

Application of NMR spectroscopy for structure elucidation of bioactive natural and synthetic compounds

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Natural products have been the source of most of the medicines. More than 80% of drug substances were natural products or inspired by a natural compound.¹ New drugs from 1981 to 2007 indicate that almost half of the drugs approved since 1994 are based on natural products.^{2,3} Thirteen natural-product-related drugs were approved from 2005 to 2007.³ Over a 100 natural-product-derived compounds are currently undergoing clinical trials. Chemical compounds exist in nature as mixtures, so the combination of liquid chromatography and mass spectrometry (LC-MS) is often used to separate the individual chemicals. Databases of mass spectras for known compounds are available. Nuclear magnetic resonance spectroscopy is another important technique for determining chemical structures of natural products. Over the past 30 years, NMR spectroscopy has had tremendous impact on organic chemistry and biomolecular structure determination at all stages of drug discovery and development. With advances in NMR techniques, complex structures can be solved with much less than 1 mg of compound the structures of more than 90% of new compounds can be elucidated within 2 weeks.

In continuation of our drug discovery program we applied these modern tools to identify the novel structures from nature.⁴⁻⁸ These tools were also used in identifying the unusual products during chemical transformation of natural products⁹ and synthetic reactions,¹⁰⁻¹⁹ which resulted in the development of novel methodologies for the synthesis of natural products analogues will be discussed.

Biography

T. Narender was born in a remote village, Vilasagar, which is located in the Karimnagar district of Andhra Pradesh State, India. He obtained the Ph.D. degree in the area of natural products (phytochemistry) from the University of Kakatiya, Warangal, A.P., India in 1999. During his Ph.D. degree studies, he received fellowship (1994-1999) from the University Grants Commission (UGC), New Delhi, India. After obtaining his Ph.D. degree, he joined as a Scientist B the Central Marine Fisheries Research Institute (CMFRI), Cochin, India, in November 1999, and continued there until July 2002, where he worked on the bioactive substances from the marine organisms. In July 2002, he moved to the Central Drug Research Institute, Lucknow, India, on a higher position, and currently he holds a Scientist E1 position. At the CDRI, he is involved in the drug discovery program from the Indian medicinal plants, marine organisms. He has been awarded the BOYSCAST Fellowship by the Department of Science and Technology, New Delhi, India, in 2007. As a part of this program he visited University of California, San Diego (UCSD), Calif, USA, where he worked with Professor William Fenical's lab on marine microorganisms from April 2007 to March 2008. He has been awarded the CDRI Incentive Award for the best publication during 2008. Currently, his research group is engaged in development of novel drugs/leads for various diseases such as malaria, leishmania, cancer, diabetes, and lipid lowering from the Indian medicinal plants, marine organisms. He also carries out work on chemical transformation and synthesis of natural products of biological importance.

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