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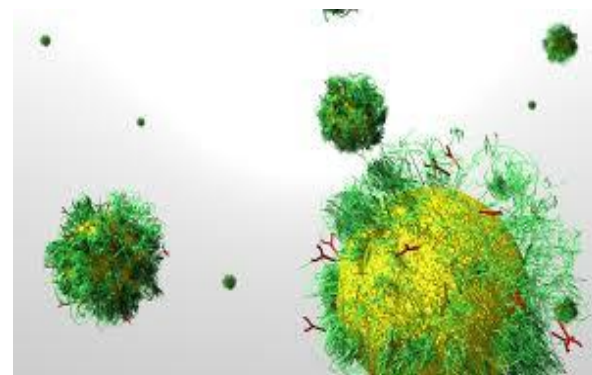
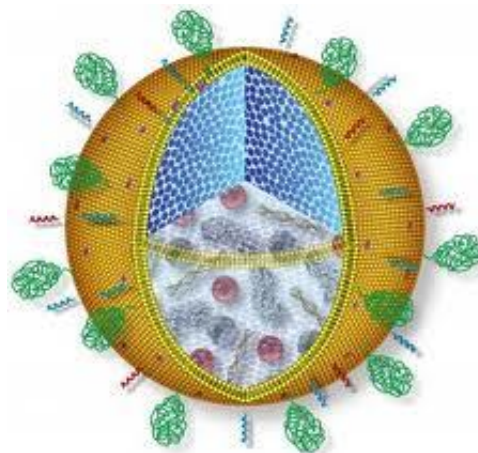
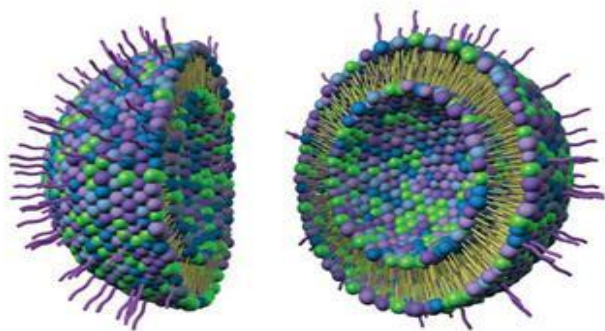
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Multifunctional Targeted Nanocarriers for Cancer Therapy



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UNIVERSITY OF HAWAII
CANCER CENTER



NANOTECH based Delivery Explorations

Overall Research Goal

Development of nanotechnology based systems for targeted delivery of small molecules, siRNA, plasmid DNA, and proteins for the treatment of various cancers, asthma and skin disorders.

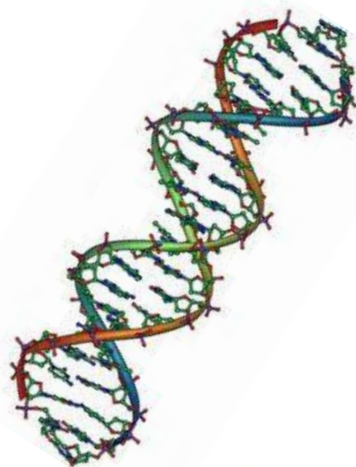
Research Focus

- Lung and Breast Cancer
- Neuroblastoma
- Mesothelioma
- Asthma
- Topical and Transdermal delivery

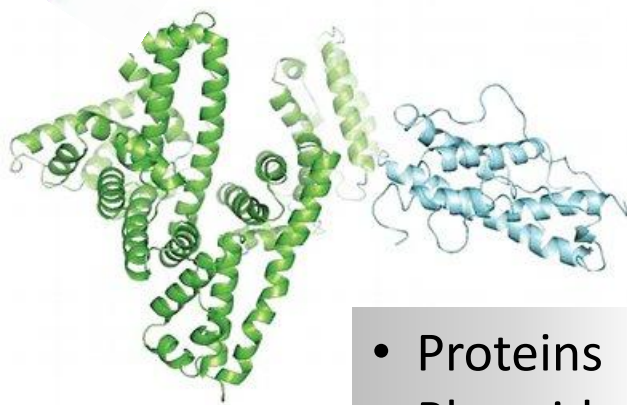
Formulation of Nanocarriers

Rational for Therapeutic Agents

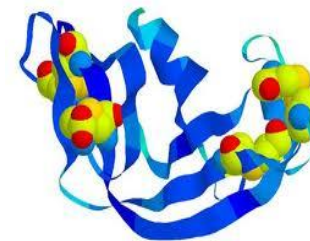
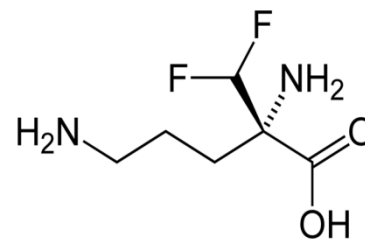
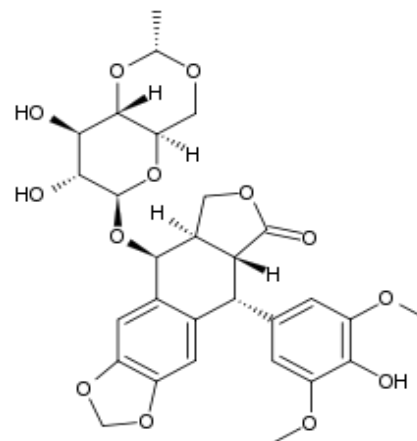
Therapeutic Agents



- siRNA
- Gene



- Proteins
- Plasmids



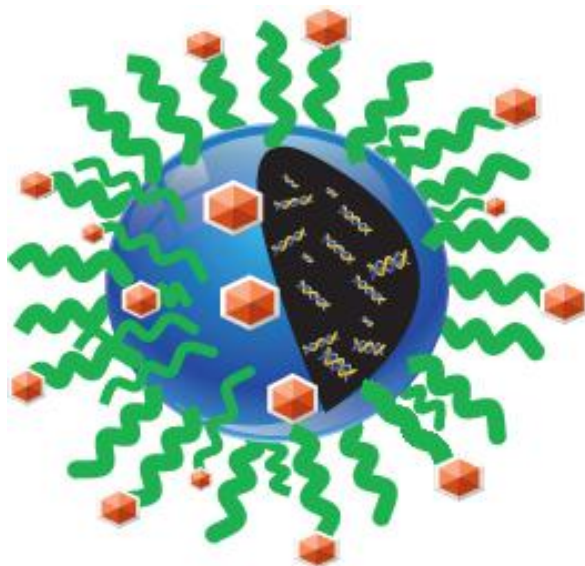
- Etoposide
- DFMO
- Onconase
- Small molecule drugs



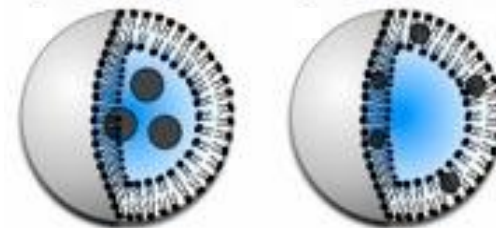
Formulation of Nanocarriers

Rational for Nanocarrier systems

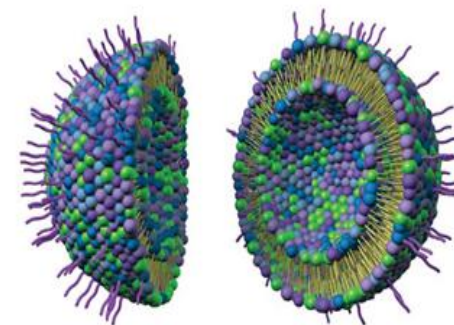
Gelatin, Albumin, Chitosan, PLGA based Targeted Hybrid Nanocarriers



Hydrophobic & Hydrophilic Nanocarriers



Liposome Nanocarriers

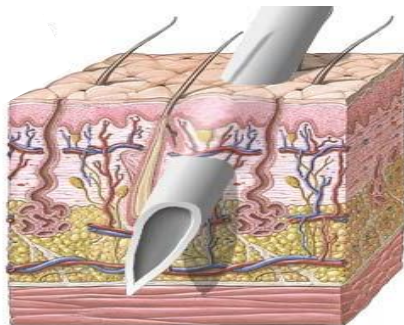


Nanocarrier selection

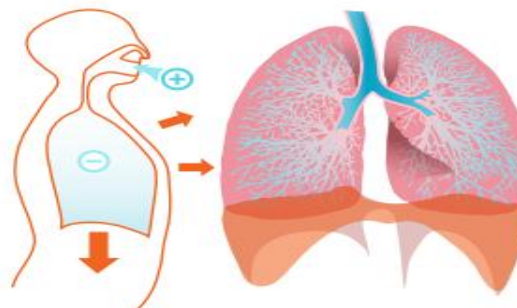
Routes of Administrations

Route of Administration

Parenternal



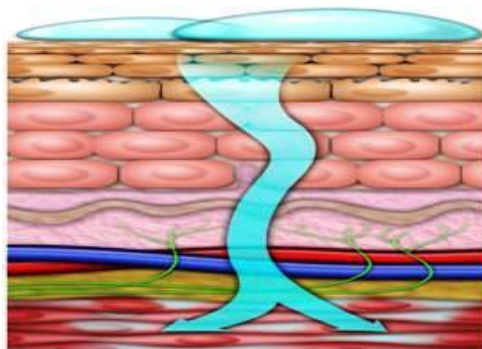
Inhalation



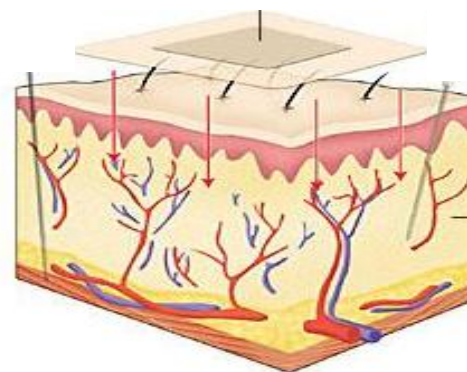
Oral



Topical



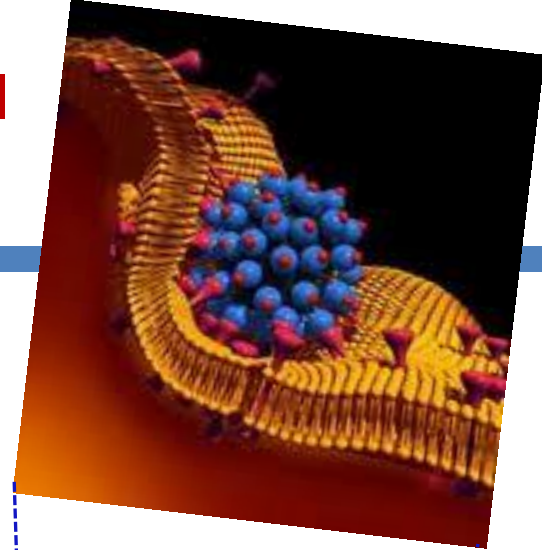
Transdermal



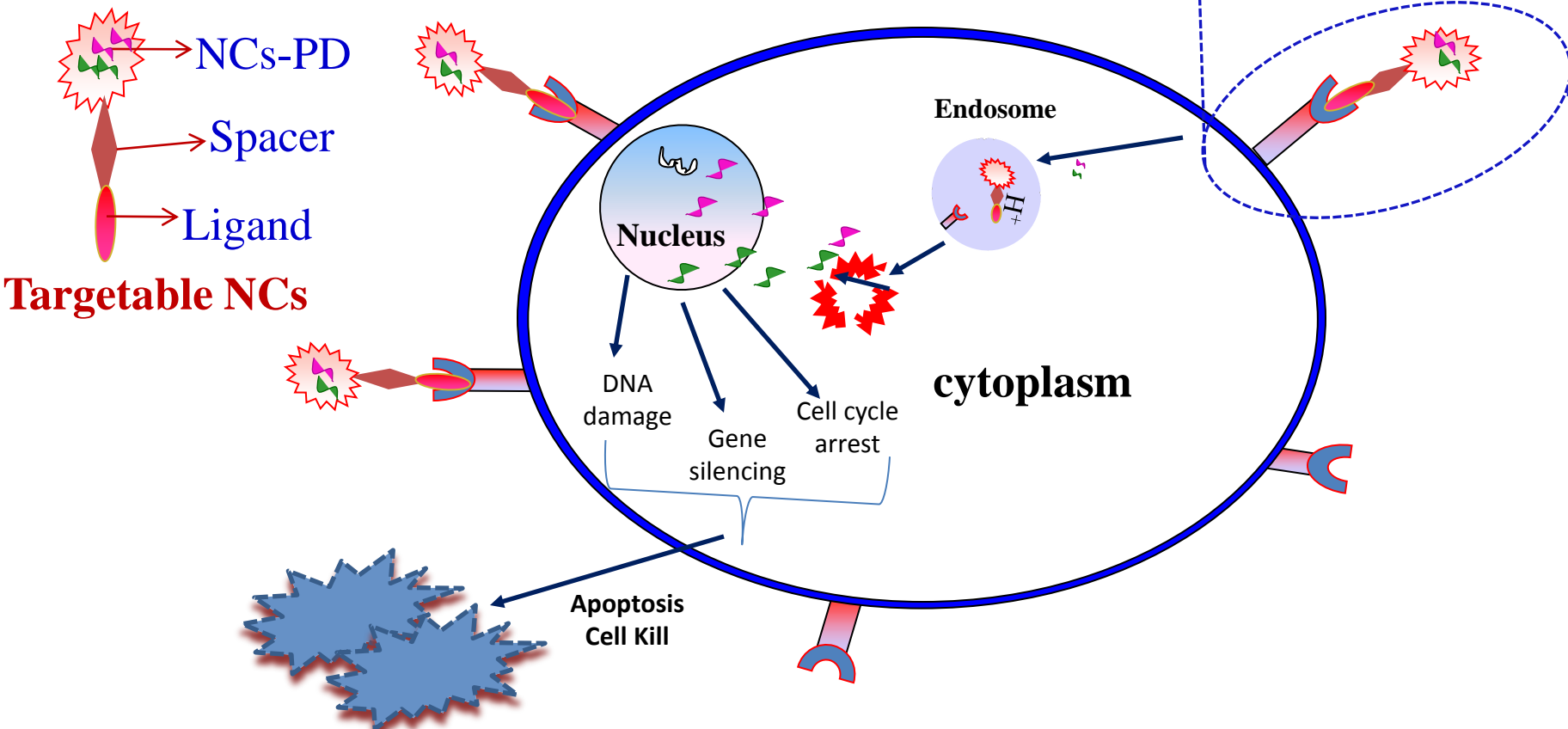
Elicit Therapeutic Effects



Improve efficacy of Multifunctional Targeted Nanocarriers

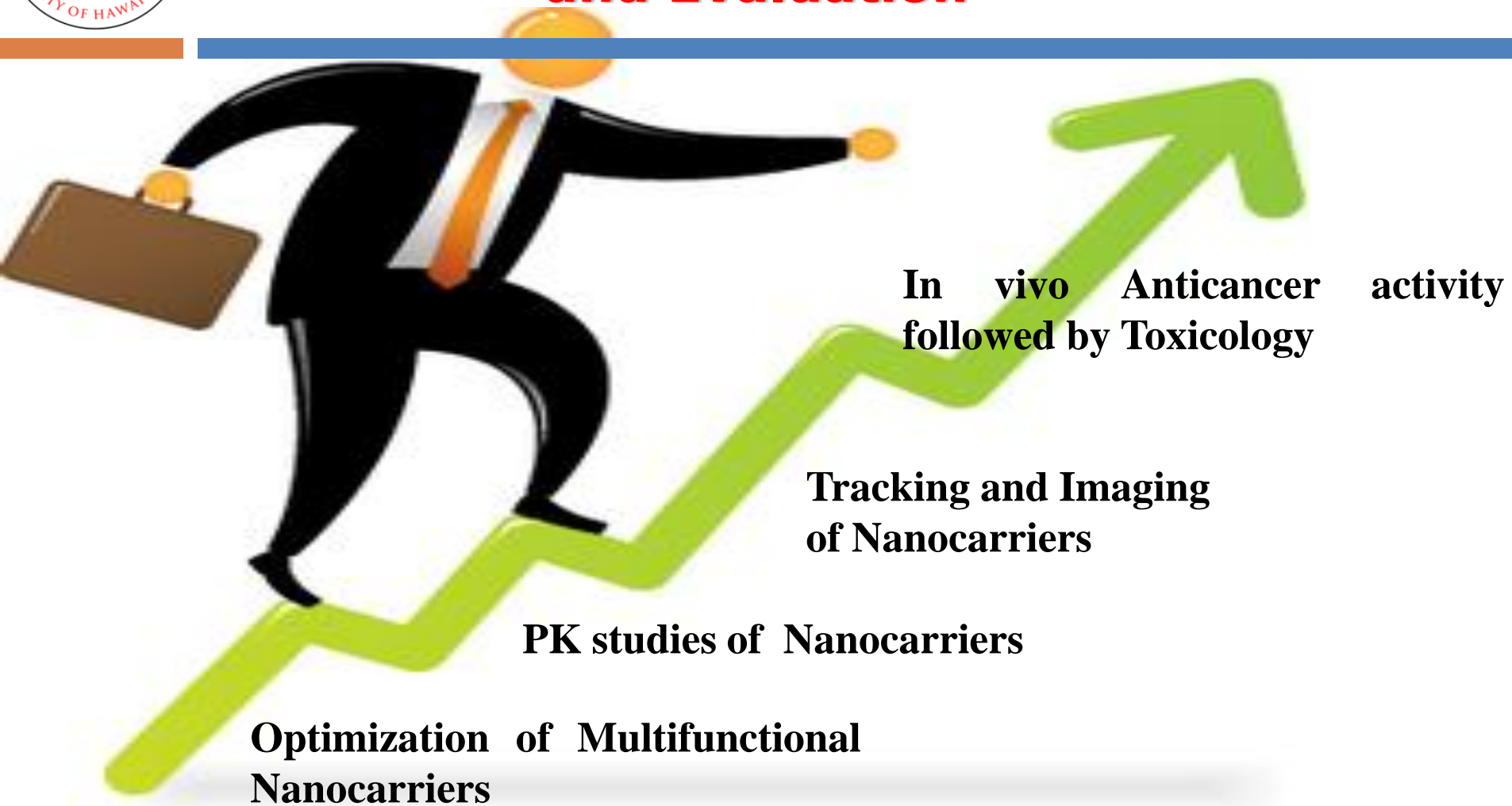


- ❑ Over expression of receptors
- ❑ Require cell receptor specific ligand
- ❑ Receptor Medicated Endocytosis





Outline of Nanocarrier Development and Evaluation

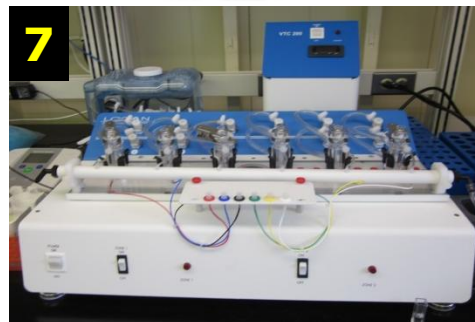
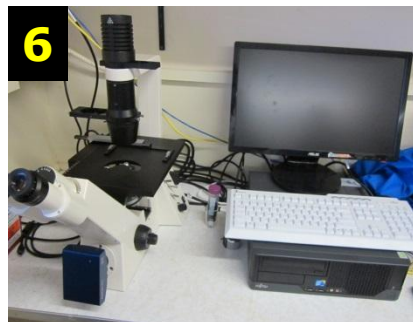
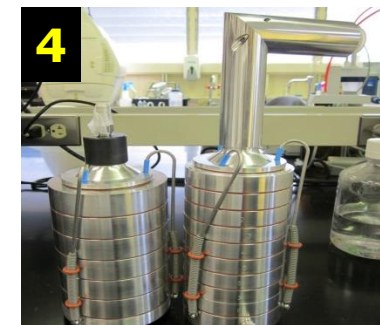




Instruments

Instruments for Nanoparticle Characterization & Formulation

1) Nano Debee High Pressure Homogenizer; **2)** Nicomp 380 ZLS Particle Size & Zeta Potential; **3)** EasyMax 102 Crystallizer; **4)** In vitro lung models; **5)** HPLC ; **6)** Fluorescent Microscope; **7)** Diffusion set up; **8)** Biotek Synergy plate reader (absorbance/ fluorescence / bioluminescence)





Relevant Publications

1. **Chougule MB**, Patel AR, Sachdeva P, Jackson T, Singh M. Anti-cancer activity of noscapine, an opioid alkaloid in combination with cisplatin in human non-small cell lung cancer. *Lung Cancer*, 2011, 71(3):271-82. PMID:PMC3094914
2. *Ichite N*, **Chougule MB**, Patel AR, Jackson T, Safe S, Singh M. Inhalation delivery of a novel diindolylmethane derivative for the treatment of lung cancer. *Molecular Cancer Therapeutics* 2010, 9(11):3003-14. PMID:PMC2978798, *The first two authors contributed equally*
3. Patlolla R, **Chougule MB**, Patel AR, Jackson T, and Singh M. Celecoxib encapsulated nanostructured lipid carrier system for pulmonary delivery. *J Control Release* 2010, 144(2):233-41. PMID:PMC2868936
4. **Chougule MB**, Patel AR, Jackson T, Singh M. Antitumor activity of noscapine in combination with Doxorubicin in triple negative breast cancer. *PLoS One* 2011, 6(3):e17733. PMID: PMC3057970
5. **Chougule MB***, Tekade RK (2012) Current Scene and Prospective Potentials of siRNA in Cancer Therapy. *J Pharmacogenom Pharmacoproteomics* 3:e125.
6. **Chougule MB***, Tekade RK, Hoffmann PR, Bhatia D, Pathak Y, Chapter 12, Nanomaterial Based Gene and Drug Delivery: Pulmonary Toxicity Considerations, *Bio-interactions of Nano materials*, 2013, Taylor and Francis, Boca Raton, Florida, USA. *In Press*.
7. Patel AR, **Chougule MB***, Ian T, Patlolla RR, Guangdi W, Singh M*. Efficacy of Aerosolized Celecoxib Encapsulated Nanostructured Lipid Carrier in Non-small Cell Lung Cancer in combination with Docetaxel, *Pharm Res*. 2013 Jan 30. [Epub ahead of print] PMC Journal - In Process
8. Kolate A, **Chougule MB***, Chapter 13, Application of polymers in lung drug delivery, *Applications of Polymers in Drug Delivery*, Smithers Rapra Publishers, Shawbury, Shrewsbury, Shropshire, SY4 4NR, UK, 2013, *In Press*
* Corresponding author

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- [Journal of Molecular and Genetic Medicine](#)
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- [2nd International Conference on Genomics & Pharmacogenomics](#)



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