

# Pharmacogenomics and Pharmacoproteomics Studies of Phosphodiesterase-5 (PDE5) Inhibitors and Paclitaxel Albumin-Stabilized Nanoparticles as Sandwiched Anti-Cancer Nano Drugs between Two DNA/RNA Molecules of Human Cancer Cells

A Heidari\*

Faculty of Chemistry, California South University, USA

\*Correspondence author: A Heidari, Faculty of Chemistry, California South University (CSU), 14731 Comet St. Irvine, CA 92604, USA, E-mail: [Scholar.Researcher.Scientist@gmail.com](mailto:Scholar.Researcher.Scientist@gmail.com)

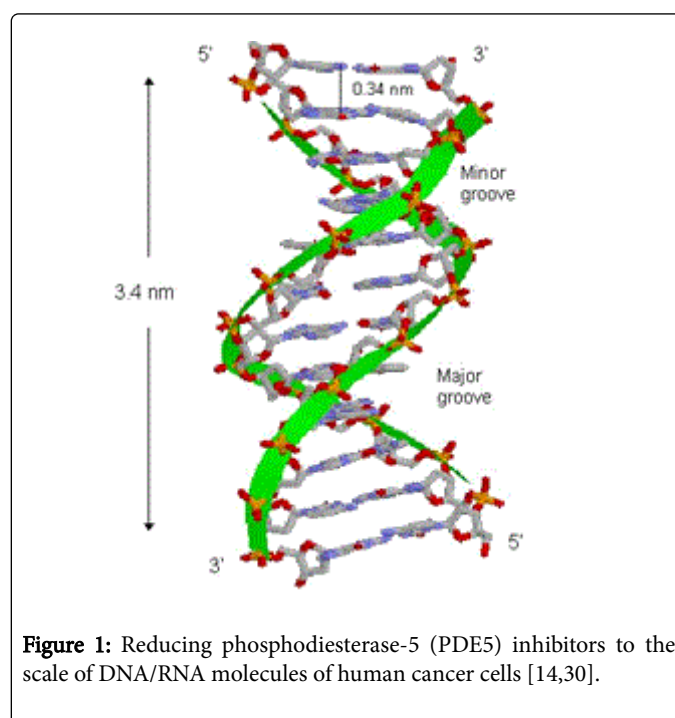
Received date: June 20, 2016 ; Accepted date: June 21, 2016; Published date: June 27, 2016

Copyright: © 2016 Heidari A. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## Editorial

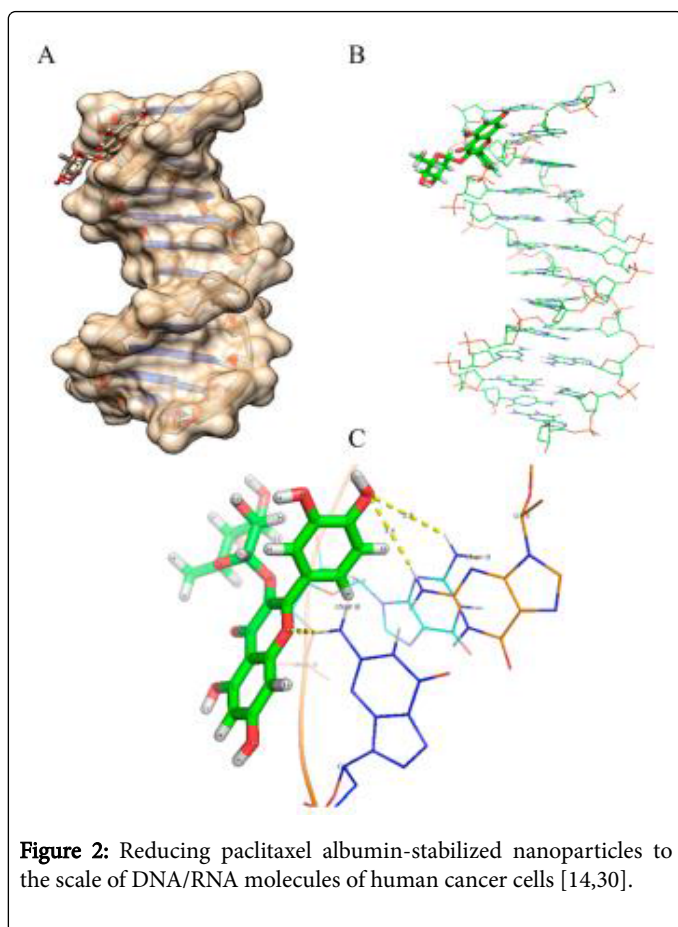
One of the most important goals in the medicine, pharmacology, pharmaceutical, physiological, clinical, biological, medical and medicinal sciences, biochemistry, pharmacogenomics and pharmacoproteomics of anti-cancer Nano drugs such as phosphodiesterase-5 (PDE5) inhibitors and paclitaxel albumin-stabilized nanoparticles is the treatment. The present methods and techniques of Nano-structuring anti-cancer Nano drugs, especially phosphodiesterase-5 (PDE5) inhibitors and paclitaxel albumin-stabilized nanoparticles, are expected to reach their limitations in the next decades. The smallest anti-cancer Nano drugs are of about five nanometers wide and hundreds of millions of them maybe integrated on a single molecule. Below this size the controlled doping becomes more and more difficult. The next important step in the treatment might be done by reducing the anti-cancer Nano drugs such as phosphodiesterase-5 (PDE5) inhibitors and paclitaxel albumin-stabilized nanoparticles to the scale of DNA/RNA molecules of human cancer cells (Figures 1 and 2). This new filed of medicine, pharmacology, pharmaceutical, physiological, clinical, biological, medical and medicinal sciences, biochemistry, pharmacogenomics and pharmacoproteomics is called pharmacotherapy. Recently, several researchers have measured electron transport in single or small groups of bioorganic molecules such as DNA/RNA of human cancer cells connected to metal such as Cadmium or Ruthenium (Figure 3) [1-29].

Phosphodiesterase-5 (PDE5) inhibitors and paclitaxel albumin-stabilized nanoparticles are two of the molecular systems and anti-cancer Nano drugs that have been studied extensively due to their ability to form a robust Self-Assembled Monolayer (SAM) on DNA/RNA surfaces of human cancer cells (Figure 3) and are useful for synthesizing insulating layers. Recently, tunneling has been identified as the main conduction mechanism for Self-Assembled Monolayers (SAMs) formed in a nanometer scale junction. However, the corresponding biochemical mechanisms governing the electron transport phenomenon in most of this experimental and computational investigation are scarcely mentioned. In this editorial, we report a first-principle study of electron transport in a single molecular conductor consisting of phosphodiesterase-5 (PDE5) inhibitors and paclitaxel albumin-stabilized nanoparticles sandwiched between two DNA/RNA molecules of human cancer cells (Figure 2). We show that the current was increased by increasing the external voltage biases.

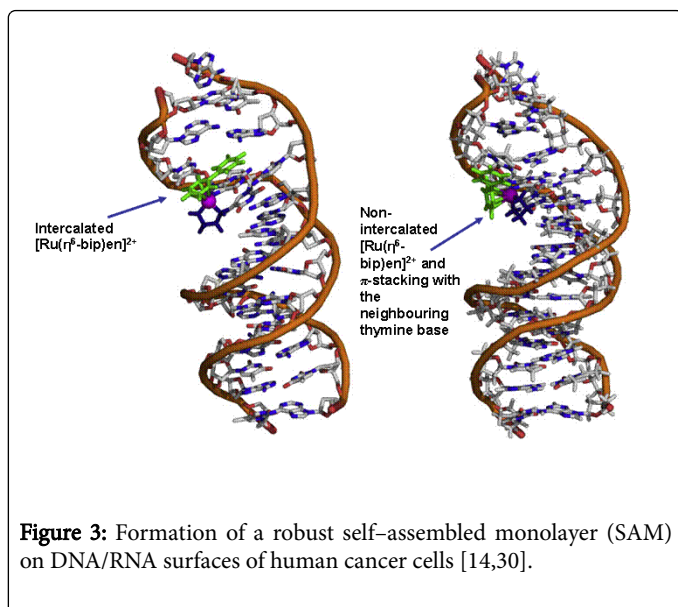


**Figure 1:** Reducing phosphodiesterase-5 (PDE5) inhibitors to the scale of DNA/RNA molecules of human cancer cells [14,30].

The Projected Density of States (PDOS) and transmission coefficients (T(E)) at various external voltage biases are analyzed and it suggests that the variation of the coupling between the phosphodiesterase-5 (PDE5) inhibitors and paclitaxel albumin-stabilized nanoparticles and the DNA/RNA molecules of human cancer cells with external bias leads to the increase in the current. Therefore, it can be concluded that the most origin of electron transport mechanism in anti-cancer Nano drugs is caused by the characteristics of phosphodiesterase-5 (PDE5) inhibitors and paclitaxel albumin-stabilized nanoparticles and the DNA/RNA molecules of human cancer cells as well as their cooperation, not necessarily only by the inherent properties of certain species of DNA/RNA molecules of human cancer cells themselves.



**Figure 2:** Reducing paclitaxel albumin-stabilized nanoparticles to the scale of DNA/RNA molecules of human cancer cells [14,30].



**Figure 3:** Formation of a robust self-assembled monolayer (SAM) on DNA/RNA surfaces of human cancer cells [14,30].

## References

1. Kibria G, Hatakeyama H, Sato Y, Harashima H (2016) Anti-tumor effect via passive anti-angiogenesis of PEGylated liposomes encapsulating doxorubicin in drug resistant tumors. *Int J Pharm* 509: 178-187.
2. Fan L, Zhang Y, Wang F, Yang Q, Tan J, et al. (2016) Multifunctional all-in-one drug delivery systems for tumor targeting and sequential release of three different anti-tumor drugs. *Biomaterials* 76: 399-407.
3. Liu N, Han J, Zhang X, Yang Y, Liu Y, et al. (2016) pH-responsive zwitterionic polypeptide as a platform for anti-tumor drug delivery. *Colloids and Surfaces B: Biointerfaces* 145: 401-409.
4. Kole L, Sarkar M, Deb A, Giri B (2016) Pioglitazone, an anti-diabetic drug requires sustained MAPK activation for its anti-tumor activity in MCF7 breast cancer cells, independent of PPAR-γ pathway. *Pharmacological Reports* 68: 144-154.
5. Kanehira Y, Togami K, Tada H, Chono S (2016) Tumor distribution and anti-tumor effect of doxorubicin following intrapulmonary administration to mice with metastatic lung tumor. *Journal of Drug Delivery Science and Technology* 33: 143-148.
6. Cao Y, Wang Q, Du Y, Liu F, Zhang Y, et al. (2016) l-arginine and docetaxel synergistically enhance anti-tumor immunity by modifying the immune status of tumor-bearing mice. *Int Immunopharmacol* 35: 7-14.
7. Kim DY, Kwon DY, Kwon JS, Park JH, Park SH, et al. (2016) Synergistic anti-tumor activity through combinational intratumoral injection of an in-situ injectable drug depot. *Biomaterials* 85: 232-245.
8. Shoja MH, Reddy ND, Nayak PG, Biswas S, Srinivasan KK, et al. (2016) In vitro mechanistic and in vivo anti-tumor studies of Glycosmis pentaphylla (Retz.) DC against breast cancer. *Journal of Ethnopharmacology* 186: 59-168.
9. Wang C, Li Y, Chen B, Zou M (2016) In vivo pharmacokinetics, biodistribution and the anti-tumor effect of cyclic RGD-modified doxorubicin-loaded polymers in tumor-bearing mice. *Colloids and Surfaces B: Biointerfaces* 146: 31-38.
10. Lin SI, Huang MH, Chang YW, Chen IH, Roffler S, et al. (2016) Chimeric peptide containing both B and T cells epitope of tumor-associated antigen L6 enhances anti-tumor effects in HLA-A2 transgenic mice. *Cancer Letters* 377: 126-133.
11. Göbel A, Thiele S, Browne AJ, Rauner M, Zinna VM, et al. (2016) Combined inhibition of the mevalonate pathway with statins and zoledronic acid potentiates their anti-tumor effects in human breast cancer cells. *Cancer Letters* 375: 162-171.
12. Wang H, Feng J, Liu G, Chen B, Jiang Y, et al. (2016) In vitro and in vivo anti-tumor efficacy of 10-hydroxycamptothecin polymorphic nanoparticle dispersions: shape- and polymorph-dependent cytotoxicity and delivery of 10-hydroxycamptothecin to cancer cells *Nanomedicine: Nanotechnology, Biology and Medicine* 12: 881-891.
13. Mendes F, Domingues C, Rodrigues-Santos P, Abrantes AM, Gonçalves AC, et al. (2016) The role of immune system exhaustion on cancer cell escape and anti-tumor immune induction after irradiation. *Biochimica et Biophysica Acta (BBA) - Reviews on Cancer* 1865: 168-175.
14. Zeng Z, Dai S, Jiao Y, Jiang L, Zhao Y, et al. (2016) Mannosylated protamine as a novel DNA vaccine carrier for effective induction of anti-tumor immune responses. *International Journal of Pharmaceutics* 506: 394-406.
15. Li SY, Liu Y, Xu CF, Shen S, Sun R, et al. (2016) Restoring anti-tumor functions of T cells via nanoparticle-mediated immune checkpoint modulation. *J Controlled Release* 231: 17-28.
16. Alwarawrah Y, Hughes P, Loisel D, Carlson DA, Darr DB, et al. (2016) Fasnall, a Selective FASN Inhibitor, Shows Potent Anti-tumor Activity in the MMTV-Neu Model of HER2+ Breast Cancer. *Cell Chemical Biology* 23: 678-688.
17. Alur I, Dodurga Y, Seçme M, Elmas L, Bağcı G, et al. (2016) Anti-tumor effects of bemiparin in HepG2 and MIA PaCa-2 cells. *Gene* 585: 241-246.
18. Cao J, Hou D, Lu J, Zhu L, Zhang P, et al. (2016) Anti-tumor activity of exopolysaccharide from *Rhizopus nigricans* Ehrenb on S180 tumor-bearing mice. *Bioorganic & Medicinal Chemistry Letters* 26: 2098-2104.
19. Hu B, Wang J, Guo Y, Chen T, Ni W, et al. (2016) Pre-clinical toxicity and immunogenicity evaluation of a MUC1-MBP/BCG anti-tumor vaccine. *International Immunopharmacology* 33: 108-118.

20. Elmasri WA, Hegazy MEE, Mechref Y, Paré PW (2016) Structure-antioxidant and anti-tumor activity of Teucrium polium phytochemicals. *Phytochemistry Letters* 15: 81-87.
21. Kang CH, Kim EY, Kim HR, Lee CO, Lee HK, et al. (2016) Minor modifications to ceritinib enhance anti-tumor activity in EML4-ALK positive cancer. *Cancer Letters* 374: 272-278.
22. Zhao Y, Ren W, Zhong T, Zhang S, Huang D, et al. (2016) Tumor-specific pH-responsive peptide-modified pH-sensitive liposomes containing doxorubicin for enhancing glioma targeting and anti-tumor activity. *J Controlled Release* 222: 56-66.
23. Luan Y, Chai D, Peng J, Ma S, Wang M, et al. (2016) A fully human monoclonal antibody targeting PD-L1 with potent anti-tumor activity. *International Immunopharmacology* 31: 248-256.
24. Eldin NE, Abu Lila AS, Kawazoe K, Elnahas HM, Mahdy MA, et al. (2016) Encapsulation in a rapid-release liposomal formulation enhances the anti-tumor efficacy of pemetrexed in a murine solid mesothelioma-xenograft model. *European Journal of Pharmaceutical Sciences* 81: 60-66.
25. Conde J, Arnold CE, Tian F, Artzi N (2016) RNAi nanomaterials targeting immune cells as an anti-tumor therapy: the missing link in cancer treatment? *Materials Today* 19: 29-43.
26. Zhang H, Liu C, Zhang F, Geng F, Xia Q, et al. (2016) MUC1 and survivin combination tumor gene vaccine generates specific immune responses and anti-tumor effects in a murine melanoma model. *Vaccine* 34: 2648-2655.
27. Guo H, Zhang Z, Su Z, Sun C, Zhang X, et al. (2016) Enhanced anti-tumor activity and reduced toxicity by combination andrographolide and bleomycin in ascitic tumor-bearing mice. *Eur J Pharmacol* 776: 52-63.
28. Wang SD, Li HY, Li BH, Xie T, Zhu T, et al. (2016) The role of CTLA-4 and PD-1 in anti-tumor immune response and their potential efficacy against osteosarcoma. *Int Immunopharmacol* 38: 81-89.
29. Hou Z, Deng K, Li C, Deng X, Lian H, et al. (2016) 808 nm Light-triggered and hyaluronic acid-targeted dual-photosensitizers nanoplatfrom by fully utilizing Nd<sup>3+</sup>-sensitized upconversion emission with enhanced anti-tumor efficacy. *Biomaterials* 101: 32-46.
30. Heidari A (2012) A Thesis submitted to the Faculty of the Chemistry, California South University (CSU), Irvine, California, The United States of America (USA) in Fulfillment of the Requirements for the Degree of Doctor of Philosophy (PhD) in Chemistry.