Shivani Tanwar

Position

Postdoctoral Research Fellow

PhD

Enantioresolution of some chiral pharmaceuticals using liquid chromatography

Research area

Development of nano probes, improvements in disease diagnosis and better understanding of drug-delivery systems

Department of Biochemical Science and Technology National Taiwan University, 1, Sec. 4, Roosevelt Road, Taipei-10617, Taiwan
Tel.: +886 098 194 1127
E-mail: shivani13@ntu.edu.tw

Supervisor's supporting comments

It gives me great pleasure to nominate Shivani Tanwar, a National Science Council, Taiwan postdoctoral fellow presently at National Taiwan University (Taiwan) for the Bioanalysis: Young Investigator 2011 award. She joined my laboratory in 2006. I have found her very diligent with high academic interests and intellectual ability. She is highly motivated and self driven for research work with the ability to design new experiments. Shivani is a promising scientist, motivated to work in

multidisciplinary research areas and quite capable of setting up her own team and carrying out independent research. She is quite efficient at training her juniors. She belongs to the brightest segment of Indian students. As part of her PhD, she worked on the development of new methods for chiral separation and determination of enantiomeric excess of certain pharmaceutically and biomedically important compounds. In her work she has applied certain fast and *de novo* reaction techniques, which have been proven to be techniques of immense importance in chiral separation. Shivani had several job offers, but her keen interest for research pushed her to accept the postdoctoral position in Taiwan, and we still now share knowledge and discuss scientific issues today. Shivani deserves this honor. I recommend her name without any reservations.

Nominated by: Ravi Bhushan, Department of Chemistry, Indian Institute of Technology Roorkee (IITR), Lab No. C-302, Roorkee- 247 667, India

Q What drove you to choose a career in bioanalysis?

My interest in separation science is somewhat related to the 'Thalidomide tragedy' widely publicized by mass media in the late 1950s; during my sophomore years I was taught about the adverse effects of the wrong chirality in the human body and as a student of chemistry, I started liking the mechanisms of action of commercially available drugs. Then, I opted for a doctoral training that led me to develop methods for enantiomeric separation and quantitation of various pharmaceuticals and biologically important compounds. My family often ask, are we able to avoid such tragic instances, and I feel there is a lot to be done, and we are not completely prepared yet.

Q Describe the main highlights of your bioanalytical research & its importance to the bioanalytical community both now and in the future.

At the Department of Chemistry, Indian Institute of Technology, Roorkee, India, we improved chiral separation techniques either by

precolumn derivatization using a chiral reagent (indirect method), by use of a chiral stationary phase, by immobilizing chiral selector on stationary phase or by adding a chiral selector to the mobile phase (i.e., the direct method) and demonstrated successful application for separation of racemic drugs, even on semipreparative scales, and for control of enantiomeric purity.

Another significant study was the analysis of atenolol enantiomers in rat plasma as a model system to understand the role of enantiomers. We used Marfey's reagent for derivatization followed by separation and quantitation of each isomer, and I believe that our method is more practical because of the improved detection limit.

Presently (in Taiwan), I work on development of nanobiosensors for metals as well as metabolites. Abnormal pH regulation in specific and localized areas of the cell can serve as a marker in the diagnosis of neurodegenerative disorders, colorectal cancer, breast cancer and cystic fibrosis. In the previous couple of months I synthesized a fundamentally new fluorescent probe that showed positive responses when applied [UNPUBLISHED DATA]. Besides, several

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other immunosensors have been made, and their electrochemical behaviors are presently being tested.

Q Where do you see your career in bioanalysis taking you?

My career in bioanalysis started with simple experiments in the analytical laboratory and then I was trained to discover new molecules, and to study their physico-optical behavior before *in vivo* testing. There are plenty of jigsaw puzzles that I can investigate in the area of targeted drug-delivery system. Improved metabolite detection is another sophisticated area to work on both, independently and in collaboration. Fast timescale is often needed to identify a critical patient and I'm working hard to improve the detection time for traditional/new compounds. In total, I project myself as a future chemist and promise to secure a permanent place in the international bioanalysis community.

Q How do you envisage the field of bioanalysis evolving in the future?

Bioanalysis is an expanding research area that emerged in the early 20th century with

colorimetric detection and nonspecific assays for life-saving drugs in biofluids. With each new generation, new challenges appeared and simultaneous improvements followed. The challenge of the present decade is to combat many lethal diseases, save our environment and improve forensic investigations. The key for many problems is to develop more sensitive detection methods. Synthetic chemists will play a major role in designing new counterparts, while other groups have to take the liability for biological testing. Physicists will discover new instruments, and together we will make the Earth a better place in which to live.

Financial & competing interests disclosure

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

No writing assistance was utilized in the production of this manuscript.

Representative Publications

- Bhushan R, Shivani T. Direct TLC resolution of atenolol and propranolol into their enantiomers using three different chiral selectors as impregnated reagents. *Biomed. Chromatogr.* 22,1028–1034 (2008).
- Bhushan R, Shivani T. Synthesis of succinimidyl-(S)-naproxen ester and its application for indirect enantioresolution of penicillamine by reversed-phase high-performance liquid chromatography. *J. Chromatogr. A* 1209, 174–178 (2008).
- Bhushan R, Shivani T. Synthesis of dinitrophenyl-L-Pro-N-hydroxysuccinimide ester and four new variants of Sanger's reagent having chiral amines and their application for enantioresolution of mexiletine using reversed-phase high-performance liquid chromatography. *J. Chromatogr. A* 1216, 5769–5773 (2009).
- Bhushan R, Shivani T. Reversed-phase liquid chromatographic determination of enantiomers of atenolol in rat plasma using derivatization with Marfey's reagent. *Biomed. Chromatogr.* 23, 787–791 (2009).
- Bhushan R, Shivani T. Different approaches of impregnation for resolution of enantiomers of atenolol, propranolol and salbutamol using Cu(II)-L-amino acid complexes for ligand exchange on commercial thin layer chromatographic plates. *J. Chromatogr. A* 1217, 1395–1398 (2010).

Bioanalysis Young Investigator Award – sponsored by Waters

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Ryan De Vooght-Johnson,
Junior Managing Commissioning Editor

Future Science Ltd,
Unitec House,
2 Albert Place,
London, N3 1QB, UK
Tel.: +44 (0)20 8371 6090
Fax: +44 (0)20 8343 2313
E-mail: r.devooght-johnson@future-science.com