

Research & Reviews: Journal of Pharmaceutics and Nanotechnology

Pharmaceutical Industry Advantages and Disadvantages...!!

Taagore Ananda Kumar B*

Department of Biotechnology, Vydehi Institute of Biotech Sciences, Bangalore, Karnataka, India

Review Article

Received: 02/09/2016
Accepted: 05/09/2016
Published: 12/09/2016

*For Correspondence

Taagore Ananda Kumar B,
Department of Biotechnology,
Vydehi Institute of Biotech
Sciences, Bangalore, Karnataka,
India
E-mail: taagore@hotmail.com

Keywords: Pharceutical,
Aerosols, Creams, Emulsions

ABSTRACT

The pharmaceutical business has been a simple focus for commentators throughout the years. There is an observation that "Enormous Pharma" is entirely out for benefit and that pharmaceutical organizations will remain absolutely determined to line the pockets of their shareholders. Actually this: Many of these medications are sparing lives and peopling live more joyful, more advantageous lives.

INTRODUCTION

While some may see the expense of pharmaceutical medications as a negative part of the business, you can likewise consider expense to be an advantage. As indicated by the Pharmaceutical Research and Manufacturers of America (PhRMA), the piece of the pie of non-specific pharmaceuticals was somewhere around 42 and 58 percent in 2006 [1-5]. This means bland medications are progressively accessible to patients, which drives down expenses. Most reports in the media talk about the high cost of medications and absence of access for specific patients, yet actually tranquilizes today are less expensive and more open than any other time in recent memory because of expanded rivalry in the commercial center. Moreover, financial improvement in nations like India and China are driving down worldwide costs for pharmaceutical items considerably more [6-11].

BETTER HEALTH OUTCOMES

As per the U.S. Authority of Labor Statistics, the pharmaceutical business creates and delivers items that treat an assortment of infections, sparing a large number of lives and peopling experiencing maladies and diseases to recuperate and lead more gainful lives [12-19]. The pharmaceutical business creates drugs that treat each sort of condition believable, for example, flu, sexually transmitted illnesses, cardiovascular ailment, diabetes, hepatitis, Parkinson's sickness and disease, to give some examples. A large portion of these are annihilating and life-changing maladies, and these items keep patients alive longer [20-27].

MONETARY BENEFITS

Pharmaceutical organizations utilized almost 300,000 individuals in the United States in 2008, as per the Bureau of Labor Statistics, and about 87 percent of the organizations in the pharmaceutical business utilized more than 100 specialists in 2008 [28-37]. The tax breaks to the United States are considerable also. Pfizer alone posted \$44 billion worth of income in 2008, as indicated by Contract Pharma. The monetary atmosphere impacts the pharmaceutical business, however beneficial organizations result in more assessable income for the U.S. Individuals may censure this measure of benefit from one organization, yet consider this: The basic objective of each and every business is to profit. Individuals single out pharmaceutical organizations for making benefits, yet it's imperative to recollect that they likewise make items that spare a large number of lives [38-44].

Advantages of Pharmaceutical Products:

Required amount of substance can be effortlessly pulled back from the bundle without pollution or presentation of the staying material.

- Pressurized canned products are simple and advantageous to apply and can be managed without the assistance of others.
- The onset of activity is speedier contrasted with other measurements frames on the grounds that the medicament is straightforwardly connected to the influenced region/part.
- The scattering of medicament is great.
- Because of shut pressing of mist concentrates, there is no manual/direct contact with the medicament.
- Airborne structure can stay away from disintegration or inactivation of medication by the pH or enzymatic activity of the stomach or digestive tract furthermore can evade the principal pass digestion system.
- A particular measure of dosage or medication can be expelled from the compartment without pollution of outstanding substance.
- Security can be upgraded for those substances antagonistically influenced by barometrical oxygen or dampness. (Hydrolysis of medicament can be avoided since charges don't contain any water. Oxidation is averted as no air is available in the compartment).
- Sterility can be for sterile item, in light of the fact that no microorganism can enter notwithstanding when the valve is opened.
- Metered valve can discharge the substance in Controlled and Uniformly.
- The vaporized compartments secure the photosensitive medicaments. (But clear glass compartments).
- For Inhalation reason a fine fog of the medication is created.
- The quick volatilization of the charge gives a cooling, invigorating impact.
- Plan of vaporized and keeping up valve control, the physical structure and the molecule size of the discharged item might be controlled, which may give adequacy of a medication.
- Bothering can be lessened by utilization of topical airborne pharmaceutical in a uniform slight layer to the skin without touching the influenced territory ^[45-54].

DISADVANTAGES

Aerosols products are financially savvy. Transfer of vacant vaporized holders are troublesome. Because of unpredictability of the fuel/s can disturb the harmed skin. A few people might be delicate to the fuel/s and people who utilizing an inward breath airborne/s, the fluorinated hydrocarbons may bring about carcinotoxic consequences for quick and rehashed utilization of the vaporized item. Vaporized packs should far from temperature and flame, since it might grow high weight inside the holder prompts blast. On the off chance that the medication is not solvent in the fuel, vaporized the plan is troublesome. Once in a while forces may bring about dangerous responses, if treatment is proceeded for a drawn out stretch of time. In Aerosol, condensed gas charge/force blend and item focus is fixed inside an airborne compartment, harmony is immediately settled between the segment of fuel that remaining parts melted and that charge which vaporizes and possesses the upper bit of the airborne holder.

Along these lines, the vapor stage which creates weight in compartment, against the dividers of the holder. At valve get together and the surface of the fluid stage, this contains the melted gas and the item think. This weight is in charge of activation of the airborne valve compels the fluid stage up to the plunge tube and through the opening of the valve substance will discharged into the climate. As the charge/s discharged into the air, it extends and vanishes as a result of the drop down in weight, which leaves the item think as airborne fluid beads or dry particles relying on the definition sort at connected territory.

Endless supply of the valve get together of the airborne framework, the weight applied by the charge/s constrains the substance of the bundle to outside through the opening of the vaporized valve. The physical type of the substance radiated which relies on upon the plan sort of the item and the kind of valve utilized. For the most part, vaporized items outlined as to oust their substance as a fine fog, a coarse, wet, or dry shower; a constant flow; or steady or quick breaking froth ^[55-64].

Some part of the fluid stage discharged from the holder, balance creates between the force/s of residual substance and hence the vapor state is restored. So notwithstanding amid ejection of the item from the vaporized the weight inside the holder stays steady and the item might be ceaselessly discharged at same rate and with the same extent. At the point when the fluid repository is finished, the weight can't be kept up, and the gas might be removed from the holder with lessening weight until it is depleted.

Emulsions

A portion of the biggest pharmaceutical medication organizations saved money over \$10 billion in 2014, a huge extent of which originated from pharmaceutical creams. Used to treat an assortment of conditions, to a great extent skin-related (e.g. rashes, stings, and parasitic contaminations), pharmaceutical creams can be set up as either water-in-oil (w/o) or oil-in-water (o/w) emulsions. Notwithstanding the sort, nonetheless, most creams are emulsion-based. Continue perusing for the upsides of emulsions over different items, and why your lab ought to consider utilizing them for your pharmaceutical creams ^[65-73].

Controlled Absorption Rate

To effectively battle a few conditions, drug treatment is required at particular time interims. Pharmaceutical emulsions can be modified for quick or moderate discharge, contingent upon what the condition requires. So if a patient applies the pharmaceutical cream at Hour 0, the dynamic fixing might be discharged at both Hour 0 and Hour 1.

Utilization of Water as Diluent and Solvent

Capacity to utilize water as both diluent and dissolvable is inconceivably invaluable. It is both cheap as a diluent and successful as a dissolvable. Despite whether you are creating a w/o or o/w emulsion, water will be important

Adaptability in Particle Size

Despite the fact that it might be expected that the littler the molecule estimate the better, it is a uniform item that makes consistency in patient results. This is especially vital if the patient buys item from more than one group of creams. An organization may utilize a nanoemulsion, or on the other hand, a microemulsion; in any case, they have the adaptability to accomplish different molecule sizes and utilize them reliably over a solitary item.

This point is especially vital for inadequately water-dissolvable medications, which would some way or another have lower rates of disintegration and bioavailability. Enhanced bioavailability is practical for the producer also, as less item should be created to accomplish the same impact [74-84].

As you either set out on, or proceed with, the way toward creating emulsions for pharmaceutical creams, your item's prosperity relies on upon the gear used to make it. High weight homogenization is the most widely recognized strategy for creating emulsions, in view of both its intense blending procedure and its cost/time viability. The homogenizer will shear liquid by compelling it through a prohibitive valve, shaping a great emulsion.

Honey bee International Technology is trusted by lab chiefs and researchers around the globe for their high-weight homogenizers. They offer homogenizers that are both high caliber and dependable, and which can help your lab produce nano/smaller scale emulsions, scatterings, and suspensions to be fused into your pharmaceutical cream. Take in more about our pharmaceutical handling gear or on the off chance that regardless you have questions about emulsions, look at our blog entry on the contrast between w/o and o/w emulsions [85-96].

CONCLUSION

Pharmaceutical products are involved in our day to day lives. Pharmaceutical products are used in various manners in our life. We need to be very cautious while using the pharmaceutical products in our day to day life. The limitation should be maintained while using it. If used excessively it can cause irreparable damage [97-102].

REFERENCES

1. Liu M et al. HPLC method development, validation, and impurity characterization of a potent antitumor nucleoside, T-dCyd (NSC 764276). *J Pharm Biomed Anal.* 2016: 429-435.
2. Ma X et al. Structural elucidation of the impurities in Enzalutamide bulk drug and the development, validation of corresponding HPLC method. *J Pharm Biomed Anal.* 2016: 436-433.
3. Li J et al. Novel α -substituted tropolones promote potent and selective caspase-dependent leukemia cell apoptosis. *Pharmacol Res.* 2016:
4. Lu MC et al. Polar Recognition Group Study of Keap1-Nrf2 Protein-Protein Interaction Inhibitors. *ACS Med Chem Lett.* 2016: 835-840.
5. Ahmad I et al. Corrigendum to "Formulation and stabilization of norfloxacin in liposomal preparations". *Eur J Pharm Sci.* 2016: 208-215.
6. Dickinson PA et al. Optimizing Clinical Drug Product Performance: Applying Biopharmaceutics Risk Assessment Roadmap (BioRAM) and the BioRAM Scoring Grid. *J Pharm Sci.* 2016: 613-618.
7. Pelay-Gimeno M et al. Synthesis of complex head-to-side-chain cyclodepsipeptides. *Nat Protoc.* 2016: 1924-1947.
8. Citraro R et al. The Anticonvulsant Activity of a Flavonoid-Rich Extract from Orange Juice Involves both NMDA and GABA-Benzodiazepine Receptor Complexes. *Molecules.* 2016: 9.
9. Budnik LT et al. Sensitising effects of genetically modified enzymes used in flavour, fragrance, detergent and pharmaceutical production: cross-sectional study. *Occup Environ Med.* 2016:
10. Blankenship-Paris TL et al. Evaluation of buprenorphine hydrochloride Pluronic(®) gel formulation in male C57BL/6NCrI mice. *Lab Anim (NY).* 2016: 370-379.
11. Javidnia K et al. Biotransformation of acetoin to 2,3-butanediol: Assessment of plant and microbial biocatalysts. *Res Pharm Sci.* 2016: 349-354.

12. Sversut RA et al. A critical review of properties and analytical methods for the determination of oxytetracycline in biological and pharmaceutical matrices. *Crit Rev Anal Chem*. 2016:
13. Baalbaki A et al. The fate of selected pharmaceuticals in solar stills: Transfer, thermal degradation or photolysis? *Sci Total Environ*. 2016: 583-593.
14. Zgair A et al. Dietary fats and pharmaceutical lipid excipients increase systemic exposure to orally administered cannabis and cannabis-based medicines. *Am J Transl Res*. 2016: 448-459.
15. Dennis E et al. Utilizing Nanotechnology to Combat Malaria. *J Infect Dis Ther*. 2015;3:229.
16. Wang W et al. Nanotechnology as a Platform for Thermal Therapy of Prostate Cancer. 2013
17. Laroo H. Colloidal Nano Silver-Its Production Method, Properties, Standards and its Bio-efficacy as an Inorganic Antibiotic. *J Phys Chem Biophys*. 2013;3:130.
18. Parchi PD et al. How Nanotechnology can Really Improve the Future of Orthopedic Implants and Scaffolds for Bone and Cartilage Defects. *J Nanomedicine Biotherapeutic Discov*. 2013;3:114.
19. De Rosa G and Caraglia M. New Therapeutic Opportunities from Old Drugs: The Role of Nanotechnology? *J Bioequiv Availab*. 2013;5:e30
20. Nazem A and Mansoori GA. Nanotechnology Building Blocks for Intervention with Alzheimer's Disease Pathology: Implications in Disease Modifying Strategies. *J Bioanal Biomed*. 2014;6:9-14.
21. Singh Y. Trends in Biomedical Nanotechnology. *J Nanomedicine Biotherapeutic Discov*. 2014;4:e130.
22. Satvekar RK et al. Emerging Trends in Medical Diagnosis: A Thrust on Nanotechnology. *Med chem*. 2014;4: 407-416.
23. Nicholson AW. Glimpsing the Future of Nanotechnology in Nucleic Acid Detection and Analysis. *J Anal Bioanal Tech*. 2013;4:e113.
24. Toffoli G and Rizzolio F. Role of Nanotechnology in Cancer Diagnostics. *J Carcinogene Mutagene*. 2013;4: 135.
25. Hadi NI et al. Electrical Conductivity of Rocks and Dominant Charge Carriers: The Paradox of Thermally Activated Positive Holes. *J Earth Sci Climate Change*. 2012;3:128.
26. Claussen JC and Medintz IL. Using Nanotechnology to Improve Lab on a Chip Devices. *J Biochips Tiss Chips*. 2012;2:e117.
27. Muehlmann LA and de Azevedo RB. There is Plenty of Room at the Bottom for Improving Chemotherapy: Exploiting the EPR Effect with Nanotechnology. *Chemotherapy*. 2012;1:e116
28. Aliosmanoglu A and Basaran I. Nanotechnology in Cancer Treatment. *J Nanomed Biotherapeut Discov*. 2012;2: 107
29. Shrivastava JN et al. Laboratory Scale Bioremediation of the Yamuna Water with Effective Microbes (EM) Technology and Nanotechnology. *J Bioremed Biodeg* 3:160
30. Pham W (2012) Quantitative Analysis and Safety Issues of Nanotechnology in Healthcare Research. *J Mol Biomark Diagn* 3:e111.
31. Cho HH and Kim BS. Nanotechnology on Boiling Heat Transfer for a Next-generation Cooling Technology. *J Material Sci Eng*. 2012;1:e106.
32. Swain S. Cutting Edge of Pharmaceutical Nanotechnology. *Pharmaceut Reg Affairs*. 2012;1:e110.
33. Bhattarai N and Bhattarai SR. Theranostic Nanoparticles: A Recent Breakthrough in Nanotechnology. *J Nanomed Nanotechol*. 2012.
34. Shokeen M. Promise of Nanotechnology in Biomedical Applications. *J Med Diagn Meth*. 2012;1:e103.
35. Muehlmann LA and de Azevedo RB. There is Plenty of Room at the Bottom for Improving Chemotherapy: Exploiting the EPR Effect with Nanotechnology. *Chemotherapy*. 2012;1:e116
36. Newman DJ and Cragg GM. Natural products as sources of new drugs over the last 25 years. *J Nat Prod*. 2007;70:461-477.
37. Ala PJ et al. Counteracting HIV-1 protease drug resistance: structural analysis of mutant proteases complexed with XV638 and SD146, cyclic urea amides with broad specificities. *Biochemistry*. 1998;37: 15042-15049.
38. Gupta A et al. Extraction of Proteases from Medicinal Plants and their Potential as Anti-Viral Targets. *J Biotechnol Biomater*. 2016;6:228.
39. Roy A et al. Effect of Different Media and Growth Hormones on Shoot Multiplication of In Vitro Grown *Centella asiatica* Accessions. *Adv Tech Biol Med*. 2016;4:1

40. Hausen BM. Centella asiatica (Indian pennywort), an effective therapeutic but a weak sensitizer. Contact Dermatitis. 1993;29:175-179.
41. Wang PJ and Charle A. Micropropagation through meristem culture in biotechnology in agriculture and forestry. Springer Verlag. 1991;17:41-44.
42. Singh S et al. Centella asiatica L. a plant with immense potential but threatened. International Journal of Pharm. Sci Review and Research. 2010;4:9-17.
43. Hausen BM. Centella asiatica (Indian pennywort), an effective therapeutic but a weak sensitizer. Contact Dermatitis. 1993;29:175-179.
44. Roy A et al. Effect of Different Media and Growth Hormones on Shoot Multiplication of In Vitro Grown Centella asiatica Accessions. Adv Tech Biol Med. 2016;4:172.
45. Tiwari KN et al. Micropropagation of Centella asiatica (L.), a valuable medicinal herb. Plant cell, Tissue and Organ Culture. 2000;63:179-185.
46. Zainol NA et al. Profiling of Centella asiatica (L.) Urbaqn Extract. The Malaysian Journal of Analytical Sciences. 2008;12:322-327.
47. Jorge OA and Jorge AD. Hepatotoxicity associated with the ingestion of Centella asiatica. Rev EspEnferm Dig. 2005;97: 115-124.
48. Wang PJ and Charle A. Micropropagation through meristem culture in biotechnology in agriculture and forestry. Springer Verlag. 1991;17:41-44.
49. Buhari Muhammad L, et al. Role of Biotechnology in Phytoremediation. J Bioremed Biodeg. 2016;7:330.
50. Jaak T et al. Phytoremediation and Plant-Assisted Bioremediation In Soil And Treatment Wetlands: A Review. The Open Biotechnology Journal. 2015;9:85-92.
51. Nriagu JO and Pacyna JM. Quantitative assessment of worldwide contamination of air, water and soils by trace metals. Nature. 1998;333: 134-139.
52. Gandia-Herrero F et al. Detoxification of the explosive 2,4,6-trinitrotoluene in Arabidopsis: discovery of bifunctional O- and C-glucosyltransferases. Plant J. 2008;56:963-974.
53. Buhari Muhammad L et al. Role of Biotechnology in Phytoremediation. J Bioremed Biodeg. 2016;7:330
54. Dillalogue E. Phytoremediation: the power of plant to clean up the environment. 2014.
55. Conesa HM et al. A critical view of current state of phytotechnologies to remediate soils: still a promising tool?Scientific World Journal. 2012;2012: 173-829.
56. Bizily SP et al. Phytodetoxification of hazardous organomercurials by genetically engineered plants. Nat Biotechnol. 2000;18:213-217.
57. Suresh B and Ravishankar GA. Phytoremediation—a novel and promising approach for environmental clean-up. Crit Rev Biotechnol. 2004;24:97-124.
58. Paniagua-Michel J and Olmos-Soto J. Modern Approaches into Biochemical and Molecular Biomarkers: Key Roles in Environmental Biotechnology. J Biotechnol Biomater. 2016;6:216.
59. Hamza-Chaffai A. Usefulness of Bioindicators and Biomarkers in Pollution Biomonitoring. International Journal of Biotechnology for Wellness Industries. 2014;3:19-26.
60. VanSchooten FJ et al. DNA dosimetry in biological indicator species living on PAH-contaminated soils and sediments. Ecotoxicol Environ Saf. 1995;30:171-179.
61. Paniagua-Michel J and Olmos-Soto J. Modern Approaches into Biochemical and Molecular Biomarkers: Key Roles in Environmental Biotechnology. J Biotechnol Biomater. 2016;6:216.
62. Jackson AD and McCullough MBA. Biomechanics: A Frontier Microbial Biotechnology. J Microb Biochem Technol. 2015;7:257.
63. Li Y. Multiscale modeling and uncertainty quantification in nanoparticle-mediated drug/gene delivery. Computational Mechanics. 2014;53:511-537.
64. Saez A et al. Is the mechanical activity of epithelial cells controlled by deformations or forces? Biophys J. 2005;89: L52-L54.
65. Liu Y. Coupling of Navier-Stokes equations with protein molecular dynamics and its application to hemodynamics. International Journal for Numerical Methods in Fluids. 2004;46:1237-1252.
66. Matías J et al. Preliminary Studies on a Derivative Verotoxin as Oral Adjuvant. J Vaccines Vaccin. 2015 6: 279
67. Madar-Balakirski N et al. Measurement of Cellular Immunity to Influenza Vaccination in Rheumatoid Arthritis;Comparison of Three Assays. J Vaccines Vaccin. 2015 6:278.

68. Watanabe S et al. Novel Cancer Vaccination System Based on Human Endo-B-N-Acetyl Glucosaminidase Gene Delivery. *J Glycobiol.* 2014;3:106.
69. Rodríguez-García et al. J Missed Opportunities for Influenza Vaccination and Its Serious Consequences. *J Community Med Health Educ.* 2014;5:335
70. Berera D and Thompson KM. Medical Student Knowledge, Attitudes, and Practices Regarding Immunization. *J Vaccines Vaccin.* 2015;6:268.
71. Tomisaka M et al. Overcoming the Japanese “Vaccine Gap”: An Analysis of Medical Leaders’ Witness. *J Vaccines Vaccin.* 2015;6: 263
72. Aga AM et al. Adaptation of Local Rabies Virus Isolates to High Growth Titer and Determination of Pathogenicity to Develop Canine Vaccine in Ethiopia. *J Vaccines Vaccin.* 2014;5:245.
73. Aga AM et al. Adaptation of Local Rabies Virus Isolates to High Growth Titer and Determination of Pathogenicity to Develop Canine Vaccine in Ethiopia. *J Vaccines Vaccin.* 2014;5:245.
74. Ren T et al. Vaccine and Needle-Free Vaccination Delivery System. *J Microb Biochem Technol.* 2014;6:359-360.
75. del Giudice MM et al. Probiotics and Vaccination in Children. *J Vaccines Vaccin.* 2014;5: 226.
76. Balasubramaniam KV and Sita V. Access to Vaccines and the Vaccine Industry - An Analysis . *J Vaccines Vaccin.* 2014;5:218.
77. Balasubramaniam KV and Sita V. Access to Vaccines and the Vaccine Industry - An Analysis . *J Vaccines Vaccin.* 2014;5:218.
78. <http://www.omicsgroup.org/journals/2167-065X/2167-065X.S1.008-011.pdf>
79. <http://www.omicsonline.org/2157-7560/2157-7560.S1.022-020.pdf>
80. <http://omicsonline.org/2157-7560/2157-7560.S1.020-082.pdf>
81. Kanampalliar AM. Reverse Vaccinology: Basics and Applications. *J Vaccines Vaccin.* 2013;4: 194
82. Petrovsky N et al. Unconventional Vaccines: Progress and Challenges. *J Vaccines Vaccin.* 2013;4: 186.
83. Bostan N et al. Current and Future Prospects of Torque Teno Virus. *J Vaccines Vaccin.* 2013;
84. Aiyer Harini P et al. An Overview of Immunologic Adjuvants - A Review. *J Vaccines Vaccin.* 2013;4: 167
85. Shimi E et al. Childhood Immunization Refusal: The Return of Vaccine-Preventable Diseases. *J Vaccines Vaccin.* 2012;3:e115.
86. Thompson KM et al. Development of Investment Cases for Globally-Coordinated Management of Infectious Diseases. *J Vaccines Vaccin.* 2012;3:164
87. Gambhir RS et al. Vaccine against Dental Caries- An Urgent Need. *J Vaccines Vaccin.* 2012;3:136
88. Singh S et al. *Centella asiatica* L. a plant with immense potential but threatened. *International Journal of Pharm. Sci Review and Research.* 2010;4:9-17.
89. Hausen BM. *Centella asiatica* (Indian pennywort), an effective therapeutic but a weak sensitizer. *Contact Dermatitis.* 1993;29:175-179.
90. Roy A et al. Effect of Different Media and Growth Hormones on Shoot Multiplication of in Vitro Grown *Centella asiatica* Accessions. *Adv Tech Biol Med.* 2016;4:172.
91. Tiwari KN et al. Micropropagation of *Centella asiatica* (L.), a valuable medicinal herb. *Plant cell, Tissue and Organ Culture.* 2000;63:179-185.
92. Zainol NA et al. Profiling of *Centella asiatica* (L.) Urbaqn Extract. *The Malaysian Journal of Analytical Sciences.* 2008;12:322-327.
93. Jorge OA and Jorge AD. Hepatotoxicity associated with the ingestion of *Centella asiatica*. *Rev EspEnferm Dig.* 2005;97:115-124.
94. Wang PJ and Charle A. Micropropagation through meristem culture in biotechnology in agriculture and forestry. Springer Verlag. 1991;17:41-44.
95. Buhari Muhammad L, et al. Role of Biotechnology in Phytoremediation. *J Bioremed Biodeg.* 2016;7:330.
96. Jaak T et al. Phytoremediation and Plant-Assisted Bioremediation In Soil And Treatment Wetlands: A Review. *The Open Biotechnology Journal.* 2015;9: 85-92.
97. Nriagu JO and Pacyna JM. Quantitative assessment of worldwide contamination of air, water and soils by trace metals. *Nature.* 1998;333:134-139.
98. Gandia-Herrero F, et al. Detoxification of the explosive 2,4,6-trinitrotoluene in *Arabidopsis*: discovery of bifunctional O- and C-glucosyltransferases. *Plant J.* 2008;56:963-974.
99. Buhari Muhammad L et al. Role of Biotechnology in Phytoremediation. *J Bioremed Biodeg.* 2016;7:330

100. Ahmad I et al. Corrigendum to "Formulation and stabilization of norfloxacin in liposomal preparations". *Eur J Pharm Sci.* 2016:208-215.
101. Dickinson PA, et al. Optimizing Clinical Drug Product Performance: Applying Biopharmaceutics Risk Assessment Roadmap (BioRAM) and the BioRAM Scoring Grid. *J Pharm Sci.* 2016:613-618.
102. Pelay-Gimeno M, et al. Synthesis of complex head-to-side-chain cyclodepsipeptides. *Nat Protoc.* 2016: 1924-1947.