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Plant based drug discovery: Past, present and future

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Throughout our evolution, the importance of natural products for medicine and health has been enormous. The World Health Organization estimates that 80% of the people in developing countries of the world rely on traditional medicine for their primary health care, and about 85% of traditional medicine involves the use of plant extracts. This means that about 3.5 to 4 billion people in the world rely on plants as sources of drugs.

Natural products and their derivatives continue to be rich sources for drug discovery. However, natural products are not drugs. They are the possible candidates for drug development. More than 60% of the drugs in market are derived from natural sources. During the last two decades, research aimed at exploiting natural products as a resource has seriously declined. This is in part due to the development of new technologies such as combinatorial chemistry, metagenomics and high-throughput screening. However, the new drug discovery approaches did not fulfill the initial expectations. In addition, there is an urgent need for new drugs to fight against infections caused by multi-resistant pathogens. These factors renewed the interest in natural products.

Today, plants continue to retain their historical significance as important sources of novel compounds useful directly as medicinal agents, as model compounds for optimization, as biochemical and/or pharmacological probes, and as sources of inspiration for medicinal chemists in generating various synthetic organic compounds. Some of the plants have gained a new investigational or therapeutical status in recent years. Number of novel plant-derived substances has also entered into markets. Clinical plant-based research has made particularly rewarding progress in the important fields of anticancer (e.g. taxoids and camptothecins) and antimalarial (e.g. artemisinin compounds) therapies.

The modern tools of chemistry and biology—in particular, the various 'omics' technologies, now allow scientists to detail the exact nature of the biological effects of natural compounds on the human body, as well as to uncover possible synergies, which holds much promise for the development of new therapies against many devastating diseases, including dementia and cancer. These illustrate the continuing value of plant-derived secondary metabolites as viable compounds for modern drug development.

Biography

Shanmugam Anusuya has completed her B.Pharmacy in Dr. M. G. R. Medical University, Chennai with distinction. She continues her post graduation in Bioinformatics in Bharathiar University, Coimbatore. She received her doctoral degree from Bharathiar University, Coimbatore on March 2012. She has published 6 papers in reputed international journals and few are yet to be submitted. Her research interest includes overcoming multidrug resistance leprosy; enhancing the bioremediation abilities of versatile peroxidase enzyme; designing a novel drug for dengue fever; and designing a potent pesticide based on the natural resources for *Aedes aegypti* mosquito, a vector for dengue. She also serves as an editorial member of a reputed journal, International Journal of Interdisciplinary Research and Reviews (IJIRR). She is the potential reviewer for so many journals.

Computational studies of potential drug targets for treating prion diseases

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Prion diseases are invariably fatal and highly infectious neurodegenerative diseases (e.g. CJD, vCJD, iCJD, fCJD, sCJD, GSS, FFI, Kulu, BSE or 'mad cow', scrapie in sheep, CWD, TME, FSE, EUE, SE, etc.) affecting humans and animals for a major public health concern. By now, there have not been effective therapeutic approaches or medications to treat all these diseases. Fortunately, rabbits, horses and dogs are immune to prion diseases and by the end of year 2010, all their NMR molecular structures had been identified. Prion does not contain nucleic acids (either DNA/RNA, or both); unlike conventional infectious diseases, prion diseases can be caused by the body's own proteins. Similarly as "PNAS 104(29) 11921-11926 (2007)" which reports a drug target fixing N159 and T196 at 1.54nm with good clinical effects, the author has found a potential drug target fixing D177 and R163 at the distance maintained by a salt bridge. The author will report the molecular dynamics principal of some potential drug targets for treating prion diseases.

Biography

Jiapu Zhang completed his Ph.D., two M.Sc., B.Sc. degrees in 1993, 1996, 2000 and 2004, respectively and finished three postdoctoral studies from CSIRO, The University of Ballarat and The University of Melbourne. He has published many papers in reputed journals and books, authored 4 books and has been serving as the editorial board member of 13 journals and the reviewer of 23 journals. He has also worked as an excellent educator.