

2015

Pharmaceutical Sciences Abstracts

Second Annual International
Conference on Pharmaceutical
Sciences

4-7 May 2015, Athens, Greece

Edited by Gregory T. Papanikos

THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH



Pharmaceutical Sciences
Abstracts
2nd Annual International
Conference on Pharmaceutical
Sciences
4-7 May 2015, Athens, Greece

Edited by Gregory T. Papanikos

First Published in Athens, Greece by the Athens Institute for Education and Research.

ISBN: 978-618-5065-86-7

All rights reserved. No part of this publication may be reproduced, stored, retrieved system, or transmitted, in any form or by any means, without the written permission of the publisher, nor be otherwise circulated in any form of binding or cover.

8 Valaoritou Street
Kolonaki, 10671 Athens, Greece
www.atiner.gr

©Copyright 2015 by the Athens Institute for Education and Research. The individual essays remain the intellectual properties of the contributors.

TABLE OF CONTENTS

(In Alphabetical Order by Author's Family name)

Preface	9
Conference Program	11
1. Novel Stability Indicating Techniques for Determination of Albendazole in Bulk Drug and Pharmaceutical Dosage Form <i>Dina Abass Ahmed Mostafa, Maha Faruk, Soheir Weshahy & Omar Abdel-Aziz</i>	17
2. Influence of the Formulation Factors of Structured Polymeric Aggregates Nanoparticles Preparations Based on Chitosan on the Release Characteristics of Diclofenac <i>Bashar Altaani</i>	18
3. Metabolic Stability of Drugs Evaluated with the Use of Liquid Chromatography/Mass Spectrometry and Supported by Chemometrics Techniques <i>Tomasz Baczek, Mariusz Belka & Szymon Ulenberg</i>	19
4. "AMELIO": Epidemiology of Adverse Drug Events in a Geriatric Setting Detected by an Adaptation of the IHI Trigger Tool Methodology <i>Sofia Bogiatzi, Victoria Rollason, Dionysios Adamopoulos & Nicole Vogt-Ferrier</i>	20
5. Biological Activity of Novel 17β-Phenylcarbamoyl-Androst-4-En-3-One as Inhibitors of Type 2 5α-Reductase Enzyme <i>Marisa Cabeza, Yesica Medina, Berenice Alvarez, Isabel Moreno & Eugene Bratoeff</i>	22
6. Production of L-Asparaginase by Filamentous Fungi <i>Tales Alexandre Costa-Silva, David Isidoro Camacho Cordova, Suellen Feitosa & Adalberto Pessoa-Jr</i>	23
7. Synergistic Interaction between Phytochemicals and Oral Antidiabetic Drugs Leading to Enhanced Glucose Uptake in Cells <i>Mukesh Doble & Pranav Kumar Prabhakar</i>	24
8. Protective Effects of Different Antioxidants against the Molecular Toxicity, Genetic and Epigenetic Alterations Induced By 3,5-Dimethylaminophenol <i>Pinar Erkekoglu, Ming-Wei Chao, Belma Koçer-Gümüşel, Chia-Yi Tseng, Wenjie Ye, Laura J. Trudel, Paul L. Skipper, Steven R. Tannenbaum & Gerald N. Wogan</i>	25
9. Sexually Dimorphic Effects of Genistein in Various Murine Diabetic Models <i>Tai Liang Guo & Wan-I Oliver Li</i>	27
10. A Novel Strategy for Quantification of 14 Major Hydrophilic and Lipophilic Bioactive Components in Six Salvia Species <i>Dongqi Han</i>	28

11.	Role of Amlexanox and Rebamipide in Recurrent Aphthous Stomatitis Case Series and Review of Literature <i>Shamimul Hasan & Shazina Saeed</i>	29
12.	Optimization of Spray Drying of Liquid Extracts from <i>Rhodiola Rosea</i> L. Roots and Rhizomes <i>Andrzej Jankowski, Ewa Dlugosz, Kazimiera Klementys, Mieczyslaw Sajewicz & Beata Sarecka-Hujar</i>	30
13.	Application of Chemometrically Processed Chromatographic Data in Medicinal Chemistry, Molecular Pharmacology and Laboratory Diagnostics <i>Roman Kaliszan</i>	32
14.	Preparation and Evaluation of Fast Dissolving Silymarin <i>Khaled Khaled, Walid Faisal, Hanaa Fathelbab & Emad Abdel Naeem</i>	33
15.	The Effect of Compression Forces on the Quality of Minitablets Prepared from Granules Containing Verapamil or Metoprolol <i>Hanna Kotlowska, Karolina Owcarz & Malgorzata Sznitowska</i>	34
16.	Novel Approach for Predicting Long-Term Side Effects of Drugs by Mass Spectrometry Based Metabolomics <i>Sung Won Kwon</i>	36
17.	Development and Application of Green Solvent-Based Extraction of Bioactive Compounds <i>Jeongmi Lee</i>	37
18.	Comparative Pharmacokinetic Study of Solvent Free Self Emulsifying Extract against Conventional Extract of <i>Centella Asiatica</i> Linn <i>Sathiyarayanan Lohidasan, Arulmozhi Sathiyarayanan, Kakasaheb Mahadik & Anant Paradkar</i>	38
19.	Diagnosis and Men-percent of Diabetes and Relationship of d-Glucose to Preservation of Kidney Function <i>Anil Mandal</i>	39
20.	Metabolomics in Search for a Biomarkers of Resistant Hypertension <i>Michal Markuszewski, Renata Bujak, Wiktoria Struck-Lewicka, Arlette Yumba Mpanga, Katarzyna Polonis, Marta Kordalewska, Michał Hoffmann & Krzysztof Narkiewicz</i>	40
21.	Design, Synthesis and Anti-Tubercular Screening of 3-Aminopyrazine 2-Carbohydrazide Derivatives by Microwave Acceleration and Lyophilization <i>Pankaj Miniyaar</i>	42
22.	Past and Future Drivers of Pharmacy Education and Practice in the United States <i>Arthur Nelson</i>	44
23.	Evaluation of the Hypoglycaemic, Hypolipidemic and Antioxidant, Properties of a Cameroonian Polyherbal Formulation on Diabetic Rats <i>Jeanne Ngogang, Bruno Mukette, Anatole Constant Pieme, Proper Cabral Biapa, Vicky Jocelyne Ama Moor, Pauline Nanfack, & Marcel Azabji</i>	45

24.	Assessment of the Bio-Repellent Property of Methanolic Extracts of Some Plants against Anopheles Mosquito <i>Funmilola Omoya, Abdul Momoh & Anuoluwapo Adeyemo</i>	47
25.	Effects of Phthalates on Epithelial Mesenchymal Transition <i>Didem Oral, Belma Kocer-Gumusel & Pinar Erkekoglu</i>	48
26.	Impact of Specific Processing of Rice on Postprandial Glycemic and Insulinemic Responses in Individuals with Type 2 Diabetes Mellitus <i>Neha Paharia & Kasturi Sen Ray</i>	49
27.	In-Situ Fiber Optic Analysis for Controlled Release of Budesonide Nanospheres through an Asymmetric Membrane Capsule <i>Anil Philip, Betty Philip, Afaf Weli, Qasim Al Riyami, Donald Cairns, Colin Thompson, Issa Al Amri, Ahlam Al Abri & Hamna Al Senani</i>	50
28.	Organelles Stress and Their Crosstalk within Diabetic Myocardium <i>Doina Popov</i>	52
29.	Method Identifying Low Molecular Weight Modulators of miRNA Biogenesis <i>Ugo Pradere, Martina Roos & Jonathan Hall</i>	53
30.	Resveratrol and Synthetic Analogues: From Cardioprotective Effects to Anticancer Activities <i>Ketan Ruparelia, Matteo Micucci, Alberto Chiarini, Giulia Baccherini, Roberta Budriesi, Randolph Arroo, Ketu Zeka Zeka, Maria Adelaide Continenza & Kenneth Beresford</i>	54
31.	Assessment of the Release of Trimetazidine from Orally Disintegrating Tablets <i>Beata Sarecka-Hujar, Ewa Dlugosz, Andrzej Jankowski, Barbara Majka & Anna Banyś</i>	56
32.	Relative Glycemic and Insulinemic Response of Staple Indian Foods in Type 2 Diabetic Patients <i>Kasturi Sen Ray & Neha Paharia</i>	58
33.	Baseline Pharmaceutical Intervention Study on Asthma, Rhinitis and Eczema in UAE Schoolchildren <i>Mohammed Shamssain, Saeed Abdulla & Aya Rahman Lafta</i>	59
34.	Synthesis and Antidepressant Activity of Some New Derivates of Benzimidazoles <i>Mugdha Suryawanshi, Vithal M. Kulkarni, Sharad H. Bhosale & Kakasaheb R. Mahadik</i>	60
35.	CYR61 as a Factor Involved in the Pathogenesis of Impaired Wound Healing in Type 2 Diabetes Mellitus <i>Richik Tripathi & Deepa Pokharia</i>	61
36.	Reduction of Prochiral Ketones by NAD(H)-Dependent Alcohol Dehydrogenase Using a Membrane Reactor <i>Michele Vitolo & Ester Junko Yoriyaz</i>	62
37.	Direct Palladium-Catalyzed Allylation of 2,3-Disubstituted Indoles with Allylic Alcohols in Water <i>Shyh-Chyun Yang & Bai-Jing Peng</i>	64

Preface

This abstract book includes all the summaries of the papers presented at the *2nd Annual International Conference on Pharmaceutical Sciences, 4-7 May 2015*, organized by the Pharmaceutical Research Unit of the Athens Institute for Education and Research. In total there were 37 papers, coming from 19 different countries (Brazil, Cameroon, China, Egypt, India, Jordan, Mexico, Nigeria, Oman, Poland, Romania, Saudi Arabia, South Korea, Switzerland, Taiwan, Turkey, UAE, UK, USA). The conference was organized into seven sessions that included areas of Pharmaceutical Sciences and other related fields. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books and/or journals of ATINER.

The Institute was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 150 international conferences and has published over 100 books. Academically, the Institute is organized into four research divisions and nineteen research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

Gregory T. Papanikos
President

FINAL CONFERENCE PROGRAM
2nd Annual International Conference on Pharmaceutical Sciences, 4-7
May 2015 Athens, Greece
PROGRAM

Conference Venue: Titania Hotel, 52 Panepistimiou Avenue, Athens, Greece

Organization and Scientific Committee

1. Dr. Gregory T. Papanikos, President, ATINER & Honorary Professor, University of Stirling, UK.
2. Dr. George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
3. Dr. Zoe Boutsoli. Director, Health Studies Research Division, ATINER.
4. Dr. Javed Ali, Assistant Professor, Department of Pharmaceutics, Faculty of Pharmacy, Jamia Hamdard, India.
5. Dr. Reyhaneh Astaneh, Lecturer, Zabol University of Medical Sciences, Zabol, Iran.
6. Dr. Nikolas Dietis, Lecturer in Pharmacological Sciences, School of Medicine, Faculty of Health, University of Tasmania, Australia.
7. Dr. Belal Rahhal, Academic Member, ATINER & Assistant Professor, An-Najah National University, Palestine.
8. Ms. Olga Gkounta, Researcher, ATINER.

Administration

Stavroula Kyritsi, Konstantinos Manolidis, Katerina Maraki & Kostas Spiropoulos

C O N F E R E N C E P R O G R A M

Monday 4 May 2015

07:45-08:40 Registration and Refreshments

08:40-09:05 (ROOM B) Welcome & Opening Remarks

- Dr. Gregory T. Papanikos, President, ATINER
- Dr. George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
- Gregory A. Katsas, Head, Sociology Research Unit & Associate Professor, The American College of Greece-Deree College, Greece.
- Dr. Zoe Boutsoli, Director, Health Sciences Research Division, ATINER.

09:05-09:15 Break

09:15-10:50 Session I (ROOM H-10th FLOOR): Pharmacy Practice & Recent Trends in Pharmacognosy

Chair: Ms. Olga Gkounta, Researcher, ATINER.

1. Arthur Nelson, Professor and Founding Dean, Texas Tech University Health Sciences Center School of Pharmacy, USA. Past and Future Drivers of Pharmacy Education and Practice in the United States.
2. Marisa Cabeza, Professor and Researcher, Universidad Autonoma Metropolitana, Mexico, Yesica Medina, Student, Instituto Tecnológico de Milpa Alta, Mexico, Berenice Alvarez, Student, Universidad Nacional Autonoma, Mexico, Isabel Moreno, Academic Technician, Universidad Autonoma Metropolitana, Mexico & Eugene Bratoeff, Universidad Nacional Autonoma, Mexico. Biological Activity of Novel 17 β -Phenylcarbamoyl-Androst-4-En-3-One as Inhibitors of Type 2 5 α -Reductase Enzyme.
3. *Shamimul Hasan, Assistant Professor, Jamia Millia Islamia, India & Shazina Saeed, University of Pittsburgh, USA. Role of Amlexanox and Rebamipide in Recurrent Aphthous Stomatitis Case Series and Review of Literature.
4. Ketan Ruparelia, Research Fellow, De Montfort University, U.K., Matteo Micucci, Research Fellow, Bologna University, Italy, Alberto Chiarini, Professor, Bologna University, Italy, Giulia Baccherini, Pharmacist, Bologna University, Italy, Roberta Budriesi, Professor, Bologna University, Italy, Randolph Arroo, Reader, De Montfort University, U.K., Ketu Zeka Zeka, Research Fellow, L'Aquila University, Italy, Maria Adelaide Continenza, Professor, L'Aquila University, Italy & Kenneth Beresford, Senior Lecturer, De Montfort University, U.K. Resveratrol and Synthetic Analogues: From Cardioprotective Effects to Anticancer Activities.

10:50-11:00 Break

11:00-12:20 Session II (ROOM H-10th FLOOR): Recent Developments in Drug Delivery Systems I

Chair: Arthur Nelson, Professor and Founding Dean, Texas Tech University Health Sciences Center School of Pharmacy, USA.

1. Anil Philip, Associate Professor, Pharmaceutics, University of Nizwa, Oman, Betty Philip, Lecturer, Pharmaceutics, University of Nizwa, Oman, Afaf Wel, Associate Professor, Chemistry and Associate Dean, University of Nizwa, Oman, Qasim Al Riyami, Assistant Dean, University of Nizwa, Oman, Donald Cairns, Professor, Chemistry and Head, The Robert Gordon University, UK, Colin Thompson, Lecturer, Pharmaceutics, The Robert Gordon University, UK, Issa Al Amri, Director, DARIS, University of Nizwa, Oman, Ahlam Al Abri, Laboratory Technician, Chemistry, University of Nizwa, Oman & Hamna Al Senani, Clinical Instructor, University of Nizwa, Oman. In-Situ Fiber Optic Analysis for Controlled Release of Budesonide Nanospheres through an Asymmetric Membrane Capsule.
2. Beata Sarecka-Hujar, Researcher, Medical University of Silesia, Poland, Ewa Dlugosz, Researcher, Medical University of Silesia, Poland, Andrzej Jankowski, Head, Department of Drug Form Technology, Medical University of Silesia, Poland, Barbara Majka, Student, Medical University of Silesia, Poland & Anna Banyś, Researcher, Medical University of Silesia, Poland. Assessment of the Release of Trimetazidine from Orally Disintegrating Tablets (ODTs).
3. Hanna Kotłowska, Research Assistant, Medical University of Gdansk, Poland, Karolina Owcarz, Student, Medical University of Gdansk, Poland & Malgorzata Sznitowska, Head, Department of Pharmaceutical Technology, Medical University of Gdansk, Poland. The Effect of Compression Forces on the Quality of Minitablets Prepared from Granules Containing Verapamil or Metoprolol.
4. Khaled Khaled, Professor, El-Minia University, Egypt, Walid Faisal, Assistant Professor, El-Minia University, Egypt, Hanaa Fathelbab, Associate Professor, El-Minia University, Egypt & Emad Abdel Naeem, Assistant Professor, El-Minia University, Egypt. Preparation and Evaluation of Fast Dissolving Silymarin.

12:20-13:20 Lunch

13:20-15:00 Session III (ROOM H-10th FLOOR): Emerging Trends in Pharmaceutical Chemistry and Analysis I

Chair: *Sathiyarayanan Lohidasan, Associate Professor, Bharati Vidyapeeth, Deemed University, India

1. Shyh-Chyun Yang, Professor and Director, Department of Fragrance and Cosmetic Science, Kaohsiung Medical University, Taiwan & Bai-Jing Peng, Student, Kaohsiung Medical University, Taiwan. Direct Palladium-Catalyzed Allylation of 2,3-Disubstituted Indoles with Allylic Alcohols in Water.
2. Michele Vitolo, Professor, University of Sao Paulo, Brazil & Ester Junko Yoriyaz, Post-doctoral Fellow, University of Sao Paulo, Brazil. Reduction of Prochiral Ketones by NAD(H)-Dependent Alcohol Dehydrogenase Using a Membrane Reactor.
3. Mugdha Suryawanshi, Assistant Professor, Bharati Vidyapeeth Deemed University-Poona, India, V.M. Kulkarni, Bharati Vidyapeeth Deemed University-Poona, India, S.H. Bhosle, Bharati Vidyapeeth Deemed University-Poona, India & K.R. Mahadik, Bharati Vidyapeeth Deemed University-Poona, India. Synthesis and Antidepressant Activity of Some new Derivates of Benzimidazoles.
4. Dongqi Han, Researcher, Shenzhen Institute for Drug Control, China. A Novel Strategy for Quantification of 14 Major Hydrophilic and Lipophilic Bioactive Components in Six Salvia Species.

15:00-15:10 Break

15:10-17:10 Session IV (ROOM H-10th FLOOR): Recent Trends in Pharmacognosy

Chair: *Pinar Erkekoglu, Associate Professor, Hacettepe University, Turkey.

1. Andrzej Jankowski, Head, Department of Drug Form Technology, Medical University of Silesia, Poland, Ewa Dlugosz, Researcher, Medical University of Silesia, Poland, Kazimiera Klementys, Researcher, Medical University of Silesia, Poland, Mieczyslaw Sajewicz, Researcher, Medical University of Silesia, Poland & Beata Sarecka-Hujar, Researcher, Medical University of Silesia, Poland. Optimization of Spray Drying of Liquid Extracts from *Rhodiola Rosea* L. Roots and Rhizomes.
2. *Sathiyarayanan Lohidasan, Associate Professor, Bharati Vidyapeeth, Deemed University, India, Arulmozhi Sathiyarayanan, Assistant Professor, Bharati Vidyapeeth Deemed University, India, Kakasaheb Mahadik, Professor, Bharati Vidyapeeth Deemed University, India & Anant Paradkar, Professor, Bradford University, U.K. Comparative Pharmacokinetic Study of Solvent Free Self Emulsifying Extract against Conventional Extract of Centella Asiatica Linn.
3. *Jeongmi Lee, Assistant Professor, Sungkyunkwan University, South Korea. Development and Application of Green Solvent-Based Extraction of Bioactive Compounds.
4. Funmilola Omoya, Senior Lecturer, The Federal University of Technology, Nigeria, Abdul Momoh, Ph.D. Student, The Federal University of Technology, Nigeria & Anuoluwapo Adeyemo, Student, The Federal University of Technology, Nigeria. Assessment of the Bio-Repellent Property of Methanolic Extracts of Some Plants against Anopheles Mosquito.
5. Tales Alexandre Costa-Silva, Post Doctor, Sao Paulo University – USP, Brazil, David Isidoro Camacho Cordova, Post Doctor, Sao Paulo University – USP, Brazil, Suellen Feitosa, Sao Paulo University – USP, Brazil & Adalberto Pessoa-Jr, Professor, Sao Paulo University – USP, Brazil. Production of L-Asparaginase by Filamentous Fungi.

17:10-18:15 Break

18:15-20:30 Session V (ROOM E-10th Floor): An International Symposium on Diabetes

Chair: Anil Mandal, Academic Member, ATINER & Courtesy Clinical Professor, Department of Medicine, University of Florida, USA.

1. *Mukesh Doble, Professor, IIT Madras, India & Pranav Kumar Prabhakar, Assistant Professor, Lovely Professional University, India. Synergistic Interaction between Phytochemicals and Oral Antidiabetic Drugs Leading to Enhanced Glucose Uptake in Cells. (DIA)
2. *Jeanne Ngogang, Professor, University of Yaounde I, Cameroon, Bruno Mukette, Ph.D. Student, University of Yaounde I, Cameroon, Anatole Constant Pieme, Lecturer, University of Yaounde I, Cameroon, Proper Cabral Biapa, Lecturer, University of Yaounde I, Cameroon, Vicky Jocelyne Ama Moor, Lecturer, University of Yaounde I, Cameroon, Pauline Nanfack, Ph.D. Student, University of Yaounde I, Cameroon & Marcel Azabji, Lecturer, University of Yaounde I, Cameroon. Evaluation of the Hypoglycaemic, Hypolipidemic and Antioxidant, Properties of a Cameroonian Polyherbal Formulation on Diabetic Rats. (DIA)
3. *Tai Liang Guo, Associate Professor, University of Georgia, USA & Wan-I Oliver Li, Associate Professor, University of Georgia, USA. Sexually Dimorphic Effects of Genistein in Various Murine Diabetic Models. (DIA)
4. *Kasturi Sen Ray, Retired Professor, SNDT Women's University, India & Neha Paharia, Ph.D. Graduate, SNDT Women's University, India. Relative Glycemic and Insulinemic Response of Staple Indian Foods in Type 2 Diabetic Patients. (DIA)
5. *Doina Popov, Head of Pathophysiology and Pharmacology Department, Institute of Cellular Biology and Pathology "N. Simionescu" of the Romanian Academy, Romania. Organelles Stress and Their Crosstalk within Diabetic Myocardium. (DIA)
6. Richik Tripathi, Professor, Banaras Hindu University, India & Deepa Pokharia, Research Scholar, Banaras Hindu University, India. CYR61 as a Factor Involved in the Pathogenesis of Impaired Wound Healing in Type 2 Diabetes Mellitus. (DIA)
7. Neha Paharia, Ph.D. Graduate, SNDT Women's University, India & Kasturi Sen Ray, Retired Professor, SNDT Women's University, India. Impact of Specific Processing of Rice on Postprandial Glycemic and Insulinemic Responses in Individuals with Type 2 Diabetes Mellitus. (DIA)
8. Anil Mandal, Courtesy Clinical Professor, Department of Medicine, University of Florida, USA. Diagnosis and Men-percent of Diabetes and Relationship of d-Glucose to Preservation of Kidney Function.

21:00-23:00 Greek Night and Dinner (Details during registration)

Tuesday 5 May 2015

08:00-10:00 Session VI (ROOM H-10th FLOOR): Current Pharmacological Trends and Other Issues

Chair: *Shamimul Hasan, Assistant Professor, Jamia Millia Islamia, India.

1. Sung Won Kwon, Associate Professor, Seoul National University, Korea. Novel Approach for Predicting Long-Term Side Effects of Drugs by Mass Spectrometry Based Metabolomics.
2. Michał Markuszewski, Associate Professor, Medical University of Gdansk, Poland, Renata Bujak, Ph.D. Student, Medical University of Gdansk, Poland, Wiktoria Struck-Lewicka, Assistant, Medical University of Gdansk, Poland, Arlette Yumba Mpanga, Assistant, Medical University of Gdansk, Poland, Katarzyna Polonis, Assistant, Medical University of Gdansk, Poland, Marta Kordalewska, Ph.D. Student, Medical University of Gdansk, Poland, Michał Hoffmann, Assistant Professor, Medical University of Gdansk, Poland & Krzysztof Narkiewicz, Professor, Medical University of Gdansk, Poland. Metabolomics in Search for a Biomarkers of Resistant Hypertension. (Tuesday, 5th of May 2015)
3. Mohammed Shamssain, Associate Professor, Ajman University of Science and Technology, UAE, Saeed Abdulla, MSc Clinical Pharmacy, Dubai Hospital, UAE, Aya Rahman Lafta, MSc Clinical Pharmacy, Dubai Hospital, UAE. Baseline Pharmaceutical Intervention Study on Asthma, Rhinitis and Eczema in Uae Schoolchildren.
4. Bashar Altaani, Associate Professor, Jordan University of Science and Technology, Jordan. Influence of the Formulation Factors of Structured Polymeric Aggregates Nanoparticles Preparations Based on Chitosan on the Release Characteristics of Diclofenac.
5. Ugo Pradere, Senior Scientist, ETH Zurich, Switzerland, Martina Roos, Ph.D. Student, ETH Zurich, Switzerland & Jonathan Hall, Professor, ETH Zurich, Switzerland. Method Identifying low Molecular Weight Modulators of miRNA Biogenesis. (Tuesday, 5th of May 2015)
6. Sofia Bogiatzi, Resident in Internal Medicine, University Hospitals of Geneva, Switzerland, Victoria Rollason, University Hospitals of Geneva, Switzerland, Dionysios Adamopoulos, University Hospitals of Geneva, Switzerland & Nicole Vogt-Ferrier, University Hospitals of Geneva, Switzerland. "AMELIO": Epidemiology of Adverse Drug Events in a Geriatric Setting Detected by an Adaptation of the IHI Trigger Tool Methodology.

10:00-10:10 Break

10:10-12:00 Session VII (ROOM H-10th FLOOR): Emerging Trends in Pharmaceutical Chemistry and Analysis II

Chair: *Jeongmi Lee, Assistant Professor, Sungkyunkwan University, South Korea.

1. Roman Kaliszan, Professor, Medical University of Gdansk, Poland. Application of Chemometrically Processed Chromatographic Data in Medicinal Chemistry, Molecular Pharmacology and Laboratory Diagnostics. (Tuesday, 5th of May 2015)
2. *Pinar Erkekoglu, Associate Professor, Hacettepe University, Turkey. Protective Effects of Different Antioxidants against the Molecular Toxicity, Genetic and Epigenetic Alterations Induced By 3,5-Dimethylaminophenol.
3. Tomasz Baczek, Associate Professor, Medical University of Gdansk, Poland, Mariusz Belka, Research Assistant, Medical University of Gdansk, Poland & Szymon Ulenberg, Ph.D. Student, Medical University of Gdansk, Poland. Metabolic Stability of Drugs Evaluated with the Use of Liquid Chromatography/Mass Spectrometry and Supported by Chemometrics Techniques. (Tuesday, 5th of May 2015)
4. Dina Abbas Ahmed Mostafa, Teaching Assistant, Future University, Egypt, Maha Faruk, Professor, Future University, Egypt, Soheir Weshahy, Professor, Future University, Egypt & Omar Abdel-Aziz, Associate Professor, Future University, Egypt. Novel Stability Indicating Techniques for Determination of Albendazole in Bulk Drug and Pharmaceutical Dosage Form. (Tuesday, 5th of May 2015)
5. Didem Oral, Ph.D. Student, Hacettepe University, Turkey. Effects of Phthalates on Epithelial Mesenchymal Transition.
6. *Pankaj Miniyar, Professor and HOD (Pharmaceutical Chemistry), Sinhgad Institute of Pharmacy, India. Design, Synthesis and Anti-Tubercular Screening of 3-Aminopyrazine 2-Carbohydrazide Derivatives by Microwave Acceleration and Lyophilization.

12:00-14:30 Urban Walk (Details during registration)

14:30-15:30 Lunch

19:00- 20:30 Dinner (Details during registration)

<p>Wednesday 6 May 2015 Cruise: (Details during registration)</p>

<p>Thursday 7 May 2015 Delphi Visit: (Details during registration)</p>
--

Dina Abbas Ahmed Mostafa
Teaching Assistant, Future University, Egypt
Maha Faruk
Professor, Future University, Egypt
Soheir Weshahy
Professor, Future University, Egypt
&
Omar Abdel-Aziz
Associate Professor, Future University, Egypt

Novel Stability Indicating Techniques for Determination of Albendazole in Bulk Drug and Pharmaceutical Dosage Form

Two sensitive stability indicating techniques were developed for the determination of Albendazole in bulk drug and pharmaceutical dosage form, in presence of alkaline-degradation product without any interference. The first one was isocratic LC technique; using Agilent Zorbex Extend C-18 (150x4.6 mm, 5 μ) column, 'phosphate buffer and acetonitrile' in the ratio of (15:85v/v) as a mobile phase with a flow rate 0.6 mlmin⁻¹ and UV-detection at 295.0 nm, where the investigated drug could be quantized in a concentration range 0.10-50.00 μ gml⁻¹ with regression coefficient (r) of 0.9989. On the other hand, the second adopted technique was derivative ratio spectrophotometry; where Albendazole could be determined in a concentration range 2.00-20.00 μ gml⁻¹ at 281.4 nm with a mean percentage recovery of 100.84. The utilized techniques were validated according to International Conference Harmonization (ICH) guidelines and successfully applied for analysis of bulk powder and pharmaceutical dosage form. All the obtained results were statistically compared to the chromatographic reported method and no significant difference was founded; indicating to the accuracy, sensitivity and reproducibility of the used techniques.

Bashar Altaani

Associate Professor, Jordan University of Science and Technology,
Jordan

Influence of the Formulation Factors of Structured Polymeric Aggregates Nanoparticles Preparations Based on Chitosan on the Release Characteristics of Diclofenac

The objective of this research is to understand the influence of formulation factors such ratio and molecular weight of chitosan, amount and type of fatty acid used, type and concentration of chitosan on the release of diclofenac from nanoparticle liquid preparation based on chitosan. The nanoparticle preparations are made of the drug, chitosan, fatty acid and surfactant. Chitosan is capable of forming complexes with anionic substances. Diclofenac as anionic substance is capable of forming complexes with chitosan. Fatty acid was used to shield the drug as it also forms complexes with chitosan. Addition of suitable surfactant made the surface of the particles hydrophilic where it can be dispersed in water as nanoparticle liquid preparation. Different nanoparticles formulations were prepared by varying the concentrations and the type of materials used. Drug release was studied by placing the formulation inside a semipermeable dialysis tube capable of retaining the complex and allowing the passage of the free drug. The bag was placed inside 6.8 phosphate buffer in USP apparatus II at rotational speed of 100 rpm. Samples were withdrawn at suitable intervals and analyzed using validated HPLC method. Results demonstrated that formulas were capable of sustaining the release of the drug and the formulation factors studied influenced drug release characteristics. The change in release characteristics was correlated with physicochemical properties of the nanoparticle preparations specially the viscosity of the polymer used or its concentration. Control of the factors studied is essential for the development of sustained release nanoparticle formulation with optimum drug release.

Tomasz Baczek

Associate Professor, Medical University of Gdansk, Poland

Mariusz Belka

Research Assistant, Medical University of Gdansk, Poland

&

Szymon Ulenberg

Ph.D. Student, Medical University of Gdansk, Poland

Metabolic Stability of Drugs Evaluated with the Use of Liquid Chromatography/Mass Spectrometry and Supported by Chemometrics Techniques

Drug metabolism is a major determinant governing both pharmacokinetics and clinical response and a great deal of efforts is directed to assess the key metabolic parameters in the early stages of drug development. A large number of drug candidates have undesirable properties, including low metabolic stability that could result in poor bioavailability or weak efficacy. Metabolic stability is defined as the susceptibility of a chemical compound to biotransformation, and could be expressed for example as a half-life ($t_{1/2}$) determined *in vitro* with the use of microsomal preparations obtained from human livers. That experimental step could allow for the determination of metabolic profiles of drug candidates and could be also useful to plan the synthesis of new chemical entities with improved properties more rationally.

Two examples of metabolic stability studies of novel derivatives of potent anticancer or antidepressant activity are provided. In the studies, metabolic stability of selected benzenesulfonamide and arylpiperazine derivatives was measured with particular emphasis on elucidation of metabolites' structures applying LC-MS and LC-MS/MS techniques. Human liver microsomes were chosen as a model enzymatic system to provide an approximation of phase I metabolism. Differences in metabolic stability between particular benzenesulfonamides and arylpiperazines derivatives were discussed in view of their chemical structures. With the support of advanced statistical and chemometrics analysis it was possible to evaluate relationships between structure and metabolic stability.

Sofia Bogiatzi

Resident in Internal Medicine, University Hospitals of Geneva,
Switzerland

Victoria Rollason

University Hospitals of Geneva, Switzerland

Dionysios Adamopoulos

University Hospitals of Geneva, Switzerland
&

Nicole Vogt-Ferrier

University Hospitals of Geneva, Switzerland

“AMELIO”: Epidemiology of Adverse Drug Events in a Geriatric Setting Detected by an Adaptation of the IHI Trigger Tool Methodology

Introduction: Polymedication is a serious problem especially for geriatric patients. The presence of multiple co-morbidities combined to their fragility results in a substantially increased probability for undesired drug interactions and adverse events.

Methods: We report the results of the continuous monitoring of adverse events in a Swiss geriatric hospital during one year. For the data collection, 20 patients are randomly selected retrospectively each month. The last 30 days of their hospital stay are analyzed. The screening for adverse events is based on a geriatric adaptation of the IHI Global Trigger Tool 2009 for a total of 38 triggers. A distinction between justified prescription, or not, was also included on the basis of drug indications and present co-morbidities.

Results: A total of **268** patients were analyzed, receiving an average of **13.4 drugs/person**. We identified **7.1 adverse events per 100 drugs** prescribed. The vast majority of these adverse events was of **category E** of harm. No deaths were documented for this population. **Hyponatremia** was the most common adverse event identified followed by **constipation**. Among the drugs for which an indication was not documented, the most frequently prescribed were the **proton-pump inhibitors** followed by the **low-molecular weight heparin**.

Conclusions: Our study shows that polymedication in the elderly often results from drug prescriptions that are maintained after the resolution of the condition for which they were indicated. This is especially true for the proton-pump inhibitors. Furthermore, a considerable number of adverse events can be avoided by increasing the frequency of evaluating the drug indications.

Perspectives: our work will permit us to develop a list of recommendations to ameliorate drug prescription in the elderly that

could be applied in the clinic in order to minimize the occurrence of adverse events due to inappropriate prescribing.

Marisa Cabeza

Professor and Researcher, Metropolitan Autonomous University,
Mexico

Yesica Medina

Student, Instituto Tecnológico de Milpa Alta, Mexico

Berenice Alvarez

Student, National Autonomous University of Mexico, Mexico

Isabel Moreno

Academic Technician, Metropolitan Autonomous University, Mexico
&

Eugene Bratoeff

National Autonomous University of Mexico, Mexico

Biological Activity of Novel 17 β -Fenilcarbamiol-Androst-4-En-3-One as Inhibitors of Type 2 5 α -Reductase Enzyme

In this paper, we describe the biological activity of four different 17 β -fenilcarbamiol-androst-4-en-3-one derivatives as inhibitors of the type 2 5 α -reductase enzyme (5 α -R2). This enzyme is present in the human prostate and has been associated with androgen-dependent illnesses as benign prostatic hyperplasia and prostate cancer.

The effect of these 17-carboxamide derivatives was determined measuring the concentration of each inhibits 50% of the activity of 5 α -R2 (IC₅₀ values). The activity of this enzyme was measured at pH of 6.5 and optimum conditions of temperature and substrate concentration for this type 2 isozyme.

The results from these experiments indicated that all novel steroidal 17-carboxamides significantly inhibited the activity of 5 α -R2 enzyme with IC₅₀ values of: **1** 5 \pm 0.5 nM, **2** 13.9 \pm 0.9 nM, **3** 0.112 \pm 45 nM, and **4** 0.167 \pm 56 nM. With the exception of steroid **2**, others showed higher potency than finasteride (IC₅₀= 8.5 nM) to inhibit this enzyme. Finasteride is the drug of choice for the treatment of benign prostatic hyperplasia and was used in this experiment as a positive control.

In conclusion all steroidal derivatives described in this paper are good inhibitors for the human 5 α -R2 isozyme with compounds **3** and **4** showing a higher inhibitory potential as compared with finasteride. Therefore these steroids could have a promising therapeutically potency for the treatment of benign prostatic hyperplasia and prostate cancer.

Tales Alexandre Costa-Silva

Post Doctor, Sao Paulo University – USP, Brazil

David Isidoro Camacho Cordova

Post Doctor, Sao Paulo University – USP, Brazil

Suellen Feitosa

Sao Paulo University – USP, Brazil

&

Adalberto Pessoa-Jr

Professor, Sao Paulo University – USP, Brazil

Production of L-Asparaginase by Filamentous Fungi

L-asparaginase enzyme (L-asparagine amidohydrolase, EC 3.5.1.1) has received significant attention owing to its potential as anticancer agent. Its anti-leukaemic effect results from the depletion of L-asparagine circulating in the blood, which is essential for malignant lymphoblastic cells. Degradation of acrylamide (neurotoxic and carcinogenic effects) is another important application of L-asparaginase. Commercially, L-asparaginase is mainly obtained from bacterial sources. However, fungal asparaginase is more promising than bacterial asparaginase as it is safe and no allergic. Thus, there is an urgent need for rapid screening of microbes which produce this enzyme extracellularly and in high yields. In the present study thirty fifty fungal strains were isolated from different biomes of Brazil. The isolated fungi were screened for L-asparaginase production using Czapek's agar media. Eight fungi showed to be good L-asparaginase producers. *A. terreus* PC 1.7A strain in 2% proline medium showed the highest enzyme activity at 72 h, with 150.0 U/L whereas P24C fungus presented 88 U/L at the same conditions. The determination of protease production was performed to explain the decrease of L-asparaginase activity. From this study, it is clearly indicated that Brazilian biomes provide a rich source of L-asparaginase producing fungi. Two isolated fungi have the ability to produce a significant amount of L-asparaginase enzyme. However, more detail investigation is required to characterize this microbial enzyme, which may be effectively used in the large scale production for commercial and pharmaceutical purposes in the future.

Mukesh Doble

Professor, IIT Madras, India

&

Pranav Kumar Prabhakar

Assistant Professor, Lovely Professional University, India

Synergistic Interaction between Phytochemicals and Oral Antidiabetic Drugs Leading to Enhanced Glucose Uptake in Cells

Diabetes mellitus (DM) leads to endocrine disorder which is the third main cause of death. It is mainly due to defective or insufficient insulin secretory response. There are millions of children and adults in the United States who have diabetes and it causes about 5% of all the deaths globally each year [1]. The ethnobotanical information report says that there are about 800 plants that have antidiabetic properties, but experimental proof for the activities of only 410 plants is available [2].

Ferulic acid is a phenolics phytochemical present in the plant cell wall. Eugenol is a phenyl propanoid extracted from certain essential oils including clove oil (*Eugenia aromaticum* or *Eugenia caryophyllata*), nutmeg, cinnamon, and bay leaf. Traditionally it has been used in dentistry, for abdominal pain, and as an acaricidal, local antiseptic and anesthetic. Both these phytochemicals were used in combination with two commercial drugs, thiazolidinedione (THZ) and metformin, to study the glucose uptake by L6 muscle cells [3]. The study reveals that both the phytochemicals have enhancing effect on glucose uptake. They act in synergy with the two commercial drugs. Ferulic acid in combination with metformin (20 μ M) and THZ increases glucose uptake considerably with reference to the base value (without the drugs or the natural products). Eugenol also in combination with the drugs increases the glucose uptake. Our findings suggest that the phytochemicals can replace the commercial drugs in part, which could lead to a reduction in toxicity and side effects caused by the later.

Pinar Erkekoglu

Associate Professor, Hacettepe University, Turkey & Massachusetts
Institute of Technology, USA

Ming-Wei Chao

Assistant Professor, Massachusetts Institute of Technology, USA &
Chung Yuan Christian University, Taiwan

Belma Koçer-Gümüsel

Professor, Hacettepe University, Turkey

Chia-Yi Tseng

Assistant Professor, Chung Yuan Christian University, Taiwan

Wenjie Ye

Post-doc Associate, Massachusetts Institute of Technology, USA

Laura J. Trudel

Technical Associate, Massachusetts Institute of Technology, USA

Paul L. Skipper

Senior Research Fellow, Massachusetts Institute of Technology, USA

Steven R. Tannenbaum

Professor, Massachusetts Institute of Technology, USA

&

Gerald N. Wogan

Professor, Massachusetts Institute of Technology, USA

**Protective Effects of Different Antioxidants against the
Molecular Toxicity, Genetic and Epigenetic Alterations
Induced By 3,5-Dimethylaminophenol**

Extensive human exposure to the monocyclic aromatic amines (MAAs), particularly to 3,5-dimethylaniline (3,5-DMA) has been clearly demonstrated by epidemiological studies. Exposure to different MMAs was significantly and independently associated with bladder cancer. One of the main mechanisms underlying the toxicity of these compounds is suggested to be oxidative stress. 3,5-dimethylaminophenol (3,5-DMAP) is the major metabolite of 3,5-DMA. The comparatively much longer duration of observable reactive oxygen species (ROS) produced by 3,5-DMAP (7 vs. 1 day) provides further evidence that 3,5-DMAP becomes embedded in the cellular matrix in a form capable of continued redox cycling. 3,5-DMAP also induced dose-dependent increase of H₂O₂ and \cdot OH, which were determined as the major free radicals contributing to the cytotoxicity and apoptosis mediated *via* caspase-3 activation. In different cellular fractions of different mammalian cell lines, 3,5-DMAP caused alterations in the enzyme activities orchestrating cellular antioxidant balance, decreases in reduced glutathione levels and cellular redox ratio as well as

increases in lipid peroxidation and protein oxidation. The cellular stress caused by this particular alkylaniline metabolite lead to both genetic (Aprrt mutagenesis) and epigenetic changes in histones 3 and 4 (H3 and H4). This may further cause molecular events triggering different pathological conditions and eventually cancer. Ascorbic acid and different selenocompounds (selenomethionine and sodium selenite) were found to be protective against cytotoxicity, ROS production, genotoxicity and epigenetic changes. The protection against the toxicity alkylanilines was observed for both nucleus and cytoplasm, suggesting that the amelioration arises from their antioxidant effects on different subcellular fractions.

Tai Liang Guo

Associate Professor, University of Georgia, USA

&

Wan-I Oliver Li

Associate Professor, University of Georgia, USA

Sexually Dimorphic Effects of Genistein in Various Murine Diabetic Models

Immune dysregulation not only serves as a hallmark of type 1 diabetes (T1D), but also directly contributes to the pathogenesis of type 2 diabetes (T2D). The isoflavone genistein (GEN; 4,7,4'-trihydroxyisoflavone), which is known to interact with the estrogen receptors and act as an antioxidant to modulate immune responses, is a phytoestrogen found at high levels in soy products. The exact role of estrogen in diabetes is unknown. The objective of this study was to determine the effects of GEN on the time of onset and/or the incidence of diabetes in various murine diabetic models, when administered by gavage once every day at physiologically relevant doses. In female non-obese diabetic (NOD) mice (T1D), oral dosing of GEN reduced the incidence and increased the time to onset of T1D when fed a soy- and alfalfa-free (SOF) diet. However, administration of GEN by gavage increased the incidence of cyclophosphamide-accelerated T1D in male NOD mice. In streptozotocin (STZ)-induced diabetes, GEN exposure increased blood glucose levels (BGLs) in female B6C3F1 mice. In STZ-induced diabetic male B6C3F1 mice fed the SOF diet, although the BGLs in GEN-treated mice were numerically lower than vehicle mice following the third injection of STZ, none of the changes reached the levels of statistical significance. In the T2D db/db mice, GEN exposure decreased the body weights when compared to the vehicle control group in both male and female mice. However, in the 19-week study period, changes in BGLs were only observed at one time point with a decrease in females and an increase in males in week 3 and 17, respectively. The differential effects of GEN on blood glucose levels in male and female mice suggest that the estrogenic properties of this compound may contribute to its modulation of diabetes (supported in part by the NIH R21ES24487 and by NIEHS contract NO1-ES-05454).

Dongqi Han

Researcher, Shenzhen Institute for Drug Control, China

A Novel Strategy for Quantification of 14 Major Hydrophilic and Lipophilic Bioactive Components in Six *Salvia* Species

Supported by a growing increase of scientific research attesting the health properties of *Salvia* species, we have decided to develop a new HPLC method for simultaneous determination of 14 major hydrophilic and lipophilic bioactive components, including danshensu, protocatechu aldehyde, caffeic acid, isoferulic acid, salvianolic acid D, rosmarinic acid, lithospermic acid, salvianolic acid B, salvianolic acid A, salvianolic acid C, 1,2-dihydrotanshinquinone, cryptotanshinone, tanshinone I and tanshinone IIA in six *Salvia* species. The contents of these fourteen main components were compared between the dried roots of *Salvia miltiorrhiza*, *Salvia przewalskii*, *Salvia japonica*, *Salvia plectranthoides*, *Salvia yunnanensis* and *Salvia trijuga*. The analysis was performed on a Zorbax SB-AQ column with gradient elution of 0.026% phosphoric acid aqueous solution and acetonitrile with diode-array detection (280nm). All calibration curves showed good linearity ($R^2 > 0.9992$) within test ranges. The LOD and LOQ were lower than 0.3 and 1.1 µg/ml on column, respectively. RSD for intra- and interday of 14 analytes were less than 2.9 % and 2.0 %, respectively. On the basement of method validation, 20 samples of six *Salvia* species collected from markets in China were monitored for the quality control, significant variations were demonstrated in the contents of the samples from diverse species and origins. In addition, principal component analysis (PCA) and hierarchical cluster analysis (HCA) were performed on the analytical data of 20 samples in order to classify samples that were different species.

Shamimul Hasan

Assistant Professor, Jamia Millia Islamia, India

&

Shazina Saeed

University of Pittsburgh, USA

Role of Amlexanox and Rebamipide in Recurrent Aphthous Stomatitis Case Series and Review of Literature

Recurrent aphthous stomatitis (RAS) are one of the most commonly encountered oral disorders, and 5- 25% of the general population have atleast one time experienced this disorder. The condition requires immense clinical attention because of its multiple etiologies and various treatment modalities with not much of a cure. The term “aphthous” has a Greek origin “aphtha” which means ulceration. Von Mikulicz and Kummel (1888) were the first to give a valid clinical description of RAS. The underlying etiology is obscure, although the known predisposing factors include genetic cause, blood and nutritional deficiencies, trauma to the mucosa, cessation of smoking, food products and drugs, hormonal alterations (menstrual cycle), immune disorders and psychologic ailments (stress and anxiety). Aphthous like ulcers also have systemic associations such as Behçet’s syndrome, Inflammatory bowel disease, cyclic neutropenia, Reiter syndrome, MAGIC syndrome (mouth and genital ulcers with inflamed cartilage), PFAPA (periodic fever, aphthous pharyngitis and cervical adenopathy), and Sweet syndrome. Oral aphthae manifests as recurrent, multiple, small, shallow round or ovoid ulcers, with well defined margins, yellowish-gray floor and are surrounded by erythematous haloes. Taking into account the size, distribution and healing of the ulcers, Stanley (1972) classified RAS into minor, major and herpetiform ulcers. Treatment is multifocal and depends on the predisposing factors. Topical therapy is effective in most cases, although, patients with major RAS or those with large number of minor lesions requires systemic therapy. Although there are many therapeutic options available, however, no treatment seems specific and definitive. This case series outline the emerging role of amlexanox oral paste (5%) and rebamipide as a treatment modality of aphthous ulcers with a detailed review of literature.

Andrzej Jankowski

Head, Department of Drug Form Technology, Medical University of
Silesia, Poland

Ewa Dlugosz

Researcher, Medical University of Silesia, Poland

Kazimiera Klementys

Researcher, Medical University of Silesia, Poland

Mieczysław Sajewicz

Researcher, Medical University of Silesia, Poland

&

Beata Sarecka-Hujar

Researcher, Medical University of Silesia, Poland

Optimization of Spray Drying of Liquid Extracts from *Rhodiola rosea* L. Roots and Rhizomes

Rhodiola rosea L., has for ages been used in Chinese and Siberian medicine. The root and rhizome of *Rhodiola rosea* L. contain a number of biologically active compounds with proven pharmacological activity. Some of the most important of these are: phenylpropanoids (rosavin, rosin, rosarin), phenylethane derivatives (salidroside, p-tyrosol), flavonoids, monoterpenes, triterpenes, phenolic acids, organic acids, and essential oils. Dry and liquid extracts from roots and rhizomes of *Rhodiola rosea* L., exhibit multidirectional pharmacological activity, in particular they influence adaptogenic activity enabling the maintenance of internal homeostasis. Apart from adaptogenic activity they influence the circulatory system, physical capacity, exhibit antioxidant, anti-cancer and anti-germ activity. Spray drying is a convectional method of drying in which we obtain a substance in the form of solid particles of controlled size, from the original liquid product (solution, suspension, emulsion). This process provides us with the possibility of modifying the final product with regards to morphology, density and humidity level. Liquid ethanol extracts were obtained conducting the extraction process using 96°ethanol in temperatures of 40°C, as well as 50°C. The method of spray drying for obtaining a dry extract from a liquid extract while minimizing loss of content of active substances allows (rosavin, salidroside). The one condition under which it was possible to obtain a dry extract of high efficiency was the proper choice of spray drying parameters. The process of spray drying was conducted at temperatures of 100°C, 110°C and 120°C with pump efficiency at 15% or 17%, and a stable extract efficiency of 60%. Effectiveness of the process decreased as temperature and pump efficiency grew, while drying 96° ethanol extracts obtained at a temperature of 40°C yielded a lower process

efficiency than drying 96° ethanol extracts obtained at a temperature of 50°C. The best technological parameters for the process of spray drying for liquid extracts from roots and rhizomes of *Rhodiola rosea* L., are, entry temperature 100°C, extract efficiency 60% and pump efficiency 15%.

Roman Kaliszan

Professor, Medical University of Gdansk, Poland

Application of Chemometrically Processed Chromatographic Data in Medicinal Chemistry, Molecular Pharmacology and Laboratory Diagnostics

At the basis of drug action are physicochemical interactions, which do not involve formation of the new or breaking of the existing covalent bonds within the interacting molecules of a drug and the components of biological environment. The same fundamental intermolecular interactions determine chromatographic retention. Therefore, information on chromatographic behavior of drug (xenobiotic) analytes can be employed for modeling of their activity in biological systems. However, the extracting of systematic information from large sets of diverse retention indices requires appropriate chemometric data processing. The widely applied approach consists in analysis of Quantitative Structure-Retention Relationships (QSRR), proposed by our group in 1977.

Example QSRR will be presented allowing prediction of physicochemical properties of compounds, which determine their "druglikeness", i.e. which are important for their pharmacokinetics (ADMETox) and pharmacodynamics, including biological barriers permeation and binding to pharmacological receptor proteins. Emphasis will be put on combination of QSRR with mass spectrometric data in proteomics and metabolomics. A QSRR model will be discussed for the prediction of retention of peptides and verification correctness of their identification, based on semiempirical structural descriptors demanding determination of retention of only 7 out of 20 existing natural amino acids. Profiles of chromatographic retention data of urine samples will be demonstrated to discriminate healthy subjects from urogenital cancer patients. Another QSRR model will be shown to support procedure of identification of bioanalytes of relevance for control of doping in sport, based on HPLC retention parameters in combination with the molecular descriptors of hypothetical compounds, generated solely by calculation chemistry methods. QSRR analysis will be demonstrated to conveniently provide biorelevant information on drugs and other xenobiotics.

Khaled Khaled

Professor, El-Minia University, Egypt

Walid Faisal

Assistant Professor, El-Minia University, Egypt

Hanaa Fathelbab

Associate Professor, El-Minia University, Egypt

&

Emad Abdel Naeem

Assistant Professor, El-Minia University, Egypt

Preparation and Evaluation of Fast Dissolving Silymarin

Silymarin is a polyphenolic compound with an anti-hepato toxic activity. It is composed of four isomers: silybin, isosilybin, silychristin and silydianin. High dose of intravenous silybin showed a potent antiviral effect on chronically infected HCV patients. Due to its poor aqueous solubility, silymarin has low oral bioavailability. Thus, enhancement of its dissolution may lead to a better bioavailability.

The objective of the presented study was to prepare solid dispersion of silymarin with PVP. The preparation was subjected to dissolution test and used for a preliminary clinical study. Twenty-four patients participated in the study. Patients were divided randomly into two groups; each group had 12 patients. One group received the solid dispersion. The second group received a leading silymarin brand name product. The study continued for 12 weeks. Patients had been subjected to full medical history, medical examination, abdominal sonography, quality of life assessment and laboratory investigation. Results showed a significantly faster dissolution rate for solid dispersion. More important, a significant reduction in ALT, AST, Total and direct bilirubin, PT and PC was observed. The effect of the preparation on the HCV viremia is undertaken and the results are encouraging.

Hanna Kotłowska

Research Assistant, Medical University of Gdansk, Poland

Karolina Owcarz

Student, Medical University of Gdansk, Poland

&

Malgorzata Sznitowska

Head, Department of Pharmaceutical Technology, Medical University
of Gdansk, Poland

The Effect of Compression Forces on the Quality of Minitablets Prepared from Granules Containing Verapamil or Metoprolol

Introduction: Minitablets (diameter ≤ 3 mm) are promising pediatric dosage forms. Depending on child's body weight the dose of API (Active Pharmaceutical Ingredient) can be adjusted by multiplication of units [1]. Like conventional tablets, minitables (MT) are compressed directly from powder mixtures or after granulation using tablet presses equipped with 1 mm-3 mm single or multiple punches and dies [2]. The technology is still not well investigated. The aim of the research was to examine in detail the compression process parameters which influence the quality of MT produced from drug containing granules.

Materials and methods: Verapamil hydrochloride (VER) and metoprolol succinate (MET) were chosen as model drugs. Granules with different content of API (40% of MET and 60% or 80% of VER) were prepared using excipients: Sorbolac 400 (*Meggle*), Vivapur 101, Pruv (*JSR Pharma*) and Ac-di-sol (*FMC*). Wet granulation was performed with Pharmacoat 606 (*ShinEtsu*) solution. MT with diameter of 2 mm, 2,5 mm and 3 mm were compressed using laboratory rotary tablet press (*Erweka RTP-D8*) equipped with concave single punches and dies. Compression pressures of either 160 MPa or 250 MPa were used and precompression forces were 100 N or 500 N. In addition, MT with different thickness (t) to diameter (d) ratio (t/d 0.8 or 1.2) were produced. To evaluate quality of MT, Ph. Eur. tests were performed: weight uniformity, flowability and disintegration time (minor modification of the pharmacopoeial disintegration apparatus was required). Crushing strength was assessed using texture analyser (*Stable Micro Systems*).

Results and discussion: The sieve analysis showed for all granules similar particles size distribution, with 50% of the granules below 500 μm . The flowability of granules was classified as good according to Ph. Eur. (bulk, tapped densities and angle of repose). Good mass uniformity of MT was obtained even when 25-30% deviations from

adjusted main compression force were registered, but generally very good stability of the compression force was observed. Greater fluctuations in weight were measured for MET-MT. During compression of thicker MT ($t/d=1.2$) higher ejection forces were noticed, however this influenced neither stability of compression force nor weight uniformity of MT. Regardless of various precompression and compression forces hardness of MT measured as friability was satisfying (friability was generally below 0,3%). On the other crushing strength tests revealed that the hardness of 2 mm MT compressed with 160 MPa was the smallest (10 N) and the largest hardness (40 N) was measured for 3 mm MT compressed with pressure of 250 MPa. Disintegration time also depended not only on size of MT (e.g. VER-MT 2 mm and 3 mm disintegrated within 1 min and 3 min, respectively) but also on the compression forces (e.g. for 3 mm VER-MT compressed with 250 MPa disintegration time increased to 8 min). Similar relationship was observed independent on API type and content. For thicker MT higher crushing strength and longer disintegration time were measured.

Conclusions: On the laboratory scale it is possible to produce MT with good weight uniformity even when higher deviations from the adjusted compression forces were observed. Good quality of MT, even with high dose of API (80%), was confirmed. Results obtained in the study confirmed validity of further development of MT dosage form.

Sung Won Kwon

Associate Professor, Seoul National University, Korea

Novel Approach for Predicting Long-Term Side Effects of Drugs by Mass Spectrometry Based Metabolomics

Currently, topical steroids have been used in primary treatment for atopic dermatitis (AD). However, since young infant has thin skin and especially the infant aged under two years with AD has lesions of the head and neck including facial areas, there is a great possibility for serious complications of topical steroids. Therefore, there is an emerged need for predicting side effects of topical steroids and comparing the long-term safety of primary treatment drugs (ex: desonide cream) with that of secondary treatment drugs (ex: pimecrolimus cream). In order to obtain functional interpretation of long-term side effects, a randomized, double-blinded trial was combined to liquid chromatography-quadrupole time-of-flight mass spectrometry (LC-QTOFMS) based metabolomics techniques to conduct systematic comparison between a topical steroid (desonide cream) and an immunosuppressant (pimecrolimus cream). Experiments were performed in the order of general MS based metabolomics procedures (urine sample collection from 55 patients, data collection by LC-QTOFMS, endogenous metabolites identification by data processing, statistical analysis by Benjamini and Hochberg procedure, biomarker identification and Functional interpretation of metabolomic data) and the results assisted by the integrated statistical algorithm were good quality, which highly reduced the false-positive interpretation. Thereby, we proved LC-QTOFMS based metabolomics is the potential omics technology as a novel method to predict the long-term side effects by integrating a highly precise statistical analysis and functional interpretation. In this study, we confirmed that immunosuppressants had non-inferior efficacy and exceptional safety compared to topical steroids by the advanced statistical investigation of omics data, suggesting the prediction method of long-term toxicity by LC-QTOFMS as an effective method to predict long-term side effects in short-term clinical model.

Jeongmi Lee

Assistant Professor, Sungkyunkwan University, South Korea

Development and Application of Green Solvent-Based Extraction of Bioactive Compounds

There has been a great demand for development of green solvents in green chemistry fields because solvents comprise the majority of chemical waste. Although enormous attention has been paid to ionic liquids (ILs) as green solvents, their greenness is often questioned because of potential toxicity, poor biodegradability. Recently, deep eutectic solvents (DESs) have been suggested as the alternatives to ILs, which are advantageous to ILs including better biodegradability and sustainability, and low cost for synthesis. As a result, selective, green extraction of natural products from biomass using DESs is of great interest in pharmaceutical and biochemical fields. In this respect, I aimed to provide a practical example showing the effectiveness and tuneability of DESs in extraction of bioactive compounds. For this purpose, a popular traditional Chinese medicine called *Flos sophorae* was employed, which is easy to obtain and known to contain high levels of bioactive compounds. DESs were screened among a number of DESs prepared by a freeze-drying method and tailored to produce the most efficient solvent for the major bioactive compounds, i.e., flavonoids including glycosides of quercetin, kaempferol, and isorhamnetin based on the analysis of extracts using liquid chromatography-ultraviolet detection. Then, operational conditions for the extraction procedure were optimized by response surface methodology using a central composite design. The resulting optimized extraction method using the tailored DES was found to be superior in terms of extraction efficiency and greenness to conventional methods including methanol-based ultrasonication method and heat reflux method that are environmentally harmful. Effects of DES on the bioactivity of extracted compounds and recovery of the isolated compounds were also investigated. Taken together, it was proven that DESs are preferable green solvents that can be tailored and are safe and sustainable, supporting an enormous potential of DESs for use in pharmaceutical and related fields.

Sathiyarayanan Lohidasan

Associate Professor, Bharati Vidyapeeth, Deemed University, India

Arulmozhi Sathiyarayanan

Assistant Professor, Bharati Vidyapeeth Deemed University, India

Kakasaheb Mahadik

Professor, Bharati Vidyapeeth Deemed University, India

&

Anant Paradkar

Professor, Bradford University, UK

**Comparative Pharmacokinetic Study of Solvent Free Self
Emulsifying Extract against Conventional Extract of
Centella asiatica Linn**

The objective of the present study is to establish a solvent free extraction technique using self emulsifying system as a tool for medicinal plants and to confirm the extractability using analytical technique. In addition, comparative pharmacokinetics of the extracts was carried out in experimental animals. The model plant selected was *Centella asiatica* (CA). Conventional methanolic extract (MECA) and optimized self emulsifying extracts of CA (SESCA) were prepared, standardized for the content of asiaticoside to confirm the better extractability. Both the extracts were comparatively analysed for pharmacokinetic properties in Wistar rats using validated Liquid Chromatographic-ELSD method. Plasma samples were collected at different time points before and after single intragastric administration of optimized SESCO and MECA equivalent to 20 mg/kg of Asiaticoside to twelve Swiss albino wistar rats under fasting conditions. 500 µL of blood samples were collected in 2 ml centrifuge tubes then centrifuged for 10 min at 12,000 rpm; the supernatant was transferred to labelled plastic vials at -20C until analysis. SESCO extracts showed higher content of asiaticoside than the MECA by HPTLC analysis. The C_{max} and T_{max} of asiaticoside for SESCO were 1062.98 ng/ml and 2 hrs respectively. Also the AUC₍₀₋₁₂₎ values for asiaticoside after administration of SESCO was found to be 1356 ng min/ml. In case of MECA, C_{max} and T_{max} for asiaticoside were found to be 430.1 ng/ml and 3 hrs respectively where as the AUC₍₀₋₁₂₎ value for asiaticoside in plasma samples was found to be 568 ng min/ml. The pharmacokinetic study revealed that the SESCO exhibited improved pharmacokinetics than MECA. The present study conclude that SESCO is solvent free, free from drawbacks of conventional method of extraction and proven to have improved pharmacokinetics and hence the proposed extraction technique can be used as effective extraction technique for herbals.

Anil Mandal

Courtesy Clinical Professor, Department of Medicine, University of
Florida, USA

**Diagnosis and Men-percent of Diabetes and Relationship
of d-Glucose to Preservation of Kidney Function**

Michał Markuszewski

Associate Professor, Medical University of Gdansk, Poland

Renata Bujak

Ph.D. Student, Medical University of Gdansk, Poland

Wiktoria Struck-Lewicka

Assistant, Medical University of Gdansk, Poland

Arlette Yumba Mpanga

Assistant, Medical University of Gdansk, Poland

Katarzyna Polonis

Assistant, Medical University of Gdansk, Poland

Marta Kordalewska

Ph.D. Student, Medical University of Gdansk, Poland

Michał Hoffmann

Assistant Professor, Medical University of Gdansk, Poland

&

Krzysztof Narkiewicz

Professor, Medical University of Gdansk, Poland

Metabolomics in search for a Biomarkers of Resistant Hypertension

Hypertension (HTN) is a common cardiovascular disease that affects about billion people worldwide. Among large population of hypertensive patients, about 15-20% of patients are resistant to antihypertensive pharmacotherapy [1] which slightly increases risk of other cardiovascular diseases. In order to understand pathomechanism of this serious body condition the metabolomic approach was carried out using plasma metabolic fingerprinting. Plasma samples derived from resistant hypertensive (RH) patients (n=30) and nonresistant ones (n=30) were determined with the use of liquid chromatography time of flight mass spectrometry (LC/TOF/MS) in negative and positive polarities as well as using gas chromatography triple quadrupole mass spectrometry technique (GC/QqQ/MS). The sample pretreatment procedure was limited to deprotenization, centrifugation, filtration and, in case of GC/QqQ/MS technique additionally, derivatization step. The obtained data sets were subsequently statistically analyzed using data pretreatment procedures (peak alignment and data filtration, normalization and scaling) as well as univariate (t-test, U Mann-Whitney test depending on data distribution) and multivariate statistical analyzes like Principal Component Analysis (PCA) and Partial Least Squares Discriminant Analysis (PLS-DA). Such advanced bioinformatics approach allowed for selection of the most relevant metabolites (n=36) which levels significantly varied between two studied groups. The list of metabolites were then putatively identified

with the use of available databases (METLIN, HMDDDB, LIPIDMAPS, KEGG and CEU Mass Mediator) and NIST library in case of GC/QqQ/MS data. As a results some of them were tentatively identified as prostaglandin, oxo-proline, hydroxyeicosatetraenoic acid (HETE) and trihydroxyoctadecenoic acid (Tri-HOME). These metabolites are known to be involved in endothelium dysfunction, oxidative stress and inflammation processes which might give a deeper insight into the causes of resistant hypertension.

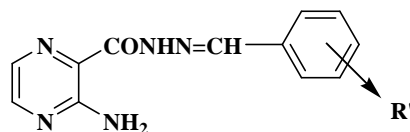
Pankaj Miniyar

Professor and HOD (Pharmaceutical Chemistry), Sinhgad Institute of
Pharmacy, India

Design, Synthesis and Anti-Tubercular Screening of 3-Aminopyrazine 2-Carbohydrazide Derivatives by Microwave Acceleration and Lyophilization

In the search of a potent anti-tubercular agent, a series of twenty six 3-amino-N'-benzylidenepyrazin-2-carbohydrazide derivatives (**3a-z**) were synthesized by microwave irradiation method. The major intermediate 3-aminopyrazine 2-carbohydrazide was isolated by lyophilization. All the compounds were screened for anti-tubercular activity against *Mycobacterium tuberculosis* H37Ra by using XRMA protocol. Out of 26 synthesized compounds, four 3-amino-N'-benzylidenepyrazine-2-carbohydrazide derivatives, **3i**, **3j**, **3v** and **3z** were found significantly active against *M. tuberculosis* H₃₇Ra at a concentration of 100 µg/ml.

Figure 1. 3-amino-N'-benzylidenepyrazin-2-carbohydrazide derivatives (3a-z)



The compounds **3i**, **3j**, **3v** and **3z** showed % inhibition of 99, 98, 92 and 87 % of the mycobacterium, respectively. This was found to be comparable to that by the standard drug rifampicin (94.21%). The MIC and IC₅₀ values for these compounds were found in the range of 24-110 and 5.9-11.1 µg/ml, respectively. To prove the structural characteristics influencing the antimycobacterial activity of these compounds, an SAR classification model was derived based on a binary QSAR approach termed as "Recursive Partitioning Analysis (RPA). The structural features highlighted by the RP model can serve as a guide to design new lead compounds.

Table 1. Statistical Results of Recursive Partitioning

Class	No. of molecules	Activity	% of molecules	Class % as	Overall % as	Enrichment Ratio
				Obs Correct	Pred Correct	
1	20	0	76.92	100	100	1.30
2	6	1	23.08	100	100	4.33

Arthur Nelson

Professor and Founding Dean, Texas Tech University Health Sciences
Center School of Pharmacy, USA

**Past and Future Drivers of Pharmacy Education and
Practice in the United States**

Past changes in the United States (US) pharmacy curricula have historically been driven by major, new directions in the scientific bases of drug discovery, development, manufacturing, and compounding. During the 1920's to mid 1940's, the developments in the chemistry of natural products and the sciences of physical/chemistry properties in manufacturing of dosage forms and compounding drove major curricular changes. The growth in understanding of organic chemistry with its application in target drug discovery and abilities to understand pharmacological action created significant changes in the 1960's-1980's curriculum, transitioning pharmacy education from a chemistry dominance, to include a more balanced biological focus. Courses like biochemistry were added and material medical was replaced with pharmacology and toxicology. The 1980's-1990's saw development of pharmacokinetics and translational clinical sciences, that began as new introductory courses, then transitioned to greater emphases within the curriculum.

Beginning in the 1990's-early 2000's, curricula began adding more direct practice courses, as well as introducing therapeutics based on a pathophysiological understanding diseases. Curricular time extended to 6 years to provide students time for experiential education. These practice-driven changes also forced programs to add practice skills, like written and verbal communications, drug information, and problem-solving, all critical skills for practitioners.

Beginning now, US colleges and schools curricula are facing a major transformational change, driven by a dramatic, rapidly changing US's health care system's delivery, economics and financing. These health system changes are creating a critical need for a transformational change in the way US colleges and schools of pharmacy train future graduates.

This presentation will examine, from a conceptual perspective, the past and current drivers of curricular change and discuss perspectives of the critical need for today's professional curriculum to transform into a new direction, driven by the need to better prepare pharmacists for greater roles in providing direct patient care services. It will also examine changes in teaching and learning methods that are also driving more effective learning outcomes and assessments.

Jeanne Ngogang

Professor, University of Yaounde I, Cameroon

Bruno Mukette

Ph.D. Student, University of Yaounde I, Cameroon

Anatole Constant Pieme

Lecturer, University of Yaounde I, Cameroon

Proper Cabral Biapa

Lecturer, University of Yaounde I, Cameroon

Vicky Jocelyne Ama Moor

Lecturer, University of Yaounde I, Cameroon

Pauline Nanfack

Ph.D. Student, University of Yaounde I, Cameroon

&

Marcel Azabji

Lecturer, University of Yaounde I, Cameroon

Evaluation of the Hypoglycaemic, Hypolipidemic and Antioxidant, Properties of a Cameroonian Polyherbal Formulation on Diabetic Rats

Diabetes mellitus (DM) is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin metabolism. This hyperglycaemia generates dyslipidemia and the production of reactive oxygen species (ROS), which can induce many complications in diabetes mellitus. The aim of this study was to investigate the hypoglycaemic, hypolipidemic and antioxidant properties of the mixture of extract from *Spilanthes africana* DC, *Portulaca oleracea* linx et *Sida rhombifolia* linx (1:1:1) on streptozotocin induced diabetic rats. We gave *per os* and during 21 days to five different groups of five rats each different doses of the mixture (50, 100, 200 mg/kg of body weight), normal (non diabetic) and diabetic control groups received distilled water. Parameters such as glycemia, lipid profile, total antioxidant status (TAOS), total protein, malondialdehyde (MDA), glutathione, as well as aspartate amino transferase (ASAT), alanine amino transferase (ALAT) and creatinin have been measured using standard recommended methods. The extract mixture significantly ($p < 0,05$) decreased in the dose dependent manner the levels of glycaemia, total and LDL cholesterol, triglycerides, MDA, ASAT, ALAT, creatinin of the treated groups compared to the diabetic control. An increase of the concentration of HDL cholesterol, total protein, glutathione and TAOS was observed in the treated groups. The mixture of the extracts had a scavenging effect on DPPH and OH radicals. In conclusion, these results suggest that this mixture has hypoglycaemic,

antioxidant and hypolipidemic properties and can be used for the management of diabetes mellitus.

Funmilola Omoya

Senior Lecturer, The Federal University of Technology, Nigeria

Abdul Momoh

Ph.D. Student, The Federal University of Technology, Nigeria

&

Anuoluwapo Adeyemo

Student, The Federal University of Technology, Nigeria

Assessment of the Bio-Repellent Property of Methanolic Extracts of Some Plants against Anopheles Mosquito

Malaria control is still a major health challenge considering the high rate of mortality recorded annually. Reducing the man-mosquito contact is the best way of combating the spread of this disease as resistance to malaria drugs increases. Many repellants are nowadays available which can easily fend off mosquitoes but are not environmentally friendly. Natural repellent against mosquito are therefore investigated. This study was carried out to investigate the effectiveness of methanolic extracts of some plants namely *Croton zambesicus*, *Citrus aurantifolia*, *Laurus nobilis* and *Ocimum americanus* in repelling adult *Anopheles* mosquito for a period of six hours using different concentrations of the crude extracts. The repellency properties of these plants is dosage dependent. At concentration of 3ml the repellent time is highest in *Laurus nobilis* treatment group with 3 hours 53 minutes, followed by *Ocimum americanus* treatment group with 3 hours 38 minutes while the least repellent time was observed in *Citrus aurantifolia* with repellent time of 2 hours 43 minutes. In the negative control group landing time of 165 seconds is observed. The phytochemical screening of these plants revealed the presence of some compounds such as alkaloids, saponin, phlobatanin and flavonoids. Hence these plants possess repellent property against *Anopheles* mosquito and therefore might be considered as bio repellent agents.

Didem Oral

Ph.D. Student, Hacettepe University, Turkey

Belma Kocer-Gumusel

Professor, Hacettepe University, Turkey

&

Pinar Erkekoglu

Associate Professor, Hacettepe University, Turkey

Effects of Phthalates on Epithelial Mesenchymal Transition

Epithelial-mesenchymal transition (EMT) is a process in which epithelial cells lose their polarity and ability to adhere. Instead, they gain properties to move, migrate through the extracellular matrix and become invasive. Finally, they become mesenchymal stem cells. This transdifferentiation is critical for development of embryo, wound healing and stem cell behavior. However, this phenomenon is also observed in cancer progression. Phthalates are endocrine disrupting chemicals (EDCs). Over the last years, several studies have been performed concerning the effects of EDCs on human complex diseases, such as different types of cancers. These chemicals are suggested to disrupt normal hormonal balance (usually by existing estrogenic or anti-androgenic properties), stimulate the development of reproductive tumors and steroid hormone dependent cancers, such as breast cancer. Di(2-ethylhexyl)phthalate (DEHP) is the most abundant phthalate in the environment and was shown to induce DNA damage in human cells *via* multiple molecular signals that include altered apoptosis and mitotic rate; increased cell proliferation, tumor mobility and invasiveness of tumor cells. DEHP was also shown to inhibit the gap junction intercellular communication and promote EMT. Phthalates may also cause the proliferation and metastasis of cancer cells and tumor progression *via* upregulating histone deacetylase 6 (HDAC6), an enzyme that regulates different signaling pathways and EMT. Besides, phthalates can also activate peroxisome proliferator activated-receptors (PPARs), which might eventually lead to high proliferation of the cancer cells and EMT. Both human PPAR α and PPAR γ were shown to be activated by the major metabolite of DEHP, namely mono(2-ethylhexyl)phthalate (MEHP). More studies are needed to show the underlying mechanisms of EMT caused by different EDCs.

Neha Paharia

Ph.D. Graduate, SNTD Women's University, India

&

Kasturi Sen Ray

Retired Professor, SNTD Women's University, India

Impact of Specific Processing of Rice on Postprandial Glycemic and Insulinemic Responses in Individuals with Type 2 Diabetes Mellitus

Background: The present study aimed to understand the impact of food processing on the postprandial glycemic and insulinemic response in individuals with type 2 diabetes, using Glycemic Index_{food} (GI_{food}). Postprandial impact of test food is compared on equi quantity basis with standard food bread giving Glycemic Bread Equivalents (GBE).

Materials and Method: Blood samples of enrolled type 2 diabetic subjects without any other clinical complication and paired clinically healthy adults were collected at fasting, 30, 60, 90 and 120 min post consumption of selected quantity of standard (white bread) or test food (Boiled Rice [BR] and Rice Puff [RP]) on different occasions and their blood glucose and insulin was recorded. The incremental area under the curve (IAUC), GI_{food} and Insulinemic Index_{food} value were calculated. The results are expressed in Mean \pm SE and statistical analysis was performed using students paired *t* test.

Results: In the diabetic group, peak glycemic response of BR was significantly lower than both RP ($p < 0.005$) and white bread ($p < 0.05$). Similarly the glycemic IAUC for BR was also significantly lower than both RP ($p = 0.017$) and bread ($p = 0.012$). The insulinemic response (both peak response and IAUC) for BR was seen to be lower than RP and bread but was statistically insignificant. This could be attributed to the diminished insulin status observed in the diabetic group. In the normal group, no significant differences were observed between the glycemic responses of BR and RP, however, both peak and IAUC insulin response was significantly lower for BR as compared to RP ($p = 0.05$).

Conclusion: The study clearly shows that selected processing of rice increases its glycemic and insulinemic impact. Apart from the food composition, other factors such as structure or physical form of food also contribute in the alteration of postprandial responses. Insufficient insulin status coupled with consumption of hyperglycemic foods could be detrimental in case of people with diabetes.

Anil Philip

Associate Professor, Pharmaceutics, University of Nizwa, Oman

Betty Philip

Lecturer, Pharmaceutics, University of Nizwa, Oman

Afaf Weli

Associate Professor, Chemistry and Associate Dean, University of
Nizwa, Oman

Qasim Al Riyami

Assistant Dean, University of Nizwa, Oman

Donald Cairns

Professor and Head, The Robert Gordon University, U.K.

Colin Thompson

Lecturer, Pharmaceutics, The Robert Gordon University, U.K.

Issa Al Amri

Director, DARIS, University of Nizwa, Oman

Ahlam Al Abri

Laboratory Technician, University of Nizwa, Oman

&

Hamna Al Senani

Clinical Instructor, University of Nizwa, Oman

**In-Situ Fiber Optic Analysis for Controlled Release of
Budesonide Nanospheres through an Asymmetric
Membrane Capsule**

Objective: Budesonide (BU) is a glucocorticoid steroid, commonly used for inflammatory bowel disease (IBD). The present study addresses BUs unpredictable solubility issues by nano sizing the drug, and using a non-disintegrating asymmetric membrane capsule (AMC) for its controlled release to overcome the side-effects.

Method: BU nanospheres were prepared by the solvent displacement method, utilizing ultrasonication at 20 KHz for 15 minutes. Fabricated glass mold pins were utilized for AMCs preparation by phase inversion. Different formulation variables based on 2³ factorial design were studied including concentrations of osmogen, pore former, and thickness of the asymmetric membrane (AM). Effects of varying osmotic pressure on drug release were also studied. In-situ fiber optics was used to study the drug release (n=6), and compared with the traditional method of analysis. The formulation characteristics involved particle size and shape analysis, scanning electron microscope (SEM), differential scanning calorimeter (DSC). Statistical tests were applied at $p < 0.05$.

Results: Results also showed the spherical shape of the BU nanospheres (90% between 100-150 nm). DSC showed no interaction between the ingredients used in the formulation. SEM showed an outer dense region with fewer pores and an inner porous region for the prepared AM. Fiber optic analysis showed statistically significant ($p=0.0241 \pm 0.0078$, $p < 0.05$), and higher percentage of drug release compared with traditional pipetting method. The contributing reasons for the loss of nanospheres were the pipetting, and manual errors employed in the traditional analysis method. The best formulation had statistical similarity to the extra design checkpoint formulation (f_2) value of 95.32. The drug release was pH independent but dependent on the dissolution medium's osmotic pressure. The release kinetics and mechanism were Higuchi model, and Fickian diffusion respectively.

Conclusion: AMCs are a viable delivery option for osmotic and controlled release of BU nanospheres. Fiber optics dip probe technique could be a new and better way for analysis of nanoformulations compared to the traditional method of analysis.

Doina Popov

Head of Pathophysiology and Pharmacology Department, Institute of
Cellular Biology and Pathology "N. Simionescu" of the Romanian
Academy, Romania

**Organelles Stress and Their Crosstalk within Diabetic
Myocardium**

Diabetes-associated cardiovascular dysfunction is characterized by homeostasis perturbation induced by systemic stressors, such as hyperglycemia, excess of ROS/RNS, shear-stress, and inflammatory environment. The recent data highlight the aggravating effect of local, organelles-related stress, manifest in mitochondria, endoplasmic reticulum (ER), lysosomes, proteasomes, inflammasomes. The occurrence of local stress might allow its alleviation inside the cell, at organelles level, a novel strategy potentially more efficient compared to current systemic therapeutic approaches. The aim of this disclosure is to link morphological evidence on organelles stress in diabetic coronary endothelium and cardiomyocytes (CMs) to the newly identified molecules/mechanisms beyond it. The issues examined are: (i) the oxidative stress linked to mitochondria dysfunction, as illustrated by the dynamic shape changes ensuing fusion or fission, generating elongated mitochondria or smaller size individual organelles, respectively; the opposing effects of fusion proteins (Mfn1, Mfn2, OPA-1) and fission proteins (Drp1, Fis1) are highlighted; (ii) the mitochondrial turnover, compromised autophagy (mitophagy), and inadequate mitochondrogenesis; the PINK1 recruitment of Parkin is underlined as key event; (iii) the molecular dialogue between mitochondria and cell nucleus, the lipid transport at mitochondrial membrane contact sites with sarcoplasmic reticulum (SR)/ER, lipid droplets (in myocardial steatosis), and peroxysomes; (iv) the SR/ER stress activation (related to fibrosis) and the functional crosstalk between fibroblasts and inflammatory cells within diabetic myocardium (by mechanisms involving released cytokines and growth factors). At the horizon, targeting mitochondrial dynamics mediators, deciphering the defects in mitochondrial cell signaling control, understanding mitochondria retrograde signaling, and manipulation of SR/ER stress-associated lipid droplets formation may conduct to novel drugs aimed to preserve CMs viability and to alleviate diabetes-induced cardiac damage.

Ugo Pradere

Senior Scientist, ETH Zurich, Switzerland

Martina Roos

Ph.D. Student, ETH Zurich, Switzerland

&

Jonathan Hall

Professor, ETH Zurich, Switzerland

Method Identifying Low Molecular Weight Modulators of miRNA Biogenesis

Coding- and non-coding RNAs are often associated with RNA-binding proteins (RBPs) to form ribonucleoprotein (RNP) complexes. The RBPs influences the fate of RNAs by playing a critical role in their biogenesis, stability, function, transport and cellular localization. MiRNA are a large class of non-coding regulatory RNAs repressing the expression of target messenger RNAs. Post-transcriptional regulation of miRNA biogenesis by trans-acting factors binding miRNA precursors (pri- and pre-miRNA) is increasingly recognized as an important element controlling miRNA maturation. Many miRNA precursors has been characterized carrying binding sites for RBPs such as Lin28, hnRNP A1, Smad, KHSRP and p53 proteins acting either as activators or repressors of miRNA processing by Drosha or Dicer. This regulation through RBPs binding process was evidenced as a major mechanism of the dysregulation in expression of several miRNA linked to various human cancers, and therefore represents a promising novel target for drug development.

We present as part of our on-going program addressing RNA drugability, the development of a novel carefully optimized Fluorescence Resonance Energy Transfer (FRET) based high-throughput screening allowing the identification of low molecular weight inhibitors of pre-miRNA – RBP interactions. The activities of the identified compounds were validated in cellular assays.

We believe this technique to be expandable to various RNA – RBP interactions offering the opportunity to efficiently identify inhibitors of such interactions.

Parts of this work were funded by grants from the ETH Zürich (ETH-01 11-2) and the Krebsforschung Schweiz (KFS-02648-08-2010).

Ketan Ruparelia

Research Fellow, De Montfort University, U.K.

Matteo Micucci

Research Fellow, Bologna University, Italy

Alberto Chiarini

Professor, Bologna University, Italy

Giulia Baccherini

Pharmacist, Bologna University, Italy

Roberta Budriesi

Professor, Bologna University, Italy

Randolph Arroo

Reader, De Montfort University, U.K.

Keti Zeka Zeka

Research Fellow, L'Aquila University, Italy

Maria Adelaide Continenza

Professor, L'Aquila University, Italy

&

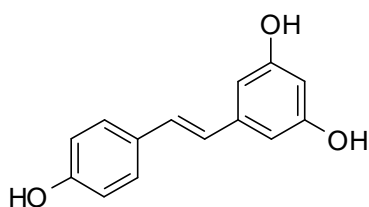
Kenneth Beresford

Senior Lecturer, De Montfort University, U.K.

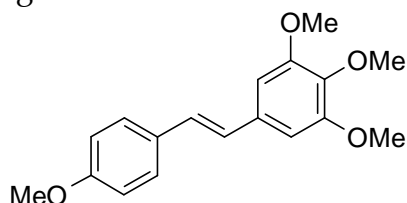
Resveratrol and Synthetic Analogues: From Cardioprotective Effects to Anticancer Activities

It has been widely acknowledged that regular consumption of fresh fruits and vegetables is linked with a relatively low incidence of cancers (e.g. breast, cervix, and colon). Notably, dietary polyphenolic compounds have been proposed to play a role in cancer prevention. However, at present there is no satisfactory explanation for the cancer preventative properties of the group of compounds. Whereas polyphenolic compounds have been shown to inhibit proliferation of tumor cells in vitro, the results of in vivo tests have mostly been disappointing in this respect. It seems that mammalian phase I and phase II detoxification mechanisms make that dietary polyphenols are rapidly and effectively removed from the body, i.e. their concentration in the blood plasma hardly ever reaches levels high enough to have a possible effect on tumor growth. Despite the experimental evidence regarding the antitumor activity of resveratrol, stilbene found in red grapes, the clinical effectiveness of the natural product is limited because of its low bioavailability. Resveratrol, however, has demonstrated antioxidant and antiproliferative activity in in-vitro models and mice. Although resveratrol exhibits significant anticancer activity, its efficacy in-vivo is limited due to its poor pharmacokinetic properties. In order to improve the pharmacokinetic properties of resveratrol and to increase the chemopreventive activity, several

methoxylated resveratrol analogues were designed, synthesized and tested in vitro models. These analogues included a synthetic anticancer prodrug based on the structure of the natural product resveratrol namely DMU-212 or *trans* 3, 4, 4' 5 -tetramethoxy stilbene. DMU-212 has considerable potency in submicromolar IC₅₀ in cancer cell lines that renders it an important candidate for further studies, as it deviates from the classical acute toxicity of standard chemotherapeutic drugs. These synthesized analogues have been tested for their antitumor activity and in vitro biological assays have been exerted in order to assess the cardiovascular effects of the compounds. In particular, Structure-Activity relationships have been studied in relation to their effects towards cardiovascular parameters. The cardiac activity of these compounds, using in vitro biological assays, on guinea-pig left and right atria, as well as their relaxant activity on guinea-pig vascular (aorta) and nonvascular (ileum) smooth muscle has been studied. The chemical modifications of the resveratrol have been made in order to maintain the stilbene scaffold that is crucial for heart selectivity. All the tested compounds exert a cardiovascular pattern activity similar to that of resveratrol. Heart and smooth muscle activity profile is similar for all tested compounds. The same modifications leading to an antitumor activity increase do not affect cardiovascular parameters. Resveratrol is devoid of relaxing effects towards vascular smooth muscle, while it relaxes non vascular smooth muscle with a low potency (EC₅₀ = 24.34 μ M (c.l 16.15-29.87)). All the resveratrol analogues have a similar activity pattern, showing selectivity towards non-vascular smooth muscle. This study is currently in progress.



Resveratrol



DMU 212

Beata Sarecka-Hujar

Researcher, Medical University of Silesia, Poland

Ewa Dlugosz

Researcher, Medical University of Silesia, Poland

Andrzej Jankowski

Head, Department of Drug Form Technology, Medical University of
Silesia, Poland

Barbara Majka

Student, Medical University of Silesia, Poland

&

Anna Banyś

Researcher, Medical University of Silesia, Poland

Assessment of the Release of Trimetazidine from Orally Disintegrating Tablets (ODTs)

Orally disintegrating tablets (ODTs) are convenient for patients with swallowing difficulties; they also have faster onset of action. Disintegration time of this drug form in saliva before swallowing should be no longer than 3 minutes according to the European Pharmacopoeia, according to FDA guidelines it should not exceed 30 seconds. The aim of the present study was to develop a formulation of orally disintegrating tablets containing trimetazidine and to assess impact of disintegrants on its release. Two formulations were prepared for the tablets with 100 mg weight. Both formulations contained: trimetazidine, lactose, sorbitol and talc. We used different disintegrants to prepare tablets: 25 mg of starch and 25 mg of microcrystalline cellulose (Avicel) were used in formulation I and II, respectively. Tablets were prepared in direct compression. Obtained tablets were evaluated for size, weight variation, thickness, friability, wetting time and the degree of binding water. Analysis of the pharmaceutical availability was performed in a paddle method (Erweka DT-600) using artificial saliva, sodium chloride solution buffered with phosphate (pH 6.8) and 0.1M HCl as acceptor fluids. The absorbance of the samples was measured spectrophotometrically with Cecil CE 3021 apparatus at a wavelength of 269 nm. The disintegration time as well as the wetting time and the binding of water by the tablets obtained from formulation II were statistically significant compared to tablets made with formulation I. The release of trimetazidine from the tablets containing microcrystalline cellulose (Avicel) showed that during the first minute 41% of the active substance was released in phosphate-buffered NaCl solution (pH 6.8) and 100% of the trimetazidine hydrochloride was released within 5 minutes. Release from the tablets with starch was

slightly slower; about 36% of trimetazidine was released in the first minute of the in vitro test and complete release of the active substance lasted 6 minutes. Similar data were observed when using 0,1M HCl. In opposite, better release was observed for formulation with starch in artificial saliva as acceptor fluid. The analyzes revealed that microcrystalline cellulose (Avicel) has better disintegration properties than starch but the release of trimetazidine are different depending on the acceptor fluid.

Kasturi Sen Ray

Retired Professor, SNDT Women's University, India

&

Neha Paharia

Ph.D. Graduate, SNDT Women's University, India

Relative Glycemic and Insulinemic Response of Staple Indian Foods in Type 2 Diabetic Patients

Background: Dietary management of diabetes largely focuses to maintain blood sugar levels close to normal. Rice and Wheat are the most common carbohydrate (CHO) based foods in the staple Indian diet. Rice is classified as a high GI product [GI - 60-110] in comparison with white bread (GI=100) and therefore commonly restricted for a person with diabetes. Unleavened Indian flat bread chapati made from whole wheat flour is favorably consumed by Indians for its higher nutrient density and low GI Value (GI=45.1). GI compares foods on equi-carbohydrate basis. The amount of food that would be needed to provide equal amount of available CHO would vary tremendously. The concept of glycemic index food (GI_{food}) was based on glycemic impact of equi-quantity consumption. The present study compares the glycemic and insulinemic impact, based on GI_{food} of rice and chapatti in diabetic and normal individuals to facilitate the selection of food.

Materials and Method: Blood samples of enrolled type 2 diabetic subjects without any other clinical complication and paired clinically healthy adults were collected at fasting, 30, 60, 90 and 120 min post consumption of selected quantity of standard (white bread) or test food (Boiled Rice [BR] and wheat chapati on different occasions and blood glucose and insulin was recorded. The incremental area under the curve (IAUC), GI_{food} and Insulinemic Index_{food} value were calculated. The results are expressed in Mean \pm SE and statistical analysis was performed using students paired *t* test.

Mohammed Shamssain

Associate Professor, Ajman University of Science and Technology, UAE

Saeed Abdulla

MSc Clinical Pharmacy, Dubai Hospital, UAE

&

Aya Rahman Lafta

MSc Clinical Pharmacy, Dubai Hospital, UAE

Baseline Pharmaceutical Intervention Study on Asthma, Rhinitis and Eczema in Uae Schoolchildren

The present study is part of a large population study in the United Arab Emirates. We studied 6000 Emirati schoolchildren. The aims and objectives were to establish a baseline prevalence of asthma, rhinitis and eczema in these children in order to implement a pharmaceutical intervention programme to reduce the prevalence rates of the above disorders. We used the Arabic version of ISAAC questionnaire (the International Study of Asthma and Allergies in Childhood). The highest prevalence of allergic diseases was current rhinitis (31.7%) followed by current eczema (12%) and current asthma (9.5%). Boys had higher prevalence of Current rhinitis (34.8%) and asthma (12.2%) than girls (29.4% and 7.4%, respectively). The prevalence rate of eczema in girls was higher than boys (12.6% and 11.2%, respectively). Children who were breastfed for less than one year had higher prevalence of asthma (20.8%), Rhinitis (20.7%) and eczema (11.3%) compared to those who breastfed more than a one year. Prevalence of asthma in children exposed to passive smoking was higher in non-exposed children. High prevalence of asthma (43.3%) was observed in children from asthmatic parents compared to the low prevalence (7.9%) in children from non-asthmatic parents. High prevalence rates of ever wheeze, current wheeze, speech limitation, ever asthma, dry cough and exercise-induced asthma were observed in children with BMI above 85 and 95 percentile. The present study shows that longer period of breastfeeding offer more protection from asthma symptoms than others. However, longer period of breastfeeding was associated with high prevalence of eczema. Overweight children have significantly higher prevalence rates of asthma symptoms than others. The present study helps to implement intervention strategies including pharmaceutical intervention and spirometric screening to reduce asthma and respiratory symptoms in children in the UAE.

Mugdha Suryawanshi

Assistant Professor, Bharati Vidyapeeth Deemed University-Poona,
India

Vithal M. Kulkarni

Bharati Vidyapeeth Deemed University-Poona, India

Sharad H. Bhosale

Bharati Vidyapeeth Deemed University-Poona, India
&

Kakasaheb R. Mahadik

Bharati Vidyapeeth Deemed University-Poona, India

Synthesis and Antidepressant Activity of Some New Derivates of Benzimidazoles

Depression is a mood disorder that causes a persistent feeling of sadness and loss of interest. Based on a survey by the World Health Organization, it is chronic, recurring and potentially life-threatening illness that affects up to 20% of population across the world. Antidepressants display differing side-effects. For example monoamine oxidase inhibitors produce undesirable side effects like anticholinergic effects, sedation and orthostatic hypotension. One of the major drawbacks of tricyclic antidepressants is their strong anticholinergic effects and low therapeutic index. Although selective serotonin reuptake inhibitors are considered relatively safe, can still cause some side-effect; considerable sexual dysfunction being the most prominent one. Thus, there exists a need for an efficacious antidepressant with superior safety profile. Hence the objective of the study is to synthesize some new derivatives of benzimidazoles and to screen them pharmacologically for antidepressant activities.

In the present series twenty five derivatives of benzimidazoles, were synthesized². Their structure confirmation was accomplished by IR, ¹H NMR, ¹³C NMR, ¹³C DEPT, MS and elemental analysis. All the synthesized compounds were evaluated for acute toxicity study and antidepressant activity using two behavior models: tail suspension test (TST) and forced swim test (FST)³. Many of the compounds exhibited moderate antidepressant profile during *in vivo* evaluation in comparison with standard drugs. Out of all compounds screened, compounds MVS25 showed most potent antidepressant activity.

Richik Tripathi

Professor, Banaras Hindu University, India

&

Deepa Pokharia

Research Scholar, Banaras Hindu University, India

CYR61 as a Factor Involved in the Pathogenesis of Impaired Wound Healing in Type 2 Diabetes Mellitus

Multiple factors are expected to contribute the impaired healing in diabetic patients including alterations in apoptosis by decreasing the number of cells specifically fibroblast that resulted into poor quality of collagen. Specific mechanism for the excessive apoptosis of the fibroblasts during wound healing process in diabetic foot ulcer is not yet fully understood. Hence, to get a better insight for the fibroblast cell apoptosis, it was considered significant to study the intensity of Cysteine-rich 61 (Cyr61) expression, apoptotic signaling molecules Fas and Caspase3, and anti-apoptotic signaling molecule Bcl-2.

For this study 90 subjects were enrolled and evaluated for fasting blood sugar, post prandial blood sugar and Glycated Haemoglobin %, further divided into three groups, 30 controlled diabetic patients without wound(G1); 30 non-diabetic patients having wound (G2) and 30 diabetic patients having impaired wound healing (G3). Biochemical tests were analyzed by Synchron CX5 auto analyzer. Expression of Cyr61, Fas Caspase3 and Bcl-2 at wound site had been studied by immunohistochemical staining method using RTU Vectastain Universal Elite ABC Kit (Vector laboratories) as per the manufacturer's protocol and the intensity of immunoreactivity was evaluated according to a scale of zero no expression, 1 faint, 2 moderate and 3 strong expression.

The fibroblast cells of the group G1 had shown zero expression of caspase3, minimal expression of Fas and Cyr61, and high expression of Bcl-2. Group G2 had shown strong expression of Bcl-2, moderate expression of Cyr61 and minimal expression of Fas and caspase3 in the fibroblast cells. Cyr61 was highly expressed in the fibroblast cells amongst the group G3. Expression Fas and caspase3 were also high in G3, whereas Bcl-2 was very weak.

Thus, the results obtained suggest that in the group G3 fibroblast cells undergo non-regulated apoptosis triggered by Cyr61 and leads to the impaired wound healing.

Michele Vitolo

Professor, University of Sao Paulo, Brazil

&

Ester Junko Yoriyaz

Post-doctoral Fellow, University of Sao Paulo, Brazil

Reduction of Prochiral Ketones by NAD(H)-Dependent Alcohol Dehydrogenase Using a Membrane Reactor

During the last decades, the interest in using biocatalysts has been growing. The reason is that they convert a specific molecule (the substrate) into a desired bio-product at a high rate under mild conditions, often generating non-toxic effluents into the environment. The reversible conversion of ketones/aldehydes into primary and/or secondary alcohols can be achieved by using the yeast alcohol dehydrogenase (ADH), an enzyme which requires the NAD/NADH coenzymes as co-substrates. By varying the hydrogenionic concentration of the medium, the ADH converts $\text{NAD} \rightarrow \text{NADH}$ ($\text{pH} \geq 8.0$) or $\text{NADH} \rightarrow \text{NAD}$ ($\text{pH} \leq 7.0$). Chiral alcohols (as 2-hexanol and 1-phenylethanol) are intermediates of organic synthesis protocols for attaining flavors, pheromone, phytohormone and therapeutic molecules. This work dealt with the conversion of acetophenone and hexanone into 1-phenylethanol and 2-hexanol, respectively, by NAD(H)-dependent alcohol dehydrogenase (ADH) in a membrane reactor (MR) operated in a continuous regimen, there being at the bottom, a nanofiltration membrane (MWCO 500Da). Among all kinds of reactors available – mainly a packed-bed or fluidized-bed reactor, in which the coenzyme might be obligatorily in the immobilized form –, the MR seems to be the most adequate because it can be operated both in a discontinuous or continuous mode as well as with the coenzyme in a soluble or immobilized form. The conversions, in which the ethanol was employed as a co-substrate, were carried out at 100rpm, a feeding rate of 5mL/h, ADH (150U), temperature (30°C), pH (8.8), an initial substrate concentration of 30mM for ethanol and 0.9mM for $\beta\text{-NAD}/\beta\text{-NADH}$. The ADH activity and the factors affecting it (temperature and initial substrate concentration) were measured through the consumption or formation of NADH at 340nm. The optimum temperature for 5min of reaction depended on the substrate used (30°C for ethanol and acetaldehyde; 45°C for acetophenone and 2-hexanone). The Michaelis-Menten constant related to the action of ADH on different substrates was $(K_M)_{\text{ethanol}} = 2.1\text{mM}$, $(K_M)_{\text{NADH}} = 0.177\text{mM}$, $(K_M)_{\text{acetal}} = 2.86\text{mM}$, $(K_M)_{\text{acetophenone}} = 1.04\text{mM}$ and $(K_M)_{\text{2hexanone}} = 1.44\text{mM}$. Along the reaction, the NAD/NADH regeneration occurred

and the membrane used retained both the ADH and the coenzymes (NAD; NADH) inside the reactor. The profile of NAD/NADH regeneration followed the alternate addition of ethanol and acetaldehyde for at least 64h. Finally, the acetophenone/1-phenylethanol and 2-hexanone/2-hexanol conversions were 60% and 50%, respectively.

Shyh-Chyun Yang

Professor and Director, Department of Fragrance and Cosmetic Science,
Kaohsiung Medical University, Taiwan

&

Bai-Jing Peng

Student, Kaohsiung Medical University, Taiwan

Direct Palladium-Catalyzed Allylation of 2,3-Disubstituted Indoles with Allylic Alcohols in Water

The palladium-catalyzed allylation is a powerful tool for C-C, C-N, and C-O bond formation, which has been widely applied to organic chemistry. The processes have been shown to proceed by attack of nucleophiles on intermediate η^3 -allylpalladium(II) complexes generated by oxidative addition of allylic compounds including halides, esters, carbonates, carbamates, phosphates, and related derivatives to a Pd(0) complex.

With green chemistry processes and the concerns over the environmental impacts of using volatile organic solvents, the promising potentials of water and other non-conventional solvents have become highly noteworthy in designing organic syntheses. Water has become a highly recommended solvent for organic reactions in terms of cost, safety, availability, and more friendly to environmental concerns. Indoles and indole-derived heterocycles are prevalent structural motifs in natural products, medicinal compounds, and organic materials. Utilizing the prevalence of indole nucleus in biologically active compounds, the direct C₃-functionalization or N-functionalization of 2,3-disubstituted indoles represent an important problem. In this study, the palladium-catalyzed 2,3-disubstituted indoles with allylic alcohols in water was investigated under various conditions.