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Interview with Timothy S. Tracy

(In this special issue on toxicology, we have interviewed three world famous toxicologists. This is the second in this special series.

Dr. Tracy received his Bachelor of Science degree in pharmacy from Ohio Northern University and then completed a Ph.D. in Clinical Pharmacology at Purdue University. He then completed a 3 & ½ year post-doctoral fellowship in Clinical Pharmacology at the Indiana University School of Medicine. Following his fellowship, he joined the faculty at West Virginia University School of Pharmacy where he rose to the rank of Full Professor. In 2003, Dr. Tracy joined the faculty of the College of Pharmacy at the University of Minnesota and is Head of the Department of Experimental and Clinical Pharmacology.).

Tim Tracy



Dr. Tracy has authored more than 55 original research publications, four book chapters and one book. He currently serves on the editorial boards of Drug Metabolism and Disposition, Clinical Pharmacology and Therapeutics and Journal of Chromatography. Dr. Tracy is the immediate past-chair of the Drug Metabolism Division of the American Society for Pharmacology and Therapeutics and has held several offices in other professional societies. He also serves on the United States Pharmacopeia Expert Committee on Antivirals and Antimicrobials.

The focus of Dr. Tracy's research program is on the kinetics, modulation and pharmacogenetics of cytochrome P450-mediated xenobiotic metabolism, including drug interactions involving this enzyme system. He also studies the disposition of drugs during pregnancy as well as the use of herbal medicines and dietary supplements in women, particularly during pregnancy.

We at the "Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology" approached him for an online interview and he graciously agreed. The interview was conducted by our journal associate Dr. Puneet Setia for well over two months. Some excerpts.. ..)

Q. Can you tell us about your educational background?

A. I received a Bachelor of Science degree in Pharmacy from Ohio Northern University and proceeded to practice community and hospital pharmacy for two years. I then entered graduate school at Purdue University where I received a Ph.D. in Pharmacy. From there, I completed a post-doctoral fellowship in Clinical Pharmacology at the Indiana University School of Medicine.

Q. What are the various professional positions that you have held? Which of them you liked the most and why?

A. I have spent my entire career in academia holding positions as Assistant Professor, Associate Professor, Professor and I am currently Professor and Department Head. I enjoy my current position as Professor and Department Head the most because I get to work with young faculty, mentor them and help them begin their careers. In this role, their success is my success.

Click here to download Dr.Tracy's CV.

...Ironically, by choice I elected to study pharmacy because it combined healthcare with business and I received a minor in Marketing along with my B.S. Pharmacy degree. My goal was to become a corporate executive in a chain drug store corporation. However, two years past graduation, the "itch" for research became too strong and I entered graduate school, leading to my current position...

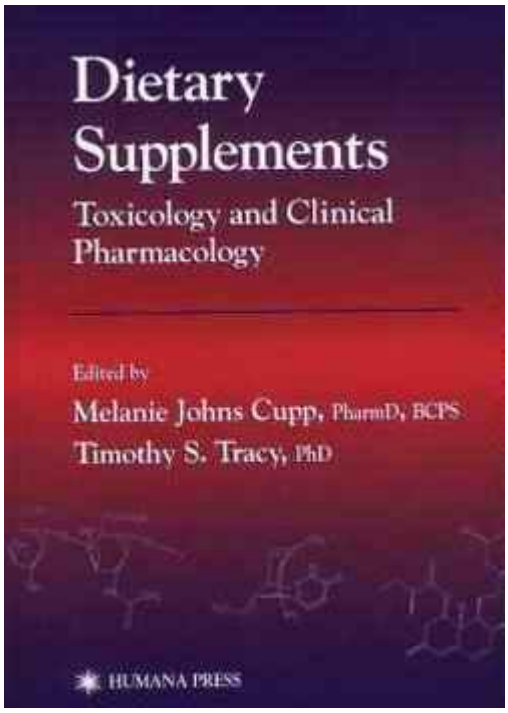
Q. 3) Where are you working at present?

A. My current position (as Professor and Department Head) is with the Department of Experimental and Clinical Pharmacology in the College of Pharmacy at the University of Minnesota.

Q. 4) Why did you choose your profession? Was it by choice or by chance?

A. Ironically, by choice I elected to study pharmacy because it combined healthcare with business and I received a minor in Marketing along with my B.S. Pharmacy degree. My goal was to become a corporate executive in a chain drug store corporation. However, two years past graduation, the "itch" for research became too strong and I entered graduate school, leading to my current position. Though academia may seem far from the corporate world, in my current position I get to use many of the business skills I learned in college as I have to manage budgets and personnel and market new ventures begun by the department, such as our Core Analytical Laboratory which conducts fee-for-service work.

Cover Jacket of *Dietary Supplements: Toxicology and Clinical Pharmacology*, the bestseller by Tim Tracy (Humana Books, 2002). Click cover to go to its review.



Q. 5) How many books you have published apart from "dietary supplements..."?

A. The book "Dietary Supplements: Toxicology and Clinical Pharmacology" is my only published book.

Q. 6) Can you tell us something about your research publications?

A. The largest majority of my research publications are in the field of drug metabolism and pharmacokinetics, being published in journals such as *Biochemistry, Drug Metabolism and Disposition, British Journal of Clinical Pharmacology*, etc. Our research areas are related to pharmacogenetics of drug metabolism and atypical kinetics of cytochrome P450 enzyme-mediated metabolism. However, we have also published a number of articles on the effects of embalming fluid (i.e., formaldehyde) on the degradation of drugs. This was an extremely interesting project, funded by the Federal Bureau of Investigation and the Department of Justice and has led to our involvement in a number of forensic investigations.

Q. 7) Which of your books or publications is dearest to you and why?

A. There is a journal article from 1998 that was published in *Biochemistry* entitled "Evaluation of atypical cytochrome P450 kinetics with two-substrate-models: Evidence that multiple substrates can simultaneously bind to cytochrome P450 active sites" that is very special to me. It was a controversial article when it was published and many people were skeptical of the results since it was contrary to the dogma of the time. It has subsequently been cited almost 200 times and really launched my current career, becoming the work I am most known for.

...Our two major research projects at the moment related to two grants we have received from the National Institutes of Health. The first deals with mechanisms and prediction of atypical kinetics of cytochrome P450 mediated drug metabolism. We hope to define why these phenomena occur and develop computer models to predict which drugs will be affected. Our second major project deals with the role that pharmacogenetics may play in an individual's susceptibility to drug-drug interactions...

Q. 8) What are the projects on which you are working at present?

A. Our two major research projects at the moment related to two grants we have received from the National Institutes of Health. The first deals with mechanisms and prediction of atypical kinetics of cytochrome P450 mediated drug metabolism. We hope to define why these phenomena occur and develop computer models to predict which drugs will be affected. Our second major project deals with the role that pharmacogenetics may play in an individual's susceptibility to drug-drug interactions.

Q.9) When can we expect a new book from you and on what topic?

A. We are currently completing a second edition of the book "Toxicology and Clinical Pharmacology of Herbal Products" for which I am the lead editor. With some luck, it will be published in early 2006.

Q. 10) What is your daily routine?

A. I usually wake at 5:30AM and arrive at work by 7:00AM. My first stop is at the laboratory where I check on progress from the previous day and plan for the current day's research. I usually have 3-4 hours of meetings each day dealing with college and department business and the remainder of the time is spent either teaching or working on my research. Arrival at home is usually by 6:00PM and following dinner I try to spend some time with the family before my wife and I go to the gym at about 8:30PM. From there it is usually falling into bed by 10:30PM to get ready for another day.

Q. 11) From where did you get the idea about editing the book "dietary supplements"

A. The initial idea was conceived by the co-editor, Dr. Melanie Cupp who had published the previous book on herbal products. Melanie saw a real need for objective information on dietary supplements (and herbal products) that could be used by researchers, health care professionals and forensic experts. She really deserves the credit and I was fortunate to be able to join her in this venture. Due to her current position and workload, Melanie was unable to continue with the series and so I will continue the herbal products book revision.

Puneet Setia - The interviewer



Puneet Setia passed his MD in Forensic Medicine and Toxicology from the prestigious Maulana Azad Medical College, New Delhi. Currently he is working as a senior resident doctor in a leading medical institution in Chandigarh. He has over 25 publications to his credit including several book reviews. He has been associated with *Anil Aggrawal's Internet Journal of Book Reviews* since its inception.

Q. 12) How was your experience while working on the book "dietary supplements"?

A. It was a very good experience in that I got to work with some wonderful people and I learned a lot of new things about the field. Putting together a book with multiple authors is a very different

experience from writing a research paper with a few co-authors. I have learned a different set of skills from this process.

Q. 13) Can you tell us something about your hobbies and how you get time to fulfill them?

A. My primary hobbies involve some form of exercise such as running, biking or camping. Though my schedule is fairly busy, I just make the time for daily exercise in the evenings. It has become easier to do this as our kids have gotten older and they need (and want!) less attention in the evenings.

Q. 14) If you don't mind, would like to tell us about your family?

A. My lovely wife Mitzi and I have been married for almost 22 years and have two children. Our daughter, Kinsey, is in college at the University of Wisconsin-Stout majoring in graphic/multimedia design. Our son, Turner, will be a junior in high school here in the Minneapolis-St. Paul area and participates in a number of sports.

Q. 15) Is there a difference between hospital and community pharmacy? If yes what is the difference?

A. Yes. Hospital pharmacy is performed in an institutional setting and typically involves patients who are staying there. This type of pharmacy routinely involves acute care situations and other circumstances in which people can only be treated in a hospital setting. Dosing is usually in single units and can also involve intravenous formulations.

Community pharmacy is what one typically considers to be that treating people chronically and in which they are located in their own homes. In this type of pharmacy, you generally provide multiple doses of the drug or drugs and injectable formulations are much more rare.

Both involve direct patient care, but in different settings.

...I find the cytochrome P450 enzyme system fascinating because it is the major enzyme system involved in drug metabolism and is capable of metabolizing such a wide variety of substrates. It is especially interesting to attempt to determine what makes a specific isoform of the cytochrome P450 enzymes metabolize one drug or drug class but not another...

Q. 16) You seem to be pretty much involved with cytochrome P 450. Has this association with only a set of proteins due to some special liking for them?

A. I find the cytochrome P450 enzyme system fascinating because it is the major enzyme system involved in drug metabolism and is capable of metabolizing such a wide variety of substrates. It is especially interesting to attempt to determine what makes a specific isoform of the cytochrome P450 enzymes metabolize one drug or drug class but not another.

Q. 17) Since our journal is read by a number of forensic pathologists, they would especially be interested in your research on the effects of embalming fluid (i.e., formaldehyde) on the degradation of drugs. Can you give us some results of that research?

A. We studied the decomposition of about 50 drugs of forensic interest in the presence of formaldehyde (embalming fluid). We found that many of them were rapidly affected by the presence of formaldehyde and formed new products. For instance, some amphetamines react completely within minutes of exposure to formaldehyde to form the methylated products that would not be detectable unless you knew what to look for upon analysis. In general, the most

common reaction of drugs with formaldehyde is a methylation reaction to form a new methylated product of the drug. However, we also found cases of ring openings and cleavage that form entirely new products.

Q. 18) Did you study only the effect of formaldehyde of other embalming fluids in that particular research?

A. Only formaldehyde since it is the most common component.

...We studied the decomposition of about 50 drugs of forensic interest in the presence of formaldehyde. We found that many of them were rapidly affected by the presence of formaldehyde and formed new products...

Q. 19) You have mentioned about the "fee-for-service work" conducted by your laboratory. Can you give some details about the kind of work you conduct?

A. Our department has an Analytical Laboratory that can conduct most HPLC and GC assays, including mass spectrometry, ELISA assays and others. We provide services to individuals in the department, to others within our institution, to hospitals and to outside individuals. We also provide professional consultation as to what the drug concentrations mean clinically.

Q. 20) How were your experiences while working for the FBI? Were you made to make any court appearances also for them? What were your experiences there?

A. During our contract work for the FBI (we were still employees of the University) we enjoyed a great relationship with them. They were extremely helpful, giving us great insight into the problems they routinely face and we got to tour their facilities which was truly an amazing experience. I have done some professional testimony as a result of this work; which can be interesting but also difficult since the answers are not always clear cut.

Q. 21) In such a long and illustrious career, one would expect much more books written by you? Why is it that you have published only one book till now?

A. I have tended to focus my career on original research manuscripts since these types of publications are most valued in the U.S. University system with regard to promotion and tenure. I really like solving current research problems and publishing data at the cutting edge. Unfortunately, it takes a good deal of time to put together and publish a book and thus, it is a little less current and sums up what is known to that time, whereas articles are leading the way.

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Q. 22) If you were asked to write a book independently, what would be its title and why?

A. It would probably be something like "Atypical Kinetics: When Enzymes Misbehave". This has been the largest thrust of my research work and involves understanding why enzymes don't always do what we think they should and how it impacts the drug metabolism process.

Q. 23) How satisfied you are with your life as it has gone so far? Is there something you would like to change in your life?

A. I'm not sure there is much I would change. I have been tremendously blessed to have been given the opportunity to do the things I do. I know there are many brighter people than me so I am just thankful to have accomplished what I have.

Q. 24) Would you like to tell us something more about yourself that you feel our readers should know?

A. Nothing I have accomplished has been done alone. I have had the opportunity to work with many great faculty colleagues and collaborators, graduate students, post-doctoral fellows and lab technicians who really carried the heavy load. Maybe more importantly, the love and support of my wife and family are what really keep me going. Without them, none of my work would have been possible.

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Interviews : Collective Index Interviews in our sister publication : Collective Index

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