

Chapter 6

References

6 References:

1. Gurunathan S, Kang MH, Qasim M, Kim JH. Nanoparticle-mediated combination therapy: Two-in-one approach for cancer. *Int. J. Mol. Sci.* 19(10), 1–37 (2018).
2. Doumat G, Daher D, Zerdan MB, *et al.* Drug Repurposing in Non-Small Cell Lung Carcinoma : Old Solutions for New Problems. *Curr. Oncol.* 30, 704–719 (2023).
3. Khan A, Alsahli MA, Aljasir MA, *et al.* Experimental and Theoretical Insights on Chemopreventive Effect of the Liposomal Thymoquinone Against Benzo[a]pyrene-Induced Lung Cancer in Swiss Albino Mice. *J. Inflamm. Res.* 15(April), 2263–2280 (2022).
4. American Institute for Cancer Research. Diet , nutrition , physical activity and lung cancer. *World Cancer Res. Fund.* (2018).
5. Kumar K, Chawla R. Nanocarriers-mediated therapeutics as a promising approach for treatment and diagnosis of lung cancer. *J. Drug Deliv. Sci. Technol.* [Internet]. 65(June), 102677 (2021). Available from: <https://doi.org/10.1016/j.jddst.2021.102677>.
6. Wang XB, Zhou HY. Molecularly targeted gemcitabine-loaded nanoparticulate system towards the treatment of EGFR overexpressing lung cancer. *Biomed. Pharmacother.* [Internet]. 70(C), 123–128 (2015). Available from: <http://dx.doi.org/10.1016/j.biopha.2015.01.008>.
7. Li Y, Liu Y, Chen Y, Wang K, Luan Y. Design, synthesis and antitumor activity study of a gemcitabine prodrug conjugated with a HDAC6 inhibitor. *Bioorganic Med. Chem. Lett.* [Internet]. 72(June), 128881 (2022). Available from: <https://doi.org/10.1016/j.bmcl.2022.128881>.
8. Jiang Z, Zhao Y, Liu Y, Tao L. Pristimerin synergizes with gemcitabine through abrogating Chk1/53BP1-mediated DNA repair in pancreatic cancer cells. *Food Chem. Toxicol.* [Internet]. 147(July 2020), 111919 (2021). Available from: <https://doi.org/10.1016/j.fct.2020.111919>.
9. Vrettos EI, Karampelas T, Sayyad N, *et al.* Development of programmable gemcitabine-GnRH pro-drugs bearing linker controllable “click” oxime bond tethers and preclinical evaluation against prostate cancer. *Eur. J. Med. Chem.* [Internet]. 211, 113018 (2021). Available from: <https://doi.org/10.1016/j.ejmech.2020.113018>.
10. Kirstein MN, Hassan I, Guire DE, *et al.* High-performance liquid chromatographic method for the determination of gemcitabine and 2',2'-difluorodeoxyuridine in plasma and tissue culture media. *J. Chromatogr. B Anal. Technol. Biomed. Life Sci.* 835(1–2), 136–142 (2006).
11. Yang X, Chen X, Wang Y, Xu G, Yu L, Ding J. Sustained release of lipophilic gemcitabine from an injectable polymeric hydrogel for synergistically enhancing tumor chemoradiotherapy. *Chem. Eng. J.* [Internet]. 396(April), 125320 (2020). Available from: <https://doi.org/10.1016/j.cej.2020.125320>.
12. Masetto F, Chegaev K, Gazzano E, *et al.* MRP5 nitration by NO-releasing gemcitabine encapsulated in liposomes confers sensitivity in chemoresistant pancreatic adenocarcinoma cells. *Biochim. Biophys. Acta - Mol. Cell Res.* [Internet]. 1867(12), 118824 (2020). Available from: <https://doi.org/10.1016/j.bbamcr.2020.118824>.
13. Kumar K, Rani V, Mishra M, Chawla R. New paradigm in combination therapy of siRNA with chemotherapeutic drugs for effective cancer therapy. *Curr. Res. Pharmacol. Drug Discov.* [Internet]. 3(April), 100103 (2022). Available from: <https://doi.org/10.1016/j.crphar.2022.100103>.

14. Takemoto H, Inaba T, Nomoto T, *et al.* Polymeric modification of gemcitabine via cyclic acetal linkage for enhanced anticancer potency with negligible side effects. *Biomaterials* [Internet]. 235(August 2019), 119804 (2020). Available from: <https://doi.org/10.1016/j.biomaterials.2020.119804>.
15. Kara G, Calin GA, Ozpolat B. RNAi-based therapeutics and tumor targeted delivery in cancer. *Adv. Drug Deliv. Rev.* [Internet]. 182, 114113 (2022). Available from: <https://doi.org/10.1016/j.addr.2022.114113>.
16. Lee JY, Chung SJ, Cho HJ, Kim DD. Phenylboronic acid-decorated chondroitin sulfate A-based theranostic nanoparticles for enhanced tumor targeting and penetration. *Adv. Funct. Mater.* 25(24), 3705–3717 (2015).
17. Guo B, Wei J, Wang J, *et al.* CD44-targeting hydrophobic phosphorylated gemcitabine prodrug nanotherapeutics augment lung cancer therapy. *Acta Biomater.* 145, 200–209 (2022).
18. Wang J, Zhu M, Nie G. Biomembrane-based nanostructures for cancer targeting and therapy: From synthetic liposomes to natural biomembranes and membrane-vesicles. *Adv. Drug Deliv. Rev.* [Internet]. 178, 113974 (2021). Available from: <https://doi.org/10.1016/j.addr.2021.113974>.
19. Gao Z, Xu M, Yue S, *et al.* Abnormal sialylation and fucosylation of saliva glycoproteins: Characteristics of lung cancer-specific biomarkers. *Curr. Res. Pharmacol. Drug Discov.* [Internet]. 3(December 2021), 100079 (2022). Available from: <https://doi.org/10.1016/j.crphar.2021.100079>.
20. Hasan A, Haque E, Hameed R, *et al.* Hsp90 inhibitor gedunin causes apoptosis in A549 lung cancer cells by disrupting Hsp90:Beclin-1:Bcl-2 interaction and downregulating autophagy. *Life Sci.* 256(May) (2020).
21. Black LE, Longo JF, Carroll SL. Mechanisms of Receptor Tyrosine-Protein Kinase ErbB-3 (ERBB3) Action in Human Neoplasia. *Am. J. Pathol.* [Internet]. 189(10), 1898–1912 (2019). Available from: <https://doi.org/10.1016/j.ajpath.2019.06.008>.
22. Harrison PT, Vyse S, Huang PH. Rare epidermal growth factor receptor (EGFR) mutations in non-small cell lung cancer. *Semin. Cancer Biol.* [Internet]. 61(August 2019), 167–179 (2020). Available from: <https://doi.org/10.1016/j.semcancer.2019.09.015>.
23. Liao ZX, Huang KY, Kempson IM, Li HJ, Tseng SJ, Yang PC. Nanomodified strategies to overcome EGFR-tyrosine kinase inhibitors resistance in non-small cell lung cancer. *J. Control. Release* [Internet]. 324(March), 482–492 (2020). Available from: <https://doi.org/10.1016/j.jconrel.2020.05.043>.
24. Ayati A, Moghimi S, Salarinejad S, Safavi M, Pouramiri B, Foroumadi A. A review on progression of epidermal growth factor receptor (EGFR) inhibitors as an efficient approach in cancer targeted therapy. *Bioorg. Chem.* [Internet]. 99(November 2019), 103811 (2020). Available from: <https://doi.org/10.1016/j.bioorg.2020.103811>.
25. Agustoni F, Suda K, Yu H, *et al.* EGFR-directed monoclonal antibodies in combination with chemotherapy for treatment of non-small-cell lung cancer: an updated review of clinical trials and new perspectives in biomarkers analysis. *Cancer Treat. Rev.* [Internet]. 72, 15–27 (2019). Available from: <https://doi.org/10.1016/j.ctrv.2018.08.002>.
26. Büll C, Boltje TJ, Van Dinther EAW, *et al.* Targeted delivery of a sialic acid-blocking glycomimetic to cancer cells inhibits metastatic spread. *ACS Nano.* 9(1), 733–745 (2015).

27. Choi Y, Kim J, Chae J, *et al.* Surface glycan targeting for cancer nano-immunotherapy. *J. Control. Release* [Internet]. 342, 321–336 (2022). Available from: <https://doi.org/10.1016/j.jconrel.2022.01.004>.
28. Abukar T, Rahmani S, Thompson NK, Antonescu CN, Wakarchuk WW. Development of BODIPY labelled sialic acids as sialyltransferase substrates for direct detection of terminal galactose on N- and O-linked glycans. *Carbohydr. Res.* [Internet]. 500, 108249 (2021). Available from: <https://doi.org/10.1016/j.carres.2021.108249>.
29. Wang DE, Yan J, Jiang J, *et al.* Polydiacetylene liposomes with phenylboronic acid tags: A fluorescence turn-on sensor for sialic acid detection and cell-surface glycan imaging. *Nanoscale*. 10(9), 4570–4578 (2018).
30. Halamish HM, Zlotver I, Sosnik A. Science Polymeric nanoparticles surface-complexed with boric acid actively target solid tumors overexpressing sialic acid. *J. Colloid Interface Sci.* [Internet]. 626, 916–929 (2022). Available from: <https://doi.org/10.1016/j.jcis.2022.07.027>.
31. Berois N, Pittini A, Osinaga E. Targeting Tumor Glycans for Cancer Therapy : Successes , Limitations, and Perspectives. 14(645), 2–42 (2022).
32. Jaiswal S, Dutta PK, Kumar S, Chawla R. Chitosan modified by organo-functionalities as an efficient nanoplatform for anti-cancer drug delivery process. *J. Drug Deliv. Sci. Technol.* [Internet]. 62(October 2020), 102407 (2021). Available from: <https://doi.org/10.1016/j.jddst.2021.102407>.
33. Madamsetty VS, Tavakol S, Moghassemi S, *et al.* Chitosan: A versatile bio-platform for breast cancer theranostics. *J. Control. Release* [Internet]. 341(December 2021), 733–752 (2022). Available from: <https://doi.org/10.1016/j.jconrel.2021.12.012>.
34. El-hack MEA, El-saadony MT, Sha ME, *et al.* Antimicrobial and antioxidant properties of chitosan and its derivatives and their applications : A review. 164, 2726–2744 (2020).
35. Ma R, Shi L. Trade- off effect of polymeric nano-medicine in anti-cancer drug. *Giant* [Internet]. 8, 100074 (2021). Available from: <https://doi.org/10.1016/j.giant.2021.100074>.
36. Kalhapure RS, Renukuntla J. Thermo- and pH dual responsive polymeric micelles and nanoparticles. *Chem. Biol. Interact.* [Internet]. 295, 20–37 (2018). Available from: <https://doi.org/10.1016/j.cbi.2018.07.016>.
37. Yan T, He J, Liu R, Liu Z, Cheng J. Chitosan capped pH-responsive hollow mesoporous silica nanoparticles for targeted chemo-photo combination therapy. *Carbohydr. Polym.* [Internet]. 231(November 2019), 115706 (2020). Available from: <https://doi.org/10.1016/j.carbpol.2019.115706>.
38. Herbst, R. S., Heymach, J. V., & Lippman S. MOLECULAR ORIGINS OF CANCER Lung cancer. *New Engl. J. Med. Rev.* 13(359), 1367–1380 (2008).
39. Nowell PC. The Clonal Evolution of Tumor Cell Populations. *Science (80-)*. 194(4260), 23–28 (1976).
40. Cryer AM, Thorley AJ. Nanotechnology in the diagnosis and treatment of lung cancer. *Pharmacol. Ther.* [Internet]. 198, 189–205 (2019). Available from: <https://doi.org/10.1016/j.pharmthera.2019.02.010>.
41. Lemjabbar-Alaoui H, Hassan OUI, Yang YW, Buchanan P. Lung cancer: Biology and

- treatment options [Internet]. *Biochim. Biophys. Acta - Rev. Cancer* 1856(2), 189–210 (2015). Available from: <http://dx.doi.org/10.1016/j.bbcan.2015.08.002>.
42. Goldstraw P, Ball D, Jett JR, *et al.* Non-small-cell lung cancer. *Lancet* [Internet]. 378(9804), 1727–1740 (2011). Available from: [http://dx.doi.org/10.1016/S0140-6736\(10\)62101-0](http://dx.doi.org/10.1016/S0140-6736(10)62101-0).
 43. Kosaka T, Yatabe Y, Endoh H, Kuwano H, Takahashi T, Mitsudomi T. Mutations of the epidermal growth factor receptor gene in lung cancer: Biological and clinical implications. *Cancer Res.* 64(24), 8919–8923 (2004).
 44. Molina JR, Yang P, Cassivi SD, Schild SE, Adjei AA. Non-small cell lung cancer: Epidemiology, risk factors, treatment, and survivorship. *Mayo Clin. Proc.* 83(5), 584–594 (2008).
 45. Hutchinson BD, Shroff GS, Truong MT, Ko JP. Spectrum of Lung Adenocarcinoma. *Semin. Ultrasound, CT MRI* [Internet]. 40(3), 255–264 (2019). Available from: <https://doi.org/10.1053/j.sult.2018.11.009>.
 46. Pal P, Cabanero M, Tsao M-S. Pulmonary Adenocarcinoma—Pathology and Molecular Testing. In: *Pulmonary Adenocarcinoma: Approaches to Treatment*, 13–33 (2019).
 47. Denisov E V, Schegoleva AA, Gervas PA, *et al.* Premalignant lesions of squamous cell carcinoma of the lung: The molecular make-up and factors affecting their progression [Internet]. *Lung Cancer* 135(July), 21–28 (2019). Available from: <https://doi.org/10.1016/j.lungcan.2019.07.001>.
 48. Sereno M, Rodríguez I, Zambrana F, *et al.* Squamous-cell carcinoma of the lungs: Is it really so different? *Crit. Rev. Oncol. / Hematol.* [Internet]. 84(3), 327–339 (2012). Available from: <http://dx.doi.org/10.1016/j.critrevonc.2012.06.009>.
 49. Hsieh MH, Choe JH, Gadhvi J, *et al.* p63 and SOX2 Dictate Glucose Reliance and Metabolic Vulnerabilities in Squamous Cell Carcinomas. *Cell Rep.* [Internet]. 28(7), 1860-1878. (2019). Available from: <https://doi.org/10.1016/j.celrep.2019.07.027>.
 50. Weissferdt A. Large cell carcinoma of lung: On the verge of extinction? *Semin. Diagn. Pathol.* [Internet]. 31(4), 278–288 (2014). Available from: <http://dx.doi.org/10.1053/j.semmp.2014.06.005>.
 51. Harms A, Endris V, Winter H, *et al.* Molecular dissection of large cell carcinomas of the lung with null immunophenotype. *Pathology.* 50(5), 530–535 (2018).
 52. Najjar F, Alammar M, Al-Massarani G, Almalla N, Japawe A, Ikhtiar A. Circulating endothelial cells and microparticles as diagnostic and prognostic biomarkers in small-cell lung cancer. *Lung Cancer* [Internet]. 124, 23–30 (2018). Available from: <https://doi.org/10.1016/j.lungcan.2018.06.033>.
 53. Wang S, Zimmermann S, Parikh K, Mansfield AS, Adjei AA. Current Diagnosis and Management of Small-Cell Lung Cancer. *Mayo Clin. Proc.* 94(8), 1599–1622 (2019).
 54. Waqar SN, Morgensztern D. Treatment advances in small cell lung cancer (SCLC) [Internet]. *Pharmacol. Ther.* 180, 16–23 (2017). Available from: <https://doi.org/10.1016/j.pharmthera.2017.06.002>.
 55. Hollings N, Shaw P. Diagnostic imaging of lung cancer. *Eur. Respir. J.* 19(4), 722–742 (2002).

56. Shaffie A, Soliman A, Ghazal M, *et al.* A new framework for incorporating appearance and shape features of lung nodules for precise diagnosis of lung cancer. *Proc. - Int. Conf. Image Process. ICIP.* 2017-Septe, 1372–1376 (2018).
57. Theodoropoulos AS, Gkiozos I, Kontopyrgias G, *et al.* Modern radiopharmaceuticals for lung cancer imaging with positron emission tomography/computed tomography scan: A systematic review. *SAGE Open Med.* 8, 205031212096159 (2020).
58. Andolfi M, Potenza R, Capozzi R, Liparulo V, Puma F, Yasufuku K. The role of bronchoscopy in the diagnosis of early lung cancer: A review. *J. Thorac. Dis.* 8(11), 3329–3337 (2016).
59. Lam S, MacAulay C, LeRiche JC, Palcic B. Detection and localization of early lung cancer by fluorescence bronchoscopy. *Cancer.* 89(11 SUPPL.), 2468–2473 (2000).
60. Colella S, Vilmann P, Konge L, Clementsen PF. Endoscopic ultrasound in the diagnosis and staging of lung cancer. *Endosc. Ultrasound*3(4), 205–212 (2014).
61. Wan X, Song Y, Song N, *et al.* The preliminary study of immune superparamagnetic iron oxide nanoparticles for the detection of lung cancer in magnetic resonance imaging. *Carbohydr. Res.* [Internet]. 419, 1–30 (2016). Available from: <http://dx.doi.org/10.1016/j.carres.2015.11.003>.
62. Wang YXJ, Lo GG, Yuan J, Larson PEZ, Zhang X. Magnetic resonance imaging for lung cancer screen. *J. Thorac. Dis.* 6(9), 1340–1348 (2014).
63. Thunnissen FBJM. Sputum examination for early detection of lung cancer. *J. Clin. Pathol.*56(11), 805–810 (2003).
64. Tsukada H, Satou T, Iwashima A, Souma T. Diagnostic accuracy of CT-guided automated needle biopsy of lung nodules. *Am. J. Roentgenol.* 175(1), 239–243 (2000).
65. Altintas Z, Tothill I. Biomarkers and biosensors for the early diagnosis of lung cancer. *Sensors Actuators, B Chem.* [Internet]. 188, 988–998 (2013). Available from: <http://dx.doi.org/10.1016/j.snb.2013.07.078>.
66. Jiang C, Lin X, Zhao Z. Applications of CRISPR/Cas9 Technology in the Treatment of Lung Cancer [Internet]. *Trends Mol. Med.*25(11), 1039–1049 (2019). Available from: <https://doi.org/10.1016/j.molmed.2019.07.007>.
67. Wang C, Kulkarni P, Salgia R. Combined Checkpoint Inhibition and Chemotherapy: New Era of 1st -Line Treatment for Non-Small-Cell Lung Cancer [Internet]. *Mol. Ther. - Oncolytics*13(June), 1–6 (2019). Available from: <https://doi.org/10.1016/j.omto.2019.02.001>.
68. Babu A, Templeton AK, Munshi A, Ramesh R. Nanoparticle-based drug delivery for therapy of lung cancer: Progress and challenges. *J. Nanomater.*2013, 1–11 (2013).
69. Landesman-Milo D, Ramishetti S, Peer D. Nanomedicine as an emerging platform for metastatic lung cancer therapy. *Cancer Metastasis Rev.* 34(2), 291–301 (2015).
70. Weaver H, Coonar AS. Lung cancer: diagnosis, staging and treatment [Internet]. *Surg. (United Kingdom)*35(5), 247–254 (2017). Available from: <http://dx.doi.org/10.1016/j.mpsur.2017.02.007>.
71. Gorain B, Choudhury H, Pandey M, *et al.* Dendrimer-Based Nanocarriers in Lung Cancer

- Therapy [Internet]. In: *Nanotechnology-Based Targeted Drug Delivery Systems for Lung Cancer*, 161–192 (2019). Available from: <http://dx.doi.org/10.1016/B978-0-12-815720-6.00007-1>.
72. Freixinet J, Embún R, Rodríguez P. Current Indications For Surgical Treatment of Lung Metastases. *Arch. Bronconeumol.* [Internet]. 53(12), 661–662 (2017). Available from: <http://dx.doi.org/10.1016/j.arbr.2017.10.002>.
 73. Lin W, Huang Y wern, Zhou XD, Ma Y. In vitro toxicity of silica nanoparticles in human lung cancer cells. *Toxicol. Appl. Pharmacol.* 217(3), 252–259 (2006).
 74. Filipaska M, Pedraz-Valdunciel C, Chaib I, Rosell R. Biological therapies in lung cancer treatment: using our immune system as an ally to defeat the malignancy [Internet]. *Expert Opin. Biol. Ther.* 19(5), 457–467 (2019). Available from: <https://doi.org/10.1080/14712598.2019.1582635>.
 75. Singhal S, Shrager JB, Kaiser JR. Biological Treatments for Lung Cancer. *Malig. Tumors Lung.* , 333–350 (2004).
 76. Ramalingam SS, Owonikoko TK, Khuri FR. Lung Cancer: New Biological Insights and Recent Therapeutic Advances. 61(2), 91–112 (2011).
 77. Pillai RN, Owonikoko TK. Small Cell Lung Cancer_ Therapies and Targets. *Semin. Oncol.* [Internet]. 41(1), 133–142 (2014). Available from: <http://dx.doi.org/10.1053/j.seminoncol.2013.12.015>.
 78. Kim JA. Targeted therapies for the treatment of cancer. *Am. J. Surg.* 186(3), 264–268 (2003).
 79. Cole AJ, Hanna GG, Jain S, O’Sullivan JM. Motion management for radical radiotherapy in non-small cell lung cancer. *Clin. Oncol.* [Internet]. 26(2), 67–80 (2014). Available from: <http://dx.doi.org/10.1016/j.clon.2013.11.001>.
 80. Palma DA, Verbakel WFAR, Otto K, Senan S. New developments in arc radiation therapy: A review [Internet]. *Cancer Treat. Rev.* 36(5), 393–399 (2010). Available from: <http://dx.doi.org/10.1016/j.ctrv.2010.01.004>.
 81. Song SY, Choi W, Shin SS, *et al.* Fractionated stereotactic body radiation therapy for medically inoperable stage I lung cancer adjacent to central large bronchus. *Lung Cancer.* 66(1), 89–93 (2009).
 82. Brunelli A, Charloux A, Bolliger CT, *et al.* ERS/ESTS clinical guidelines on fitness for radical therapy in lung cancer patients (surgery and chemo-radiotherapy). *Eur. Respir. J.* [Internet]. 34(1), 17–41 (2009). Available from: <https://erj.ersjournals.com/content/34/1/17.short>.
 83. Caracciolo G, Vali H, Moore A, Mahmoudi M. Challenges in molecular diagnostic research in cancer nanotechnology. *Nano Today* [Internet]. 27, 6–10 (2019). Available from: <https://doi.org/10.1016/j.nantod.2019.06.001>.
 84. Sharma P, Mehta M, Dhanjal DS, *et al.* Emerging trends in the novel drug delivery approaches for the treatment of lung cancer [Internet]. *Chem. Biol. Interact.* 309(May), 108720 (2019). Available from: <https://doi.org/10.1016/j.cbi.2019.06.033>.
 85. Schroeder A, Heller DA, Winslow MM, *et al.* Treating metastatic cancer with nanotechnology [Internet]. *Nat. Rev. Cancer* 12(1), 39–50 (2012). Available from: <http://dx.doi.org/10.1038/nrc3180>.

86. Sanna V, Pala N, Sechi M. Targeted therapy using nanotechnology: Focus on cancer. *Int. J. Nanomedicine*. 9(1), 467–483 (2014).
87. Salahpour Anarjan F. Active targeting drug delivery nanocarriers: Ligands. *Nano-Structures and Nano-Objects* [Internet]. 19, 100370 (2019). Available from: <https://doi.org/10.1016/j.nanoso.2019.100370>.
88. Danhier F, Feron O, Préat V. To exploit the tumor microenvironment: Passive and active tumor targeting of nanocarriers for anti-cancer drug delivery. *J. Control. Release* [Internet]. 148(2), 135–146 (2010). Available from: <http://dx.doi.org/10.1016/j.jconrel.2010.08.027>.
89. Sung JC, Pulliam BL, Edwards DA. Nanoparticles for drug delivery to the lungs. *Trends Biotechnol.* 25(12), 563–570 (2007).
90. Van Rijt SH, Bein T, Meiners S. Medical nanoparticles for next generation drug delivery to the lungs. *Eur. Respir. J.* 44(3), 765–774 (2014).
91. Choi HS, Ashitate Y, Lee JH, *et al.* Rapid translocation of nanoparticles from the lung airspaces to the body. *Nat. Biotechnol.* 28(12), 1300–1303 (2010).
92. Maeda H. The enhanced permeability and retention (EPR) effect in tumor vasculature: The key role of tumor-selective macromolecular drug targeting. *Adv. Enzyme Regul.* 41(1), 189–207 (2001).
93. Dinauer N, Balthasar S, Weber C, Kreuter J, Langer K, Von Briesen H. Selective targeting of antibody-conjugated nanoparticles to leukemic cells and primary T-lymphocytes. *Biomaterials*. 26(29), 5898–5906 (2005).
94. Rivera MP, Mehta AC, Wahidi MM. Establishing the diagnosis of lung cancer: Diagnosis and management of lung cancer, 3rd ed: American college of chest physicians evidence-based clinical practice guidelines. *Chest* [Internet]. 143(5 SUPPL), e142S–e165S (2013). Available from: <http://dx.doi.org/10.1378/chest.12-2353>.
95. Wu M, Huang S. Magnetic nanoparticles in cancer diagnosis, drug delivery and treatment (Review). *Mol. Clin. Oncol.* 7, 738–746 (2017).
96. Jin C, Wang K, Oppong-Gyebi A, Hu J. Application of nanotechnology in cancer diagnosis and therapy - A mini-review. *Int. J. Med. Sci.* 17(18), 2964–2973 (2020).
97. Wang H, Zheng L, Peng C, Shen M, Shi X, Zhang G. Folic acid-modified dendrimer-entrapped gold nanoparticles as nanoprobe for targeted CT imaging of human lung adenocarcinoma. *Biomaterials* [Internet]. 34(2), 470–480 (2013). Available from: <http://dx.doi.org/10.1016/j.biomaterials.2012.09.054>.
98. Pfaff A, Schallon A, Ruhland TM, *et al.* Magnetic and fluorescent glycopolymer hybrid nanoparticles for intranuclear optical imaging. *Biomacromolecules*. 12(10), 3805–3811 (2011).
99. Li N, Han L, Jing H. Contrast-enhanced ultrasound with a novel nanoparticle contrast agent for clinical diagnosis in patients with non-small cell lung cancer. *Exp. Ther. Med.* 14(4), 3768–3773 (2017).
100. Wang Y, Zheng D, Tan Q, Wang MX, Gu LQ. Nanopore-based detection of circulating microRNAs in lung cancer patients. *Nat. Nanotechnol.* 6(10), 668–674 (2011).
101. Sivarajakumar R, Mallukaraj D, Kadavakollu M, *et al.* Nanoparticles for the treatment of lung

- cancers. *J. Young Pharm.* 10(3), 276–281 (2018).
102. Hussain S. Nanomedicine for treatment of lung cancer. *Adv. Exp. Med. Biol.* 890(February), 137–147 (2016).
103. Norouzi M, Hardy P. Clinical applications of nanomedicines in lung cancer treatment. *Acta Biomater.* [Internet]. 121, 134–142 (2021). Available from: <https://doi.org/10.1016/j.actbio.2020.12.009>.
104. Bangham AD, Standish MM, Watkins JC. Diffusion of univalent ions across the lamellae of swollen phospholipids. *J. Mol. Biol.* [Internet]. 13(1), 238–252 (1965). Available from: [http://dx.doi.org/10.1016/S0022-2836\(65\)80093-6](http://dx.doi.org/10.1016/S0022-2836(65)80093-6).
105. Hu CMJ, Zhang L. Nanoparticle-based combination therapy toward overcoming drug resistance in cancer. *Biochem. Pharmacol.* [Internet]. 83(8), 1104–1111 (2012). Available from: <http://dx.doi.org/10.1016/j.bcp.2012.01.008>.
106. Garrastazu Pereira G, Lawson AJ, Buttini F, Sonvico F. Loco-regional administration of nanomedicines for the treatment of lung cancer. *Drug Deliv.* 23(8), 2881–2896 (2016).
107. Mylonakis N, Athanasiou A, Ziras N, *et al.* Phase II study of liposomal cisplatin (Lipoplatin™) plus gemcitabine versus cisplatin plus gemcitabine as first line treatment in inoperable (stage IIIB/IV) non-small cell lung cancer. *Lung Cancer.* 68(2), 240–247 (2010).
108. Jinturkar KA, Anish C, Kumar MK, Bagchi T, Panda AK, Misra AR. Liposomal formulations of Etoposide and Docetaxel for p53 mediated enhanced cytotoxicity in lung cancer cell lines. *Biomaterials.* 33(8), 2492–2507 (2012).
109. Wang X, Zhou J, Wang Y, *et al.* A phase I clinical and pharmacokinetic study of paclitaxel liposome infused in non-small cell lung cancer patients with malignant pleural effusions. *Eur. J. Cancer.* 46(8), 1474–1480 (2010).
110. Park JW, Hong K, Kirpotin DB, Papahadjopoulos D, Benz CC. Immunoliposomes for Cancer Treatment. *Adv. Pharmacol.* 40(C), 399–435 (1997).
111. Moreira JN, Gaspar R, Allen TM. Targeting Stealth liposomes in a murine model of human small cell lung cancer. *Biochim. Biophys. Acta - Biomembr.* 1515(2), 167–176 (2001).
112. Moreira JN, Hansen CB, Gaspar R, Allen TM. A growth factor antagonist as a targeting agent for sterically stabilized liposomes in human small cell lung cancer. *Biochim. Biophys. Acta - Biomembr.* 1514(2), 303–317 (2001).
113. Kurmi BD, Kayat J, Gajbhiye V, Tekade RK, Jain NK. Micro- and nanocarrier-mediated lung targeting. *Expert Opin. Drug Deliv.* 7(7), 781–794 (2010).
114. Ito I, Ji L, Tanaka F, *et al.* Liposomal vector mediated delivery of the 3p FUS1 gene demonstrates potent antitumor activity against human lung cancer in vivo. *Cancer Gene Ther.* [Internet]. 11(11), 733–739 (2004). Available from: <https://www.nature.com/articles/7700756>.
115. Mishra M, Kumar P, Rajawat JS, Malik R, Sharma G, Modgil A. Nanotechnology: Revolutionizing the Science of Drug Delivery. *Curr. Pharm. Des.* [Internet]. 24(43), 5086–5107 (2019). Available from: <https://www.ingentaconnect.com/content/ben/cpd/2018/00000024/00000043/art00002>.
116. Malam Y, Loizidou M, Seifalian AM. Liposomes and nanoparticles: nanosized vehicles for

- drug delivery in cancer [Internet]. *Trends Pharmacol. Sci.*30(11), 592–599 (2009). Available from: <https://www.sciencedirect.com/science/article/pii/S0165614709001370>.
117. Lin CH, Chen CH, Lin ZC, Fang JY. Recent advances in oral delivery of drugs and bioactive natural products using solid lipid nanoparticles as the carriers [Internet]. *J. Food Drug Anal.*25(2), 219–234 (2017). Available from: <https://www.sciencedirect.com/science/article/pii/S1021949817300522>.
 118. Xiang QY, Wang MT, Chen F, *et al.* Lung-targeting delivery of dexamethasone acetate loaded solid lipid nanoparticles. *Arch. Pharm. Res.* 30(4), 519–525 (2007).
 119. Sahu PK, Mishra DK, Jain N, Rajoriya V, Jain AK. Mannosylated solid lipid nanoparticles for lung-targeted delivery of Paclitaxel. *Drug Dev. Ind. Pharm.* [Internet]. 41(4), 640–649 (2015). Available from: <https://www.tandfonline.com/action/journalInformation?journalCode=ididi20http://informahealthcare.com/ddi>.
 120. Pooja D, Kulhari H, Tunki L, *et al.* Nanomedicines for targeted delivery of etoposide to non-small cell lung cancer using transferrin functionalized nanoparticles. *RSC Adv.* 5(61), 49122–49131 (2015).
 121. Rosière R, Amighi K, Wauthoz N. New Dry Powders for Inhalation Containing Chitosan Derivative-Coated Solid Lipid Nanoparticles for Targeted Delivery to Lung Cancer Cells. *RDD Eur.* 2015. 2, 447–452 (2015).
 122. Lee HY, Mohammed KA, Nasreen N. Nanoparticle-based targeted gene therapy for lung cancer. *Am. J. Cancer Res.* 6(5), 1118–1134 (2016).
 123. Choi SH, Jin SE, Lee MK, *et al.* Novel cationic solid lipid nanoparticles enhanced p53 gene transfer to lung cancer cells. *Eur. J. Pharm. Biopharm.* 68(3), 545–554 (2008).
 124. Müller RH, Radtke M, Wissing SA. Solid lipid nanoparticles (SLN) and nanostructured lipid carriers (NLC) in cosmetic and dermatological preparations. In: *Advanced Drug Delivery Reviews*, S131–S155 (2002).
 125. Fang C-L, A. Al-Suwayeh S, Fang J-Y. Nanostructured Lipid Carriers (NLCs) for Drug Delivery and Targeting. *Recent Pat. Nanotechnol.* 7(1), 41–55 (2013).
 126. Taratula O, Kuzmov A, Shah M, Garbuzenko OB, Minko T. Nanostructured lipid carriers as multifunctional nanomedicine platform for pulmonary co-delivery of anticancer drugs and siRNA. *J. Control. Release* [Internet]. 171(3), 349–357 (2013). Available from: <https://www.sciencedirect.com/science/article/pii/S016836591300237X>.
 127. Patil TS, Deshpande AS. Nanostructured lipid carriers-based drug delivery for treating various lung diseases: A State- of- the- Art Review. *Int. J. Pharm.*547(1–2), 209–225 (2018).
 128. Wang Y, Zhang H, Hao J, Li B, Li M, Xiuwen W. Lung cancer combination therapy: co-delivery of paclitaxel and doxorubicin by nanostructured lipid carriers for synergistic effect. *Drug Deliv.* [Internet]. 23(4), 1398–1403 (2016). Available from: <http://www.tandfonline.com/doi/full/10.3109/10717544.2015.1055619>.
 129. Shao Z, Shao J, Tan B, *et al.* Targeted lung cancer therapy: Preparation and optimization of transferrin-decorated nanostructured lipid carriers as novel nanomedicine for co-delivery of anticancer drugs and DNA. *Int. J. Nanomedicine.* 10, 1223–1233 (2015).

130. Conde J, Doria G, Baptista P. Noble Metal Nanoparticles Applications in Cancer. *J. Drug Deliv.* [Internet]. 2012, 1–12 (2012). Available from: <https://www.hindawi.com/archive/2012/751075/abs/>.
131. Jin KT, Lu ZB, Chen JY, *et al.* Recent Trends in Nanocarrier-Based Targeted Chemotherapy: Selective Delivery of Anticancer Drugs for Effective Lung, Colon, Cervical, and Breast Cancer Treatment. *J. Nanomater.* 2020 (2020).
132. Peng G, Tisch U, Adams O, *et al.* Diagnosing lung cancer in exhaled breath using gold nanoparticles. *Nat. Nanotechnol.* [Internet]. 4(10), 669–673 (2009). Available from: www.nature.com/naturenanotechnology.
133. Barash O, Peled N, Tisch U, Bunn PA, Hirsch FR, Haick H. Classification of lung cancer histology by gold nanoparticle sensors. *Nanomedicine Nanotechnology, Biol. Med.* [Internet]. 8(5), 580–589 (2012). Available from: <http://dx.doi.org/10.1016/j.nano.2011.10.001>.
134. Chen YH, Tsai CY, Huang PY, *et al.* Methotrexate conjugated to gold nanoparticles inhibits tumor growth in a syngeneic lung tumor model. *Mol. Pharm.* 4(5), 713–722 (2007).
135. Ma LL, Tam JO, Willsey BW, *et al.* Selective targeting of antibody conjugated multifunctional nanoclusters (nanoroses) to epidermal growth factor receptors in cancer cells. *Langmuir.* 27(12), 7681–7690 (2011).
136. Zhou G, Wang W. Synthesis of silver nanoparticles and their antiproliferation against human lung cancer cells in vitro. *Orient. J. Chem.* [Internet]. 28(2), 651–655 (2012). Available from: <http://www.orientjchem.org/vol28no2/synthesis-of-silver-nanoparticles-and-their-antiproliferation-against-human-lung-cancer-cells-in-vitro/>.
137. Dayem AA, Hossain MK, Lee S Bin, *et al.* The role of reactive oxygen species (ROS) in the biological activities of metallic nanoparticles. *Int. J. Mol. Sci.* 18(1), 1–21 (2017).
138. Foldbjerg R, Dang DA, Autrup H. Cytotoxicity and genotoxicity of silver nanoparticles in the human lung cancer cell line, A549. *Arch. Toxicol.* 85(7), 743–750 (2011).
139. He Y, Du Z, Ma S, *et al.* Effects of green-synthesized silver nanoparticles on lung cancer cells in vitro and grown as xenograft tumors in vivo. *Int. J. Nanomedicine.* 11, 1879–1887 (2016).
140. Wu H, Zhao Y, Mu X, *et al.* A silica-polymer composite nano system for tumor-targeted imaging and p53 gene therapy of lung cancer. *J. Biomater. Sci. Polym. Ed.* 26(6), 384–400 (2015).
141. Zhang J, Fu Y, Mei Y, Jiang F, Lakowicz JR. Fluorescent metal nanoshell probe to detect single mirna in lung cancer cell. *Anal. Chem.* 82(11), 4464–4471 (2010).
142. Llu KK, Zheng WW, Wang CC, *et al.* Covalent linkage of nanodiamond-paclitaxel for drug delivery and cancer therapy. *Nanotechnology.* 21(31) (2010).
143. Chowdhury P, Roberts AM, Khan S, *et al.* Magnetic nanoformulations for prostate cancer [Internet]. *Drug Discov. Today*22(8), 1233–1241 (2017). Available from: <https://www.sciencedirect.com/science/article/pii/S1359644616304688>.
144. Sadhasivam J, Sugumaran A. Journal of Drug Delivery Science and Technology Magnetic nanocarriers : Emerging tool for the e ff ective targeted treatment of lung cancer. 55(November 2019) (2020).

145. Sadhukha T, Wiedmann TS, Panyam J. Inhalable magnetic nanoparticles for targeted hyperthermia in lung cancer therapy. *Biomaterials* [Internet]. 34(21), 5163–5171 (2013). Available from: <https://www.sciencedirect.com/science/article/pii/S0142961213003839>.
146. Yokoyama T, Tam J, Kuroda S, *et al.* Egfr-targeted hybrid plasmonic magnetic nanoparticles synergistically induce autophagy and apoptosis in non-small cell lung cancer cells. *PLoS One* [Internet]. 6(11), 1–13 (2011). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3210119/>.
147. Wang Y, Zhang Y, Du Z, Wu M, Zhang G. Detection of micrometastases in lung cancer with magnetic nanoparticles and quantum dots. *Int. J. Nanomedicine*. 7, 2315–2324 (2012).
148. Li K, Chen B, Xu L, *et al.* Reversal of multidrug resistance by cisplatin-loaded magnetic Fe₃O₄ nanoparticles in A549/ DDP lung cancer cells in vitro and in vivo. *Int. J. Nanomedicine*. 8, 1867–1877 (2013).
149. Verma NK, Crosbie-Staunton K, Satti A, *et al.* Magnetic core-shell nanoparticles for drug delivery by nebulization. *J. Nanobiotechnology*. 11(1), 1–12 (2013).
150. Cho K, Wang X, Nie S, Chen Z, Shin DM. Therapeutic nanoparticles for drug delivery in cancer. *Clin. Cancer Res.*14(5), 1310–1316 (2008).
151. Hu CMJ, Aryal S, Zhang L. Nanoparticle-assisted combination therapies for effective cancer treatment. *Ther. Deliv.*1(2), 323–334 (2010).
152. Sharma P, Mehta M, Dhanjal DS, *et al.* Emerging trends in the novel drug delivery approaches for the treatment of lung cancer. *Chem. Biol. Interact.* [Internet]. 309 (2019). Available from: <https://doi.org/10.1016/j.cbi.2019.06.033>.
153. Jung J, Park SJ, Chung HK, *et al.* Polymeric nanoparticles containing taxanes enhance chemoradiotherapeutic efficacy in non-small cell lung cancer. *Int. J. Radiat. Oncol. Biol. Phys.* 84(1), e77–e83 (2012).
154. Tseng CL, Wang TW, Dong GC, *et al.* Development of gelatin nanoparticles with biotinylated EGF conjugation for lung cancer targeting. *Biomaterials*. 28(27), 3996–4005 (2007).
155. Tseng CL, Su WY, Yen KC, Yang KC, Lin FH. The use of biotinylated-EGF-modified gelatin nanoparticle carrier to enhance cisplatin accumulation in cancerous lungs via inhalation. *Biomaterials*. 30(20), 3476–3485 (2009).
156. Aslan B, Ozpolat B, Sood AK, Lopez-Berestein G. Nanotechnology in cancer therapy. *J. Drug Target.*21(10), 904–913 (2013).
157. Kedar U, Phutane P, Shidhaye S, Kadam V. Advances in polymeric micelles for drug delivery and tumor targeting. *Nanomedicine Nanotechnology, Biol. Med.*6(6), 714–729 (2010).
158. Nishiyama N, Okazaki S, Cabral H, *et al.* Novel Cisplatin-Incorporated Polymeric Micelles Can Eradicate Solid Tumors in Mice. *Cancer Res.* 63(24), 8977–8983 (2003).
159. Wan X, Min Y, Bludau H, *et al.* Drug Combination Synergy in Worm-like Polymeric Micelles Improves Treatment Outcome for Small Cell and Non-Small Cell Lung Cancer. *ACS Nano*. 12(3), 2426–2439 (2018).
160. Gothwal A, Khan I, Gupta U. Polymeric Micelles: Recent Advancements in the Delivery of Anticancer Drugs. *Pharm. Res.*33(1), 18–39 (2016).

161. Markman JL, Rekechenetskiy A, Holler E, Ljubimova JY. Nanomedicine therapeutic approaches to overcome cancer drug resistance [Internet]. *Adv. Drug Deliv. Rev.* 65(13–14), 1866–1879 (2013). Available from: <https://www.sciencedirect.com/science/article/pii/S0169409X13002329>.
162. Wolinsky JB, Grinstaff MW. Therapeutic and diagnostic applications of dendrimers for cancer treatment [Internet]. *Adv. Drug Deliv. Rev.* 60(9), 1037–1055 (2008). Available from: <https://www.researchgate.net/publication/5404655>.
163. Liu J, Liu J, Chu L, *et al.* Novel peptide-dendrimer conjugates as drug carriers for targeting nonsmall cell lung cancer. *Int. J. Nanomedicine* [Internet]. 6(1), 59–69 (2011). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3025585/>.
164. Wang H, Zhao X, Guo C, *et al.* Aptamer-dendrimer bioconjugates for targeted delivery of miR-34a expressing plasmid and antitumor effects in non-small cell lung cancer cells. *PLoS One* [Internet]. 10(9), 1–15 (2015). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4583438/>.
165. Ryan GM, Kaminskas LM, Kelly BD, Owen DJ, McIntosh MP, Porter CJH. Pulmonary administration of PEGylated polylysine dendrimers: Absorption from the lung versus retention within the lung is highly size-dependent. *Mol. Pharm.* 10(8), 2986–2995 (2013).
166. Kaminskas LM, McLeod VM, Ryan GM, *et al.* Pulmonary administration of a doxorubicin-conjugated dendrimer enhances drug exposure to lung metastases and improves cancer therapy. *J. Control. Release* [Internet]. 183(1), 18–26 (2014). Available from: <https://www.sciencedirect.com/science/article/pii/S0168365914001461>.
167. Li XT, Zhou ZY, Jiang Y, *et al.* PEGylated VRB plus quinacrine cationic liposomes for treating non-small cell lung cancer. *J. Drug Target.* 23(3), 232–243 (2015).
168. Din F ud, W, Aman A, *et al.* Effective use of nanocarriers as drug delivery systems for the treatment of selected tumors. *Int. J. Nanomedicine.* 12, 7291–7309 (2017).
169. Song XL, Ju RJ, Xiao Y, *et al.* Application of multifunctional targeting epirubicin liposomes in the treatment of non-small-cell lung cancer. *Int. J. Nanomedicine.* 12, 7433–7451 (2017).
170. Bae KH, Lee JY, Lee SH, Park TG, Nam YS. Optically traceable solid lipid nanoparticles loaded with siRNA and paclitaxel for synergistic chemotherapy with in situ imaging. *Adv. Healthc. Mater.* 2(4), 576–584 (2013).
171. Leiva MC, Ortiz R, Contreras-Cáceres R, *et al.* Tripalmitin nanoparticle formulations significantly enhance paclitaxel antitumor activity against breast and lung cancer cells in vitro. *Sci. Rep.* 7(1), 1–15 (2017).
172. Rawal S, Bora V, Patel B, Patel M. Surface-engineered nanostructured lipid carrier systems for synergistic combination oncotherapy of non-small cell lung cancer. *Drug Deliv. Transl. Res.* [Internet]. (0123456789) (2020). Available from: <https://doi.org/10.1007/s13346-020-00866-6>.
173. Kabary DM, Helmy MW, Elkhodairy KA, Fang JY, Elzoghby AO. Hyaluronate/lactoferrin layer-by-layer-coated lipid nanocarriers for targeted co-delivery of rapamycin and berberine to lung carcinoma. *Colloids Surfaces B Biointerfaces* [Internet]. 169, 183–194 (2018). Available from: <https://doi.org/10.1016/j.colsurfb.2018.05.008>.
174. Hu J, Fu S, Peng Q, *et al.* Paclitaxel-loaded polymeric nanoparticles combined with chronomodulated chemotherapy on lung cancer: In vitro and in vivo evaluation. *Int. J. Pharm.*

- [Internet]. 516(1–2), 313–322 (2017). Available from: <http://dx.doi.org/10.1016/j.ijpharm.2016.11.047>.
175. Harshita, Barkat MA, Beg S, Pottoo FH, Ahmad FJ. Nanopaclitaxel therapy: An evidence based review on the battle for next-generation formulation challenges. *Nanomedicine*. 14(10), 1323–1341 (2019).
176. Mehrotra A, Nagarwal RC, Pandit JK. Lomustine loaded chitosan nanoparticles: Characterization and in-vitro cytotoxicity on human lung cancer cell line L132. *Chem. Pharm. Bull.* 59(3), 315–320 (2011).
177. Karthikeyan S, Prasad RR, Ganamani A, Balamurugan E. Anticancer activity of resveratrol-loaded gelatin nanoparticles on NCI-H460 non-small cell lung cancer cells. *Biomed. Prev. Nutr.* [Internet]. 3(1), 64–73 (2013). Available from: <http://dx.doi.org/10.1016/j.bionut.2012.10.009>.
178. Zhang WW, Wang YC, Kan XM, Wang XM, Geng DM. Preparation and evaluation of peptide-dendrimer-paclitaxel conjugates for treatment of heterogeneous stage 1 non-small cell lung cancer in 293T and L132 cell lines. *Trop. J. Pharm. Res.* 16(4), 737–742 (2017).
179. Amreddy N, Babu A, Panneerselvam J, *et al.* Chemo-biologic combinatorial drug delivery using folate receptor-targeted dendrimer nanoparticles for lung cancer treatment. *Nanomedicine Nanotechnology, Biol. Med.* [Internet]. 14(2), 373–384 (2018). Available from: <https://doi.org/10.1016/j.nano.2017.11.010>.
180. Gill KK, Kamal MM, Kaddoumi A, Nazzal S. EGFR targeted delivery of paclitaxel and parthenolide co-loaded in PEG-Phospholipid micelles enhance cytotoxicity and cellular uptake in non-small cell lung cancer cells. *J. Drug Deliv. Sci. Technol.* [Internet]. 36, 150–155 (2016). Available from: <http://dx.doi.org/10.1016/j.jddst.2016.10.005>.
181. Kim HJ, Ishii T, Zheng M, *et al.* Multifunctional polyion complex micelle featuring enhanced stability, targetability, and endosome escapability for systemic siRNA delivery to subcutaneous model of lung cancer. *Drug Deliv. Transl. Res.* 4(1), 50–60 (2014).
182. Qian Y, Qiu M, Wu Q, *et al.* Enhanced cytotoxic activity of cetuximab in EGFR-positive lung cancer by conjugating with gold nanoparticles. *Sci. Rep.* 4, 1–8 (2014).
183. Ke S, Zhou T, Yang P, *et al.* Gold nanoparticles enhance TRAIL sensitivity through Drp1-mediated apoptotic and autophagic mitochondrial fission in NSCLC cells. *Int. J. Nanomedicine*. 12, 2531–2551 (2017).
184. Cryer AM, Chan C, Eftychidou A, *et al.* Tyrosine Kinase Inhibitor Gold Nanoconjugates for the Treatment of Non-Small Cell Lung Cancer. *ACS Appl. Mater. Interfaces*. 11(18), 16336–16346 (2019).
185. Wang MS, Chen L, Xiong YQ, Xu J, Wang JP, Meng ZL. Iron oxide magnetic nanoparticles combined with actein suppress non-small-cell lung cancer growth in a p53-dependent manner. *Int. J. Nanomedicine*. 12, 7627–7651 (2017).
186. Ferreira LMB, dos Santos AM, Boni FI, *et al.* Design of chitosan-based particle systems: A review of the physicochemical foundations for tailored properties. *Carbohydr. Polym.* 250(May) (2020).
187. Zhang K, Xu Y, Lu L, *et al.* Hydrodynamic cavitation: A feasible approach to intensify the emulsion cross-linking process for chitosan nanoparticle synthesis. *Ultrason. Sonochem.*

- [Internet]. 74, 105551 (2021). Available from: <https://doi.org/10.1016/j.ultsonch.2021.105551>.
188. Narayanan VHB, Lewandowski A, Durai R, Gonciarz W, Wawrzyniak P, Brzezinski M. Spray-dried tenofovir alafenamide-chitosan nanoparticles loaded oleogels as a long-acting injectable depot system of anti-HIV drug. *Int. J. Biol. Macromol.* 222(August), 473–486 (2022).
189. Naskar S, Sharma S, Kuotsu K. Chitosan-based nanoparticles: An overview of biomedical applications and its preparation. *J. Drug Deliv. Sci. Technol.* [Internet]. 49(June 2018), 66–81 (2019). Available from: <https://doi.org/10.1016/j.jddst.2018.10.022>.
190. Kedir WM, Abdi GF, Goro MM, Tolesa LD. Pharmaceutical and drug delivery applications of chitosan biopolymer and its modified nanocomposite: A review. *Heliyon* [Internet]. 8(8), e10196 (2022). Available from: <https://doi.org/10.1016/j.heliyon.2022.e10196>.
191. Naskar S, Koutsu K, Sharma S. Chitosan-based nanoparticles as drug delivery systems: a review on two decades of research. *J. Drug Target.* [Internet]. 27(4), 379–393 (2019). Available from: <https://doi.org/10.1080/1061186X.2018.1512112>.
192. Yanat M, Schroën K. Preparation methods and applications of chitosan nanoparticles; with an outlook toward reinforcement of biodegradable packaging. *React. Funct. Polym.* 161(February) (2021).
193. Algharib SA, Dawood A, Zhou K, *et al.* Preparation of chitosan nanoparticles by ionotropic gelation technique: Effects of formulation parameters and in vitro characterization. *J. Mol. Struct.* [Internet]. 1252, 132129 (2022). Available from: <https://doi.org/10.1016/j.molstruc.2021.132129>.
194. Kazemi Shariat Panahi H, Dehghani M, Amiri H, *et al.* Current and emerging applications of saccharide-modified chitosan: a critical review. *Biotechnol. Adv.* [Internet]. 66(October 2022), 108172 (2023). Available from: <https://doi.org/10.1016/j.biotechadv.2023.108172>.
195. Pakizeh M, Moradi A, Ghassemi T. Chemical extraction and modification of chitin and chitosan from shrimp shells. *Eur. Polym. J.* [Internet]. 159(May), 110709 (2021). Available from: <https://doi.org/10.1016/j.eurpolymj.2021.110709>.
196. Verma C, Quraishi MA, Rhee KY. Aqueous phase polymeric corrosion inhibitors: Recent advancements and future opportunities. *J. Mol. Liq.* [Internet]. 348, 118387 (2022). Available from: <https://doi.org/10.1016/j.molliq.2021.118387>.
197. Hadi Z, Navarchian AH, Rafienia M. Synthesis of pH-responsive carboxymethyl chitosan for encapsulating tetracycline-HCl: Morphology, drug release behavior and antibacterial activity of microcapsules. *J. Drug Deliv. Sci. Technol.* [Internet]. 84(October 2022), 104462 (2023). Available from: <https://doi.org/10.1016/j.jddst.2023.104462>.
198. Lupa D, Płaziński W, Michna A, *et al.* Chitosan characteristics in electrolyte solutions: Combined molecular dynamics modeling and slender body hydrodynamics. *Carbohydr. Polym.* 292(March) (2022).
199. Pan T, Chen H, Gao X, Wu Z, Ye Y, Shen Y. Engineering efficient artificial nanozyme based on chitosan grafted Fe-doped-carbon dots for bacteria biofilm eradication. *J. Hazard. Mater.* [Internet]. 435(April), 128996 (2022). Available from: <https://doi.org/10.1016/j.jhazmat.2022.128996>.
200. Mukhtar M, Fényes E, Bartos C, Zeeshan M, Ambrus R. Chitosan biopolymer, its derivatives

- and potential applications in nano-therapeutics: A comprehensive review. *Eur. Polym. J.* 160(May) (2021).
201. Rostami E. Progresses in targeted drug delivery systems using chitosan nanoparticles in cancer therapy: A mini-review. *J. Drug Deliv. Sci. Technol.* [Internet]. 58(May), 101813 (2020). Available from: <https://doi.org/10.1016/j.jddst.2020.101813>.
 202. Dmour I, Taha MO. Natural and semisynthetic polymers in pharmaceutical nanotechnology [Internet]. Elsevier Inc. Available from: <http://dx.doi.org/10.1016/B978-0-12-813663-8.00002-6>.
 203. Bose P, Agrahari AK, Singh AS, Jaiswal MK, Tiwari VK. Sialic acid-containing molecules in drug discovery and development [Internet]. Elsevier Inc. Available from: <http://dx.doi.org/10.1016/B978-0-12-816675-8/00005-1>.
 204. Wang J, Shewell LK, Day CJ, Jennings MP. N-glycolylneuraminic acid as a carbohydrate cancer biomarker. *Transl. Oncol.* [Internet]. 31(February), 101643 (2023). Available from: <https://doi.org/10.1016/j.tranon.2023.101643>.
 205. Bondioli L, Ruozi B, Belletti D, *et al.* Delivery Sialic acid as a potential approach for the protection and targeting of nanocarriers Sialic acid as a potential approach for the protection and targeting of nanocarriers. 921–937 (2011).
 206. Vodovozova EL, Moiseeva E V, Grechko GK, Gayenko GP, Nifant NE. Antitumour activity of cytotoxic liposomes equipped with selectin ligand SiaLe X , in a mouse mammary adenocarcinoma model. 36, 942–949 (2000).
 207. Zeisig R, Stahn R, Wenzel K, Behrens D, Fichtner I. Effect of sialyl Lewis X-glycoliposomes on the inhibition of E-selectin-mediated tumour cell adhesion in vitro. 1660, 31–40 (2004).
 208. Zheng J, Zheng S, Zhang Y, Yu B, Zheng W, Yang F. Colloids and Surfaces B : Biointerfaces Sialic acid surface decoration enhances cellular uptake and apoptosis-inducing activity of selenium nanoparticles. 83, 183–187 (2011).
 209. Chen Y, Zheng X, Wu C. The Role of the Tumor Microenvironment and Treatment Strategies in Colorectal Cancer. *Front. Immunol.* 12(December), 1–21 (2021).
 210. Subramaniyan V, Fuloria S, Gupta G, *et al.* A review on epidermal growth factor receptor's role in breast and non-small cell lung cancer. *Chem. Biol. Interact.* [Internet]. 351(August 2021), 109735 (2022). Available from: <https://doi.org/10.1016/j.cbi.2021.109735>.
 211. Cho BC, Simi A, Sabari J, Vijayaraghavan S, Moores S, Spira A. Amivantamab, an Epidermal Growth Factor Receptor (EGFR) and Mesenchymal-epithelial Transition Factor (MET) Bispecific Antibody, Designed to Enable Multiple Mechanisms of Action and Broad Clinical Applications. *Clin. Lung Cancer* [Internet]. 24(2), 89–97 (2023). Available from: <https://doi.org/10.1016/j.clcc.2022.11.004>.
 212. Duwa R, Banstola A, Emami F, Jeong JH, Lee S, Yook S. Cetuximab conjugated temozolomide-loaded poly (lactic-co-glycolic acid) nanoparticles for targeted nanomedicine in EGFR overexpressing cancer cells. *J. Drug Deliv. Sci. Technol.* [Internet]. 60(February), 101928 (2020). Available from: <https://doi.org/10.1016/j.jddst.2020.101928>.
 213. Dutta B, Barick KC, Hassan PA. Recent advances in active targeting of nanomaterials for anticancer drug delivery. *Adv. Colloid Interface Sci.* [Internet]. 296(July), 102509 (2021). Available from: <https://doi.org/10.1016/j.cis.2021.102509>.

214. Wathoni N, Puluhalawa LE, Joni IM, *et al.* Monoclonal antibody as a targeting mediator for nanoparticle targeted delivery system for lung cancer. *Drug Deliv.* [Internet]. 29(1), 2959–2970 (2022). Available from: <https://doi.org/10.1080/10717544.2022.2120566>.
215. Habeeb M, Kareem TA, Deepthi KL, Khot VS, Woon YH, Pawar SS. Nanomedicine for targeting the lung cancer cells by interpreting the signaling pathways. *J. Drug Deliv. Sci. Technol.* [Internet]. 77(September), 103865 (2022). Available from: <https://doi.org/10.1016/j.jddst.2022.103865>.
216. Sabir F, Qindeel M, Zeeshan M, *et al.* Onco-receptors targeting in lung cancer via application of surface-modified and hybrid nanoparticles: A cross-disciplinary review. *Processes.* 9(4) (2021).
217. Wang F, Wang Y, Ma Q, Cao Y, Yu B. Development and characterization of folic acid-conjugated chitosan nanoparticles for targeted and controlled delivery of gemcitabine in lung cancer therapeutics. *Artif. Cells, Nanomedicine Biotechnol.* 45(8), 1530–1538 (2017).
218. Mottaghitlab F, Kiani M, Farokhi M, *et al.* Targeted Delivery System Based on Gemcitabine-Loaded Silk Fibroin Nanoparticles for Lung Cancer Therapy. *ACS Appl. Mater. Interfaces.* 9(37), 31600–31611 (2017).
219. Zhang Q, Zhang Y, Li K, Wang H, Li H, Zheng J. A novel strategy to improve the therapeutic efficacy of Gemcitabine for non-small cell lung cancer by the tumor-penetrating peptide iRGD. *PLoS One.* 10(6), 1–14 (2015).
220. Hatami E, Nagesh PKB, Jaggi M, Chauhan SC, Yallapu MM. Gambogic acid potentiates gemcitabine induced anticancer activity in non-small cell lung cancer. *Eur. J. Pharmacol.* [Internet]. 888(May), 173486 (2020). Available from: <https://doi.org/10.1016/j.ejphar.2020.173486>.
221. Shetab Boushehri MA, Dietrich D, Lamprecht A. Nanotechnology as a platform for the development of injectable parenteral formulations: A comprehensive review of the know-hows and state of the art. *Pharmaceutics.* 12(6), 1–53 (2020).
222. Bernal-Chávez SA, Del Prado-Audelo ML, Caballero-Florán IH, *et al.* Insights into terminal sterilization processes of nanoparticles for biomedical applications. *Molecules.* 26(7), 1–20 (2021).
223. Arora S, Dash SK, Dhawan D, Sahoo PK, Jindal A, Gugulothu D. Freeze-drying revolution: unleashing the potential of lyophilization in advancing drug delivery systems. Springer US.
224. Singh A, Xu J, Mattheolabakis G, Amiji M. EGFR-targeted gelatin nanoparticles for systemic administration of gemcitabine in an orthotopic pancreatic cancer model. *Nanomedicine Nanotechnology, Biol. Med.* [Internet]. 12(3), 589–600 (2016). Available from: <http://dx.doi.org/10.1016/j.nano.2015.11.010>.
225. Karuppaiah A, Babu D, Selvaraj D, *et al.* Building and behavior of a pH-stimuli responsive chitosan nanoparticles loaded with folic acid conjugated gemcitabine silver colloids in MDA-MB-453 metastatic breast cancer cell line and pharmacokinetics in rats. *Eur. J. Pharm. Sci.* [Internet]. 165(July), 105938 (2021). Available from: <https://doi.org/10.1016/j.ejps.2021.105938>.
226. Dilip Dhavale D. Sialic Acid Conjugated Chitosan for the Attenuation of Amyloid-beta Toxicity. (2009). Available from: https://digitalcommons.lsu.edu/gradschool_theses.

227. Chatterjee NS, Sukumaran HG, Dara PK, *et al.* Nano-encapsulation of curcumin in fish collagen grafted succinyl chitosan hydrogel accelerates wound healing process in experimental rats. *Food Hydrocoll. Heal.* [Internet]. 2(December 2021), 100061 (2022). Available from: <https://doi.org/10.1016/j.fhfh.2022.100061>.
228. Beg S, Malik AK, Ansari MJ, *et al.* Systematic Development of Solid Lipid Nanoparticles of Abiraterone Acetate with Improved Oral Bioavailability and Anticancer Activity for Prostate Carcinoma Treatment. (2022).
229. Zhang P, Zhang L, Wang J, *et al.* An intelligent hypoxia-relieving chitosan-based nanopatform for enhanced targeted chemo-sonodynamic combination therapy on lung cancer. *Carbohydr. Polym.* [Internet]. 274(September), 118655 (2021). Available from: <https://doi.org/10.1016/j.carbpol.2021.118655>.
230. Huang X, Chen Q, Li X, *et al.* CKAP4 Antibody-Conjugated Si Quantum Dot Micelles for Targeted Imaging of Lung Cancer. *Nanoscale Res. Lett.* [Internet]. 16(1) (2021). Available from: <https://doi.org/10.1186/s11671-021-03575-2>.
231. Lin X, Bai Y, Jiang Q. Precise fabrication of folic acid-targeted therapy on metformin encapsulated β -cyclodextrin nanomaterials for treatment and care of lung cancer. *Process Biochem.* [Internet]. 118(39), 74–83 (2022). Available from: <https://doi.org/10.1016/j.procbio.2022.04.003>.
232. Wang Y, Ma J, Qiu T, Tang M, Zhang X, Dong W. In vitro and in vivo combinatorial anticancer effects of oxaliplatin- and resveratrol-loaded N,O-carboxymethyl chitosan nanoparticles against colorectal cancer. *Eur. J. Pharm. Sci.* [Internet]. 163(October 2020), 105864 (2021). Available from: <https://doi.org/10.1016/j.ejps.2021.105864>.
233. Jadon RS, Sharma G, Garg NK, *et al.* Efficient in vitro and in vivo docetaxel delivery mediated by pH-sensitive LPHNPs for effective breast cancer therapy. *Colloids Surfaces B Biointerfaces* [Internet]. 203(July 2020), 111760 (2021). Available from: <https://doi.org/10.1016/j.colsurfb.2021.111760>.
234. Kumar K, Kumar V, Lal J, Kaur H, Singh J. A simple 2D composite image analysis technique for the crystal growth study of L-ascorbic acid. *Microsc. Res. Tech.* 80(6), 615–626 (2017).
235. Shahabadi N, Razlansari M, Zhaleh H. In vitro cytotoxicity studies of smart pH-sensitive lamivudine-loaded CaAl-LDH magnetic nanoparticles against Mel-Rm and A-549 cancer cells. *J. Biomol. Struct. Dyn.* [Internet]. 40(1), 213–225 (2022). Available from: <https://doi.org/10.1080/07391102.2020.1812431>.
236. Anandakumar P, Kamaraj S, Jagan S, *et al.* Capsaicin inhibits benzo(a)pyrene-induced lung carcinogenesis in an in vivo mouse model. *Inflamm. Res.* 61(11), 1169–1175 (2012).
237. Yan C, Shi W, Gu J, Lee RJ, Zhang Y. Design of a Novel Nucleus-Targeted NLS-KALA-SA Nanocarrier to Delivery Poorly Water-Soluble Anti-Tumor Drug for Lung Cancer Treatment. *J. Pharm. Sci.* [Internet]. 110(6), 2432–2441 (2021). Available from: <https://doi.org/10.1016/j.xphs.2020.12.034>.
238. Essa ML, Elashkar AA, Hanafy NAN, Saied EM, El-Kemary M. Dual targeting nanoparticles based on hyaluronic and folic acids as a promising delivery system of the encapsulated 4-Methylumbelliferone (4-MU) against invasiveness of lung cancer in vivo and in vitro. *Int. J. Biol. Macromol.* [Internet]. 206(February), 467–480 (2022). Available from: <https://doi.org/10.1016/j.ijbiomac.2022.02.095>.

239. Kim J, Shim MK, Cho YJ, *et al.* The safe and effective intraperitoneal chemotherapy with cathepsin B-specific doxorubicin prodrug nanoparticles in ovarian cancer with peritoneal carcinomatosis. *Biomaterials* [Internet]. 279(July), 121189 (2021). Available from: <https://doi.org/10.1016/j.biomaterials.2021.121189>.
240. Wei D, Cheng X, Du C, *et al.* Stroma-targeted nanoparticles that remodel stromal alignment to enhance drug delivery and improve the antitumor efficacy of Nab-paclitaxel in pancreatic ductal adenocarcinoma models. *Nano Today* [Internet]. 45, 101533 (2022). Available from: <https://doi.org/10.1016/j.nantod.2022.101533>.
241. Mitchell MJ, Billingsley MM, Haley RM, Wechsler ME, Peppas NA, Langer R. Engineering precision nanoparticles for drug delivery. *Nat. Rev. Drug Discov.* [Internet]. 20(2), 101–124 (2021). Available from: <http://dx.doi.org/10.1038/s41573-020-0090-8>.
242. Liao J, Song Y, Liu C, Li D, Zheng H, Lu B. Dual-drug delivery based charge-conversional polymeric micelles for enhanced cellular uptake and combination therapy. *Polym. Chem.* 10(43), 5879–5893 (2019).
243. Hanafy NAN, Salim EI, Mahfouz ME, Eltonouby EA, Hamed IH. Fabrication and characterization of bee pollen extract nanoparticles: Their potential in combination therapy against human A549 lung cancer cells. *Food Hydrocoll. Heal.* 3(100110) (2023).
244. Guan M, Zhou Y, Zhu QL, *et al.* N-trimethyl chitosan nanoparticle-encapsulated lactosyl-norcantharidin for liver cancer therapy with high targeting efficacy. *Nanomedicine Nanotechnology, Biol. Med.* [Internet]. 8(7), 1172–1181 (2012). Available from: <http://dx.doi.org/10.1016/j.nano.2012.01.009>.
245. Shakiba S, Astete CE, Cueto R, Rodrigues DF, Sabliov CM, Louie SM. Asymmetric flow field-flow fractionation (AF4) with fluorescence and multi-detector analysis for direct, real-time, size-resolved measurements of drug release from polymeric nanoparticles. *J. Control. Release* [Internet]. 338(March), 410–421 (2021). Available from: <https://doi.org/10.1016/j.jconrel.2021.08.041>.
246. Milligan JJ, Saha S. A Nanoparticle’s Journey to the Tumor: Strategies to Overcome First-Pass Metabolism and Their Limitations. *Cancers (Basel)*. 14(7) (2022).
247. Wang J kang, Zhou Y ying, Guo S jun, *et al.* Cetuximab conjugated and doxorubicin loaded silica nanoparticles for tumor-targeting and tumor microenvironment responsive binary drug delivery of liver cancer therapy. *Mater. Sci. Eng. C* [Internet]. 76, 944–950 (2017). Available from: <http://dx.doi.org/10.1016/j.msec.2017.03.131>.
248. Patel J, Amrutiya J, Bhatt P, Javia A, Jain M, Misra A. Targeted delivery of monoclonal antibody conjugated docetaxel loaded PLGA nanoparticles into EGFR overexpressed lung tumour cells. *J. Microencapsul.* [Internet]. 35(2), 204–217 (2018). Available from: <https://doi.org/10.1080/02652048.2018.1453560>.
249. Arya G, Vandana M, Acharya S, Sahoo SK. Enhanced antiproliferative activity of Herceptin (HER2)-conjugated gemcitabine-loaded chitosan nanoparticle in pancreatic cancer therapy. *Nanomedicine Nanotechnology, Biol. Med.* [Internet]. 7(6), 859–870 (2011). Available from: <http://dx.doi.org/10.1016/j.nano.2011.03.009>.
250. Ribeiro EF, de Barros-Alexandrino TT, Assis OBG, *et al.* Chitosan and crosslinked chitosan nanoparticles: Synthesis, characterization and their role as Pickering emulsifiers. *Carbohydr. Polym.* [Internet]. 250(July), 116878 (2020). Available from: <https://doi.org/10.1016/j.carbpol.2020.116878>.

251. Gupta B, Dalal P, Rao R. Cyclodextrin decorated nanosponges of sesamol: Antioxidant, anti-tyrosinase and photostability assessment. *Food Biosci.* [Internet]. 42(April), 101098 (2021). Available from: <https://doi.org/10.1016/j.fbio.2021.101098>.
252. Kush P, Bajaj T, Kaur M, *et al.* Biodistribution and Pharmacokinetic Study of Gemcitabine Hydrochloride Loaded Biocompatible Iron-Based Metal Organic Framework. *J. Inorg. Organomet. Polym. Mater.* [Internet]. 30(8), 2827–2841 (2020). Available from: <https://doi.org/10.1007/s10904-019-01417-4>.
253. Yu A, Shi H, Liu H, *et al.* Mucoadhesive dexamethasone-glycol chitosan nanoparticles for ophthalmic drug delivery. *Int. J. Pharm.* 575(November 2019) (2020).
254. Alhaji N, Zakaria Z, Naharudin I, Ahsan F, Li W, Wong TW. Critical physicochemical attributes of chitosan nanoparticles admixed lactose-PEG 3000 microparticles in pulmonary inhalation. *Asian J. Pharm. Sci.* [Internet]. 15(3), 374–384 (2020). Available from: <https://doi.org/10.1016/j.ajps.2019.02.001>.
255. Kalavani R, Maruthupandy M, Muneeswaran T, *et al.* Synthesis of chitosan mediated silver nanoparticles (Ag NPs) for potential antimicrobial applications. *Front. Lab. Med.* [Internet]. 2(1), 30–35 (2018). Available from: <https://doi.org/10.1016/j.flm.2018.04.002>.
256. Dalal P, Rao R. β -Cyclodextrin nanosponges for enhanced anti-melanoma potential of silymarin with functions of anti-oxidant, anti-inflammatory and anti-tyrosinase. *Results Chem.* [Internet]. 6(June), 101006 (2023). Available from: <https://doi.org/10.1016/j.rechem.2023.101006>.
257. Guo X, Zhuang Q, Ji T, *et al.* Multi-functionalized chitosan nanoparticles for enhanced chemotherapy in lung cancer. *Carbohydr. Polym.* [Internet]. 195(April), 311–320 (2018). Available from: <https://doi.org/10.1016/j.carbpol.2018.04.087>.
258. Cemek M, Aymelek F, Büyükkuroğlu ME, Karaca T, Büyükben A, Yilmaz F. Protective potential of Royal Jelly against carbon tetrachloride induced-toxicity and changes in the serum sialic acid levels. *Food Chem. Toxicol.* 48(10), 2827–2832 (2010).
259. Nair AB, Dalal P, Kadian V, *et al.* Formulation, Characterization, Anti-Inflammatory and Cytotoxicity Study of Sesamol-Laden Nanosponges. *Nanomaterials.* 12(23) (2022).
260. Miranda MA, Silva LB, Carvalho IPS, *et al.* Targeted uptake of folic acid-functionalized polymeric nanoparticles loading glycoalkaloidic extract in vitro and in vivo assays. *Colloids Surfaces B Biointerfaces* [Internet]. 192(May), 111106 (2020). Available from: <https://doi.org/10.1016/j.colsurfb.2020.111106>.
261. Shukla SK, Kulkarni NS, Farrales P, *et al.* Sorafenib Loaded Inhalable Polymeric Nanocarriers against Non-Small Cell Lung Cancer. *Pharm. Res.* 37(3), 1–19 (2020).
262. Vikas, Viswanadh MK, Mehata AK, *et al.* Bioadhesive chitosan nanoparticles: Dual targeting and pharmacokinetic aspects for advanced lung cancer treatment. *Carbohydr. Polym.* [Internet]. 274(March), 118617 (2021). Available from: <https://doi.org/10.1016/j.carbpol.2021.118617>.
263. Kushwah V, Katiyar SS, Dora CP, *et al.* Co-delivery of docetaxel and gemcitabine by anacardic acid modified self-assembled albumin nanoparticles for effective breast cancer management. *Acta Biomater.* [Internet]. 73, 424–436 (2018). Available from: <https://doi.org/10.1016/j.actbio.2018.03.057>.

264. Saravanakumar K, Sathiyaseelan A, Mariadoss AVA, *et al.* Dual stimuli-responsive release of aptamer AS1411 decorated erlotinib loaded chitosan nanoparticles for non-small-cell lung carcinoma therapy. *Carbohydr. Polym.* [Internet]. 245(April), 116407 (2020). Available from: <https://doi.org/10.1016/j.carbpol.2020.116407>.
265. Forest V, Pourchez J. Preferential binding of positive nanoparticles on cell membranes is due to electrostatic interactions: A too simplistic explanation that does not take into account the nanoparticle protein corona. *Mater. Sci. Eng. C* [Internet]. 70, 889–896 (2017). Available from: <http://dx.doi.org/10.1016/j.msec.2016.09.016>.
266. Kiill CP, Barud H da S, Santagneli SH, *et al.* Synthesis and factorial design applied to a novel chitosan/sodium polyphosphate nanoparticles via ionotropic gelation as an RGD delivery system. *Carbohydr. Polym.* [Internet]. 157, 1695–1702 (2017). Available from: <http://dx.doi.org/10.1016/j.carbpol.2016.11.053>.
267. Li J, Dou Y, Yang J, *et al.* Surface characterization and biocompatibility of micro- and nano-hydroxyapatite/chitosan-gelatin network films. *Mater. Sci. Eng. C* [Internet]. 29(4), 1207–1215 (2009). Available from: <http://dx.doi.org/10.1016/j.msec.2008.09.038>.
268. de Toledo AMN, Silva NCC, Sato ACK, Picone CSF. A comprehensive study of physical, antimicrobial and emulsifying properties of self-assembled chitosan/lecithin complexes produced in aqueous media. *Futur. Foods.* 4(July) (2021).
269. Gooneh-Farahani S, Naghib SM, Naimi-Jamal MR, Seyfoori A. A pH-sensitive nanocarrier based on BSA-stabilized graphene-chitosan nanocomposite for sustained and prolonged release of anticancer agents. *Sci. Rep.* [Internet]. 11(1), 1–14 (2021). Available from: <https://doi.org/10.1038/s41598-021-97081-1>.
270. Lohiya G, Katti DS. Carboxylated chitosan-mediated improved efficacy of mesoporous silica nanoparticle-based targeted drug delivery system for breast cancer therapy. *Carbohydr. Polym.* [Internet]. 277(August 2021), 118822 (2022). Available from: <https://doi.org/10.1016/j.carbpol.2021.118822>.
271. Soares PIP, Sousa AI, Silva JC, Ferreira IMM, Novo CMM, Borges JP. Chitosan-based nanoparticles as drug delivery systems for doxorubicin: Optimization and modelling. *Carbohydr. Polym.* [Internet]. 147, 304–312 (2016). Available from: <http://dx.doi.org/10.1016/j.carbpol.2016.03.028>.
272. Zhong L, Xu L, Liu Y, *et al.* Transformative hyaluronic acid-based active targeting supramolecular nanoplatform improves long circulation and enhances cellular uptake in cancer therapy. *Acta Pharm. Sin. B.* 9(2), 397–409 (2019).
273. He G, Nie JJ, Liu X, *et al.* Zinc oxide nanoparticles inhibit osteosarcoma metastasis by downregulating β -catenin via HIF-1 α /BNIP3/LC3B-mediated mitophagy pathway. *Bioact. Mater.* [Internet]. 19(March 2022), 690–702 (2023). Available from: <https://doi.org/10.1016/j.bioactmat.2022.05.006>.
274. Yang SJ, Lin FH, Tsai KC, *et al.* file:///C:/Users/hp/Des. *Bioconjug. Chem.* 21(4), 679–689 (2010).
275. Zhao H, Lin ZY, Yildirimer L, Dhinakar A, Zhao X, Wu J. file:///C:/Users/hp/Desktop/For Revision of Paper/Refrence/1-s2.0-S0378517317309559-main.pdf. *J. Mater. Chem. B.* 4(23), 4060–4071 (2016).
276. Di J, Gao X, Du Y, Zhang H, Gao J, Zheng A. Size, shape, charge and “stealthy” surface:

- Carrier properties affect the drug circulation time in vivo. *Asian J. Pharm. Sci.* [Internet]. 16(4), 444–458 (2021). Available from: <https://doi.org/10.1016/j.ajps.2020.07.005>.
277. Wang XB, Zhou HY. Molecularly targeted gemcitabine-loaded nanoparticulate system towards the treatment of EGFR overexpressing lung cancer. *Biomed. Pharmacother.* 70(C), 123–128 (2015).
278. Duan J, Zhang Y, Han S, *et al.* Synthesis and in vitro/in vivo anti-cancer evaluation of curcumin-loaded chitosan/poly(butyl cyanoacrylate) nanoparticles. *Int. J. Pharm.* 400(1–2), 211–220 (2010).
279. Lee SY, Nam S, Koo JS, *et al.* Possible contribution of sialic acid to the enhanced tumor targeting efficiency of nanoparticles engineered with doxorubicin. *Sci. Rep.* [Internet]. 10(1), 1–15 (2020). Available from: <https://doi.org/10.1038/s41598-020-76778-9>.
280. Zhao J, Feng SS. Effects of PEG tethering chain length of vitamin E TPGS with a Herceptin-functionalized nanoparticle formulation for targeted delivery of anticancer drugs. *Biomaterials* [Internet]. 35(10), 3340–3347 (2014). Available from: <http://dx.doi.org/10.1016/j.biomaterials.2014.01.003>.
281. Obireddy SR, Chintha M, Kashayi CR, Venkata KRKS, Subbarao SMC. Gelatin-Coated Dual Cross-Linked Sodium Alginate/Magnetite Nanoparticle Microbeads for Controlled Release of Doxorubicin. *ChemistrySelect.* 5(33), 10276–10284 (2020).
282. Heuer-Jungemann A, Feliu N, Bakaimi I, *et al.* The role of ligands in the chemical synthesis and applications of inorganic nanoparticles. *Chem. Rev.* 119(8), 4819–4880 (2019).
283. Kazmi I, Shaikh MAJ, Afzal O, *et al.* Chitosan-based nano drug delivery system for lung cancer. *J. Drug Deliv. Sci. Technol.* [Internet]. 81(February), 104196 (2023). Available from: <https://doi.org/10.1016/j.jddst.2023.104196>.
284. Meng H, Liong M, Xia T, *et al.* Engineered design of mesoporous silica nanoparticles to deliver doxorubicin and p-glycoprotein siRNA to overcome drug resistance in a cancer cell line. *ACS Nano.* 4(8), 4539–4550 (2010).
285. Chen L, Chen B, Deng L, *et al.* An optimized two-vial formulation lipid nanoemulsion of paclitaxel for targeted delivery to tumor. *Int. J. Pharm.* [Internet]. 534(1–2), 308–315 (2017). Available from: <https://doi.org/10.1016/j.ijpharm.2017.10.005>.

Chapter 7

Publications

7 Publications

7.1 Publication from Research Work

1. **Krishan Kumar**, Shiv Govind Rawat, Manjit, Mohini Mishra, Priya, Ajay Kumar, Ruchi Chawla, "Dual targeting pH responsive chitosan nanoparticles for enhanced active cellular internalization of gemcitabine in non-small cell lung cancer." *International Journal of Biological Macromolecules* (2023): 126057. **(Impact Factor 8.2)**
2. **Krishan Kumar**, Rinki Verma, Manjit, Priya, Mohini Mishra, Varsha Rani, Ruchi Chawla "In vivo cancer microenvironment responsive glycan receptor targeted nanoparticles for gemcitabine delivery to Benzo[a]pyrene induced lung cancer model" *AAPS PharmSciTech* (2024)25,2. **(Impact Factor 3.3)**

7.2 Other Publications

1. **Krishan Kumar**, Virender Kumar, Jatin Lal, Harmeet Kaur, Jasbir Singh. "A simple 2D composite image analysis technique for the crystal growth study of L-ascorbic acid" *Microscopy Research and Technique* 80.6 (2017): 615-626. **(Impact Factor 2.5)**
2. Harmeet Kaur, Virender Kumar, **Krishan Kumar**, Sandeep Rathor, Parveen Kumari and Jasbir Singh." Polymer Particulates in Drug Delivery" *Current Pharmaceutical Design, Bentham science* 22.19 (2016): 2761-2787. **(Impact Factor 3.3)**
3. **Krishan Kumar**, Ruchi Chawla. "Nanocarriers-mediated therapeutics as a promising approach for treatment and diagnosis of lung cancer" *Journal of Drug Delivery Science and Technology* 65 (2021): 102677. **(Impact Factor 5)**
4. Sandeep Rathor, Sheikh Aamir, D.C. Bhatt, **Krishan Kumar** and Vikash Kumar, "A Comprehensive Review on Microbubble Concept, Development and Its Application in Therapeutic Drug Delivery and Clinical Management of Disease." *Current Pharmaceutical Biotechnology* 22.11 (2021): 1424-1443.
5. **Krishan Kumar**, Varsha Rani, Mohini Mishra, Ruchi Chawla "New paradigm in combination therapy of siRNA with chemotherapeutic drugs for effective cancer therapy" *Current Research in Pharmacology and Drug Discovery* 3 (2022): 100103. **(Impact Factor 3.97)**
6. Ruchi Chawla, Venkatanaidu Karri, Varsha Rani, Mohini Mishra, **Krishan Kumar** "Factorial Design-Based Nanocarrier Mediated Formulation of Efavirenz and Its Characterization." *Nano Life* 12.02 (2022): 2250002.
7. Varsha Rani, Rinki Verma, **Krishan Kumar**, Ruchi Chawla, "Role of pro-inflammatory cytokines in Alzheimer's disease and neuroprotective effects of pegylated self-assembled

nanoscaffolds." *Current Research in Pharmacology and Drug Discovery* 4 (2023): 100149. **(Impact Factor 3.97)**

8. Rani, Varsha, Rinki Verma, **Krishan Kumar**, and Ruchi Chawla. "pH-influenced self-assembled stealth nanoscaffolds encapsulating memantine for treatment of Alzheimer's disease." *Journal of Biosciences* 48, no. 3 (2023): 31. **(Impact Factor 2.9)**
9. Yadav, Akhilesh Kumar, Himanshu Tripathi, Sanjna Rajput, Priya Singh, Ashutosh Kumar Dubey, **Krishan Kumar**, Ruchi Chawla, and Chandana Rath. "Drug kinetics and antimicrobial properties of quaternary bioactive glasses 81S (81SiO₂-(16-x) CaO-2P₂O₅-1Na₂O-xMgO); an in-vitro study." *Biomaterials Advances* (2023): 213729. **(Impact Factor 7.9)**
10. Manjit, Manish Kumar, **Krishan Kumar**, Madhukiran R Dhondale, Abhishek Jha, Kanchan Bharti, Zinnu Rain, Pradyot Prakash, Brahmeshwar Mishra "Fabrication of dual drug-loaded Polycaprolactone/Gelatin composite nanofibres for full thickness diabetic wound healing" *Therapeutic Delivery* (2023). **(I.F 4.2)**

7.3 Book Chapters

1. Ruchi Chawla, Varsha Rani, Mohini Mishra, **Krishan Kumar** "Integrated role of nanotechnology and pharmacogenetics in diagnosis and treatment of diseases." *Pharmacogenetics* (2021): 11.
2. Ruchi Chawla, Varsha Rani, Mohini Mishra, **Krishan Kumar** "Computer Simulation and Modeling in Pharmacokinetics and Pharmacodynamics." *Computer Aided Pharmaceutics and Drug Delivery: An Application Guide for Students and Researchers of Pharmaceutical Sciences*. Singapore: Springer Nature Singapore, 2022. 217-254.
3. Ruchi Chawla, Varsha Rani, **Krishan Kumar**, Mohini Mishra "Repurposing Drugs: A New Paradigm and Hopes for Life-threatening Diseases". Drug repurposing against SARS-CoV-2, 2023, 1-24, *Bentham Books*.
4. Ruchi Chawla, **Krishan Kumar**, Mohini Mishra, and Varsha Rani "COVID-19 Therapy Molecular Mechanisms, Pharmacological Interventions and Therapeutic Targets" *Current Therapeutic Approaches*, 2023 *Taylor and Francis*.

Chapter 8

Curriculum Vitae

8 Curriculum Vitae

KRISHAN KUMAR

**Research Scholar, Department of Pharmaceutical Engineering & Technology,
Indian Institute of Technology (BHU), Varanasi, India,**

Mobile : +91 9813274971

Email: krishan.kumar.rs.phe18@itbhu.ac.in

I have sixteen papers to my name and five of them as the first author (three research, two review article). Seven more articles are in pipeline, two as first author and five as co-author. I have two years and eight months industrial research & development experience and five years of research experience in the area of novel drug delivery systems, particularly development of targeted nanomedicine and biomaterials for the treatment of cancer. My doctoral research work is focused on the **Development and Evaluation of Nanoformulation for Targeted Delivery of Gemcitabine for the treatment of Lung Cancer**. As EGFR and glycan receptors are overexpressed in the lung cancer cells, used to design and develop the targeted nanomedicine. The Design of Experiment was done by design expert software through Box-Behnken surface analysis to optimize the formulations. A novel encapsulation material was synthesized by conjugation of chitosan with Neu5Ac by carbodiimide chemistry. The chitosan and Neu5Ac conjugated chitosan nanoparticulate formulations containing gemcitabine were prepared by ionic gelation method followed by conjugation of chimeric monoclonal antibody cetuximab through electrostatic interaction. The prepared nanoformulations characterized for various physicochemical parameters including entrapment efficiency, hydrodynamic particle size diameter, surface charge, morphology assessment, XRD, DSC, FTIR, XPS analysis and drug release profile. *In vitro* cellular uptake, cytotoxicity studies, wound healing assay, apoptosis assay by Annexin-V/PI staining was assessed on A-549 lung cancer cells. Further *in vivo* histopathology, bio distribution profile, bio-imaging for glycan receptor targeted and *in vivo* pharmacokinetics study and anticancer efficacy for both glycan and EGFR-glycan receptor targeted gemcitabine loaded chitosan nanoparticles was evaluated and reported. Both works are published in peer reviewed journals such as **International Journal of Biological Macromolecules (Elsevier, 8.2 impact factor)** and **AAPS PharmSciTech (Springer, 3.3 impact factor)**.

ACADEMIC RECORDS

Examinations	Specilization	University/Institution	Year of Passing	Grade,% of Marks	Class/ Division
B. Pharm	Pharmaceutical Sciences	Kurukshetra University	2013	68.25 %	I
M. Pharm	Pharmaceutics	Pt. B.D. Sharma university of Health and Sciences	2015	65.21 %	I
Ph. D (Full time)	Pharmaceutics	Indian Institute of Technology (BHU)	12 December 2023 (Date of pre submission seminar delivered)	8.80	I

PUBLICATIONS

- Krishan Kumar**, Shiv Govind Rawat, Manjit, Mohini Mishra, Priya, Ajay Kumar, Ruchi Chawla, "Dual targeting pH responsive chitosan nanoparticles for enhanced active cellular internalization of gemcitabine in non-small cell lung cancer." *International Journal of Biological Macromolecules* (2023): 126057. **(Impact Factor 8.2)**
- Krishan Kumar**, Rinki Verma, Manjit, Priya, Mohini Mishra, Varsha Rani, Ruchi Chawla "In vivo cancer microenvironment responsive glycan receptor targeted nanoparticles for gemcitabine delivery to Benzo[a]pyrene induced lung cancer model" *AAPS PharmSciTech* (2024)25,2. **(Impact Factor 3.3)**
- Krishan Kumar**, Virender Kumar, Jatin Lal, Harmeet Kaur, Jasbir Singh. "A simple 2D composite image analysis technique for the crystal growth study of L-ascorbic acid" *Microscopy Research and Technique* 80.6 (2017): 615-626. **(Impact Factor 2.5)**
- Harmeet Kaur, Virender Kumar, **Krishan Kumar**, Sandeep Rathor, Parveen Kumari and Jasbir Singh." Polymer Particulates in Drug Delivery" *Current Pharmaceutical Design, Bentham science* 22.19 (2016): 2761-2787. **(Impact Factor 3.3)**
- Krishan Kumar**, Ruchi Chawla. "Nanocarriers-mediated therapeutics as a promising approach for treatment and diagnosis of lung cancer" *Journal of Drug Delivery Science and Technology* 65 (2021): 102677. **(Impact Factor 5)**
- Sandeep Rathor, Sheikh Aamir, D.C. Bhatt, **Krishan Kumar** and Vikash Kumar, "A Comprehensive Review on Microbubble Concept, Development and Its Application in Therapeutic Drug Delivery and Clinical Management of Disease." *Current Pharmaceutical Biotechnology* 22.11 (2021): 1424-1443.

7. **Krishan Kumar**, Varsha Rani, Mohini Mishra, Ruchi Chawla “ New paradigm in combination therapy of siRNA with chemotherapeutic drugs for effective cancer therapy” *Current Research in Pharmacology and Drug Discovery* 3 (2022): 100103. **(Impact Factor 3.97)**
8. Ruchi Chawla, Venkatanaidu Karri, Varsha Rani, Mohini Mishra, **Krishan Kumar** "Factorial Design-Based Nanocarrier Mediated Formulation of Efavirenz and Its Characterization." *Nano Life* 12.02 (2022): 2250002.
9. Varsha Rani, Rinki Verma, **Krishan Kumar**, Ruchi Chawla, "Role of pro-inflammatory cytokines in Alzheimer's disease and neuroprotective effects of pegylated self-assembled nanoscaffolds." *Current Research in Pharmacology and Drug Discovery* 4 (2023): 100149. **(Impact Factor 3.97)**
10. Rani, Varsha, Rinki Verma, **Krishan Kumar**, and Ruchi Chawla. "pH-influenced self-assembled stealth nanoscaffolds encapsulating memantine for treatment of Alzheimer's disease." *Journal of Biosciences* 48, no. 3 (2023): 31. **(Impact Factor 2.9)**
11. Yadav, Akhilesh Kumar, Himanshu Tripathi, Sanjna Rajput, Priya Singh, Ashutosh Kumar Dubey, **Krishan Kumar**, Ruchi Chawla, and Chandana Rath. "Drug kinetics and antimicrobial properties of quaternary bioactive glasses 81S (81SiO₂-(16-x) CaO-2P₂O₅-1Na₂O-xMgO); an in-vitro study." *Biomaterials Advances* (2023): 213729. **(Impact Factor 7.9)**
12. Manjit, Manish Kumar, **Krishan Kumar**, Madhukiran R Dhondale, Abhishek Jha, Kanchan Bharti, Zinnu Rain, Pradyot Prakash, Brahmeshwar Mishra “Fabrication of dual drug-loaded Polycaprolactone/Gelatin composite nanofibres for full thickness diabetic wound healing” *Therapeutic Delivery* (2023). **(I.F 4.2)**
13. Ruchi Chawla, Varsha Rani, Mohini Mishra, **Krishan Kumar** "Integrated role of nanotechnology and pharmacogenetics in diagnosis and treatment of diseases." *Pharmacogenetics* (2021): 11.
14. Ruchi Chawla, Varsha Rani, Mohini Mishra, **Krishan Kumar** "Computer Simulation and Modeling in Pharmacokinetics and Pharmacodynamics." *Computer Aided Pharmaceutics and Drug Delivery: An Application Guide for Students and Researchers of Pharmaceutical Sciences*. *Singapore: Springer Nature Singapore*, 2022. 217-254.
15. Ruchi Chawla, Varsha Rani, **Krishan Kumar**, Mohini Mishra "Repurposing Drugs: A New Paradigm and Hopes for Life-threatening Diseases". *Drug repurposing against SARS-CoV-2*, 2023, 1-24, *Bentham Books*.
16. Ruchi Chawla, **Krishan Kumar**, Mohini Mishra, and Varsha Rani “COVID-19 Therapy Molecular Mechanisms, Pharmacological Interventions and Therapeutic Targets” *Current Therapeutic Approaches*, 2023 *Taylor and Francis*.

ACHIEVEMENTS

- Qualified **GPAT 2013** with **541th** all India rank.
- Qualified **NIPER-JEE 2013** with **619th** all India rank.
- Qualified **Ph.D. National-wide Entrance examination** conducted by **Department of Pharmaceutical Engineering & Technology, IIT (BHU), Varanasi**.
- Qualified **Drug Inspector** examination in **Himachal Pradesh** state government 2021.
- Qualified **Drug Inspector** examination in **Haryana** state government 2019.
- Qualified **Pharmacist** examination in **Haryana** state government 2021.

CONFERENCE/WORKSHOPS/SEMINARS/SYMPOSIUM ATTENDED

- Participated in **18th Annual convection of society of pharmacognosy on “Promotion and Globalization of Indian Herbal Products-perspectives and prospects”** at Department of Pharmaceutical Sciences, Maharshi Dayanand University, Rohtak, India on February 21-22, 2014.
- Participated in **2nd National Conference on Breaking New Grounds in Pharmaceutical Research**, organised by Department of Pharmacy, Manav Bharti University, Solan, H.P. from 28th-29th March, 2014.
- Presented a poster titled **“Dual Receptor Targeted Nanomedicine for Gemcitabine Delivery in Lung Cancer Treatment”** at International Conference on Advanced Materials for Better Tomorrow-II organized by Department of Physics (BHU) & Society for Interdisciplinary Research in Materials & Biology (SIRMB), AMBT 2023 at Banaras Hindu University from 10-13 October 2023.
- Presented a poster titled **“In vivo cancer microenvironment responsive glycan receptor targeted nanoparticles for gemcitabine delivery to lung cancer model”** at 93rd Annual Session of National Academy of Science, India (NASI), organised at BARC, Mumbai from December 03 to 05, 2023.
- Participated in Hands-on Training on **“Particle size, Shape analysis assisted by AI/ML in Pharmaceutical Formulation and Development”** on 29-Sep-2023 at Department of Pharmaceutical Engineering and Technology, IIT (BHU) Varanasi, India.
- Participated in for online participation in SERB sponsored SSR Workshop on **“Exploring New Avenues and Innovations in Drug Discovery”** held on October 27-28th, 2023 at the Department of Pharmaceutical Engineering & Technology, Indian Institute of Technology (Banaras Hindu University), Varanasi, India

ANALYTICAL SKILLS

Instrument: HPLC, UV-Vis Spectrophotometer, Malvern Zeta-Sizer, Freeze Dryer, Rotary Evaporator, Ultra-centrifuge, Multi-mode Plate Reader, Confocal Microscope, Fluorescence Microscope, IVIS, Tablet Punching Machine etc.

Software: Minitab 18, Design Expert, Chem-Draw, ImageJ, Graph Pad, Origin, Mestrenova, Nova etc.

PROJECT INFORMATION

Ph.D. Research work: “Development and Evaluation of Nanoformulation for Targeted Delivery of Gemcitabine for the treatment of Lung Cancer”

M. Pharmacy Research Work: “A simple 2D composite image analysis technique for the crystal growth study of L-ascorbic acid”

EXPERIENCE DETAILS

Organisation	Period	Duration
R&D, Reckitt Benckiser (India) Ltd.,	April 2016-December 2018	2 years 8 months
Junior Research Fellow (JRF)-IIT,BHU	January 2019-December 2020	2 years
Senior Research Fellow (SRF)-IIT,BHU	January 2021-December 2023	3 years

PERSONAL INFORMATION

Name : Krishan Kumar
Father's Name : Shivcharan
Gender : Male
Marital status : Married
Languages Known : English and Hindi
Present address : Department of Pharmaceutical Engineering & Technology, IIT (BHU), VARANASI-221005, UP, INDIA
Permanent address : Village: Bahin, Distt. Palwal, Haryana, 121105

REFERENCES

1) Dr. Ruchi Chawla

Associate Professor, (Pharmaceutics)
 Department of Pharmaceutical Engineering & Technology,
 Indian Institute of Technology (BHU), Varanasi, UP, India.
 Mail: rchawla.phe@iitbhu.ac.in Phone: +91 9336077707

2) Prof. Brahmeshwar Mishra

Professor, (Pharmaceutics)
 Department of Pharmaceutical Engineering & Technology,
 Indian Institute of Technology (BHU), Varanasi, UP, India.
 Mail: bmishra.phe@iitbhu.ac.in Phone: +91 8052641306

4) Dr. Dinesh Kumar

Assistant Professor, (Pharmaceutics)
 Department of Pharmaceutical Engineering and Technology,
 Indian Institute of Technology (BHU), Varanasi, UP, India.

Mail: dinesh.phe@iitbhu.ac.in Phone: +91 8816089092