lysine** Times Cited: 70

By: Blum, Jeremy S.; Saltzman, W. Mark

JOURNAL OF CONTROLLED RELEASE Volume: 129 Issue: 1 Pages: 66-72 Published: JUL 2 2008
- Co-encapsulation of Nigella sativa oil and plasmid DNA for enhanced gene therapy of Alzheimer's disease** Times Cited: 11

By: Doolaanea, Abd Almonem; Mansor, Nur Izzati; Nor, Nurul Hafizah Mohd; et al.

JOURNAL OF MICROENCAPSULATION Volume: 33 Issue: 2 Pages: 114-126 Published: FEB 17 2016
- Cellular uptake of Nigella sativa oil-PLGA microparticle by PC-12 cell line** Times Cited: 5

By: Doolaanea, Abd Almonem; Mansor, Nur Izzati; Nor, Nurul Hafizah Mohd; et al.

JOURNAL OF MICROENCAPSULATION Volume: 31 Issue: 6 Pages: 600-608 Published: 2014
- Effect of Surfactants on Plasmid DNA Stability and Release from Poly (D,L-lactide-co-glycolide) Microspheres** Times Cited: 3

By: Doolaanea, Abd Almonem; Ismail, Ahmad Fahmi Harun; Mansor, Nur Izzati; et al.

TROPICAL JOURNAL OF PHARMACEUTICAL RESEARCH Volume: 14 Issue: 10 Pages: 1769-1778 Published: OCT 2015
- Understanding the adsorption mechanism of chitosan onto poly(lactide-co-glycolide) particles** Times Cited: 63

By: Guo, Chunqiang; Gemeinhart, Richard A.

EUROPEAN JOURNAL OF PHARMACEUTICS AND BIOPHARMACEUTICS Volume: 70 Issue: 2 Pages: 597-604 Published: OCT 2008
- Intramuscular delivery of DNA releasing microspheres: Microsphere properties and transgene expression** Times Cited: 34

By: Jang, JH; Shea, LD

JOURNAL OF CONTROLLED RELEASE Volume: 112 Issue: 1 Pages: 120-128 Published: MAY 1 2006
- Improved chitosan-mediated gene delivery based on easily dissociated chitosan polyplexes of highly defined chitosan oligomers** Times Cited: 271

By: Koping-Hoggard, M; Varum, KM; Issa, M; et al.

GENE THERAPY Volume: 11 Issue: 19 Pages: 1441-1452 Published: OCT 2004

11. [Physico-chemical characterization of polysaccharide-coated nanoparticles](#) Times Cited: 39  
By: Lemarchand, C; Gref, R; Lesieur, S; et al.  
JOURNAL OF CONTROLLED RELEASE Volume: 108 Issue: 1 Pages: 97-111 Published: NOV 2 2005
12. [Current advances in research and clinical applications of PLGA-based nanotechnology](#) Times Cited: 382  
By: Lue, Jian-Ming; Wang, Xinwen; Marin-Muller, Christian; et al.  
EXPERT REVIEW OF MOLECULAR DIAGNOSTICS Volume: 9 Issue: 4 Pages: 325-341 Published: MAY 2009
13. [Chitosan-based formulations for delivery of DNA and siRNA](#) Times Cited: 493  
By: Mao, Shirui; Sun, Wei; Kissel, Thomas  
ADVANCED DRUG DELIVERY REVIEWS Volume: 62 Issue: 1 Pages: 12-27 Published: JAN 31 2010
14. [Relevance of the colloidal stability of chitosan/PLGA nanoparticles on their cytotoxicity profile](#) Times Cited: 89  
By: Nafee, Noha; Schneider, Marc; Schaefer, Ulrich F.; et al.  
INTERNATIONAL JOURNAL OF PHARMACEUTICS Volume: 381 Issue: 2 Special Issue: SI Pages: 130-139 Published: NOV 3 2009
15. [Not ready to use - overcoming pitfalls when dispersing nanoparticles in physiological media](#) Times Cited: 121  
By: Schulze, Christine; Kroll, Alexandra; Lehr, Claus-Michael; et al.  
NANOTOXICOLOGY Volume: 2 Issue: 2 Pages: 51-U17 Published: 2008

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