



SOUTHWEST COLLEGE OF
NATUROPATHIC MEDICINE
& HEALTH SCIENCES

Research Department Presents:

New Advances in Evidence- Based Botanical Medicine

November 9th, 2021
Southwest College of Naturopathic Medicine
Tempe, AZ

Active constituents and drug interaction of *Echinacea* and pharmaceuticals

Presented by: Narges Kiyani, PharmD and Susan Trapp, PhD

Contact email: n.kiyani@scnm.edu, s.trapp@scnm.edu

A brief lecture description:

Echinacea is one of the most popular herbal supplements with sales ranking typically in the top 5 in the mass market annually for the past two decades. It is not a surprise that Echinacea was one of the top selling herbal supplements in the first half of 2020 with sales growing during this time by over 50% due to the increased consumer demand during the initial stages of the COVID-19 pandemic for supplements with potential immune-enhancing effects. As these numbers demonstrate, most of the interest in Echinacea within the last century has revolved around its immunomodulatory activity, although historically it has been used for a wide range of conditions including pain relief, inflammation, infections, and snakebites. With the medicinal plant's growing popularity among the general population comes the need for a more concrete understanding of any drug interactions or safety concerns so that practitioners can safely and confidently advise patients on Echinacea use. Since Echinacea has been found to have immune-stimulating properties, the common recommendation is that patients taking immunosuppressive drugs should be discouraged from concurrent Echinacea use, to avoid counteracting the desired immunosuppression. This general practice, however, does not account for all echinacea products; and thus highlights the need for a more critical evaluation, addressed herein this review.

Talk objectives:

- Understand the reasons of different therapeutic effects of echinacea.
- Understand the different effect of echinacea Spp, due to their different parts and components.
- Understand the potential unwanted drug interactions and sites of action.
- Understand the beneficial interactions.

Statement of relevance to medical practice:

To know which kind of echinacea's products are suited for what kind of conditions.

To emphasize standardization of echinacea products and labeling based on at least 2 main components of echinacea: ADs & Alkamides.

To avoid unwanted interactions and enable practitioners to safely and confidently advise patients on Echinacea use.

A brief bio for *Dr. Narges Kiyani, PharmD's*:

Dr. Kiyani received a professional doctorate in pharmacy and being PhD candidate in naturopathic pharmacy in Tehran university. Her doctoral research was on making new botanical formulations from traditional Persian medicine. She worked on Galenic and handmade medicines in naturopathic clinics besides cooperation with pharmaceutical factories.

Her research area is exploring new therapeutic formulations and standardization them, mainly in these fields: immunomodulatory, respiratory, and purgative system.

A brief bio for *Dr. Susan Trapp, PhD:*

Dr. Susan Trapp, PhD. received her doctorate degree in Biochemistry from the University of Maryland, College Park. Dr Trapp's doctoral thesis focused on examining the horizontal gene transfer of a biosynthetic pathway of a fungal sesquiterpenoid from the *Fusarium* and *Myrothecium* fungi to a the Brazilian *Baccharis* plant. She continued to study the molecular evolution of natural products utilizing terpenes as a model system during her post-doctoral training at the Institute of Biological Chemistry at Washington University State in Pullman WA. and remains one of her main research areas today. Prior and during graduate school Dr Trapp was a research assistant at the esteemed institutes of Marine Biological Laboratory, USDA (Peoria, IL) and National Institutes of Health NIH). In the later, she had the privilege to work directly with Dr. Craig Venter on the Human Genome Project, during the DOE pilot. Dr. Trapp's passion for genomics, molecular biology, biotechnology, computational biology and plants has guided her to research and directorship positions within Industry and Academia including InForMax, University of Colorado Boulder, Denver, Solix Biofuels, Array BioPharma. Sunrise Genetics and most recently several entrepreneurial startups within the medical device and ancillary hemp/cannabis industries. Dr Trapp is passionate about teaching within/ out of academia including General Biology, General Chemistry, Organic Chemistry, Microarray Technology, and Terpene Basics, and swim coach, disabled ski, swim, and yoga instructor. Dr. Trapp joined the Ric Scalzo Institute of Botanical Research in February of 2021 and is currently involved in several early-stage projects characterizing biological activity and mechanism of action for various botanical client's projects and is developing methodologies for state-of-the-art biotechnology instrumentation. She is currently co-authoring/editing several scientific manuscripts including the *Echinacea* Interaction review.

A statement summarizing speaker's qualifications:

Dr. Kiyani has been research assistant since Feb 2020 in SCNM and has work in different fields such as herbal medicine formulations, writing articles, and performing research with the research team.

Dr. Trapp has been a research scientist studying natural products, plants and genomics for over twenty years. She has presented her research at National conferences and has over 15 publications and reviews. She has also been an invited guest speaker at conferences and several podcasts as a terpene expert.

Notes: _____

Rhinovirus enhancing effects of *Echinacea purpurea* root water extracts

Presented by: Jeffrey O. Langland, PhD

Contact email: j.langland@scnm.edu

A brief lecture description:

Rhinovirus infections are associated with the common cold. Symptomology and complications of rhinovirus infections are often linked to the immune response and the expression of the cytokine, IL-8. Rhinovirus complications may include chronic bronchitis, sinusitis, otitis media and asthma. *Echinacea purpurea* has historically been used as a therapy for rhinovirus infections, but results from clinical studies have been controversial. *Echinacea* root extracts are often used as a therapy, many times being prepared as a tea. Our research investigated the effects of *Echinacea purpurea* roots extracted in water on rhinovirus replication. Results demonstrated that a water extract of the root led to a 10-100 fold enhancement of rhinovirus replication. The mechanism of action for this enhancement process is still being investigated, but possible mechanisms will be discussed. This data may suggest that administration of an *Echinacea purpurea* root tea for the common cold could potentially lead to a exacerbation in symptoms due to enhanced rhinovirus replication.

Talk objectives:

- Understand the historical use of *Echinacea purpurea* as a therapy for the common cold.
- Understand the varying effects of plant parts and extraction processes on biological activity.
- Understand the symptomology of the common cold and rhinovirus infections.
- Understand the effect of *Echinacea purpurea* root water extracts on rhinovirus replication

Statement of relevance to medical practice:

Although not typically life-threatening, rhinovirus infections account for millions of infections every year. Complications of rhinovirus infections are often linked to the immune response and may exacerbate symptoms in patients with chronic bronchitis, sinusitis, otitis media and asthma. *Echinacea purpurea* has historically been used as a therapy for rhinovirus infections, but results from clinical studies have been controversial. *Echinacea* root extracts are often used as a therapy, many times being prepared as a tea. Our research has demonstrated that a water extract of the *Echinacea purpurea* root led to a 10-100 fold enhancement of rhinovirus replication. This data may suggest that administration of an *Echinacea purpurea* root tea for the common cold may not be indicated due to enhanced rhinovirus replication.

A brief bio for Jeffrey Langland, PhD:

Dr. Jeffrey Langland, Ph.D., received his doctorate degree from Arizona State University in the area of virology in December 1990. His area of interest at that time, and still today, is investigating and understanding the complex cellular defenses and immune responses against microorganisms. After graduating from Arizona State University, he was a post-doctoral fellow at University of California Davis studying oncolytic viruses, followed by a post-doctoral position at the University of Wyoming comparing similarities between plant and human defenses against viruses. In 1995, he returned to Arizona State University as a Research Assistant Professor. In this capacity, he instructed several courses including General Virology and The Biology of AIDS. In August 2007, Dr. Langland became faculty at the Southwest College of Naturopathic Medicine as the instructor for Medical Microbiology, Immunology, and Concepts in Research courses. At SCNM, Dr. Langland mentors students in evidence-based botanical medicine research and training Residents in the preparation of case studies. As a Full Professor, Chair of the Research Department, Research Director of the Ric Scalzo Institute for Botanical Research, Dr. Langland brings new insight and a cutting-edge approach to research for students and to the field of naturopathic medicine. Dr. Langland is currently involved in various projects characterizing the activity and mechanism of action of various botanicals towards viruses (including pox, herpes, varicella-zoster, HPV, rhinovirus, zika, ebola, COVID-19), bacteria (including MRSA, lyme disease, antibiotic-resistant strains, plague, and others), immune regulation, and cancer.

A statement summarizing speaker's qualifications:

Dr. Langland has been a research scientist studying viruses and host-virus interactions for over thirty years. He has been studying antiviral and antimicrobial botanicals for the past 12 years. Dr. Langland is highly recognized in the field of naturopathic medicine and in the scientific community. He has nearly 60 publications in peer-reviewed journals and has presented his research at national and international conferences.

Notes: _____

Rhinovirus inhibitory effects of *Echinacea purpurea* root ethanol extracts and alkylamides

Presented by: Keely Puchalski, ND

Contact email: k.pulchalski@scnm.edu

A brief lecture description:

The roots of various *Echinacea* species have been used medicinally for over three hundred years. Consumer demand for *Echinacea* as an immunostimulatory agent to treat the common cold (rhinovirus) and flu (influenza spp.) has increased significantly over the past several decades. *Echinacea angustifolia* was the species used most commonly medicinally until the late 1930's. *Echinacea purpurea* is now the most heavily cultivated and utilized species, although *E. angustifolia* and/or blends of both species are increasingly seen in many modern *Echinacea* products. Despite there being hundreds of *in vitro* and *in vivo* studies exploring *Echinacea*'s plant chemistry and bioactivity, there are still discrepancies in the literature surrounding its therapeutic efficacy and confusion regarding which species, plant parts, extraction methods, and specific compounds are implicated in the purported immunomodulatory, anti-inflammatory, and antiviral effects of the plant. Of the four major medicinal compounds of interest in *E. purpurea* roots - alkylamides (alkamides), caffeic acid derivatives (phenylpropanoids, phenolics), glycoproteins, and polysaccharaides, the first two have garnered the most scientific attention in recent years due to their bioactivity and greater ease of isolation and quantification. The alkamides are of particular interest for their immunomodulatory effects related to the endocannabinoid system (ECS), a topic recently popularized by the surge of hemp and cannabidiol (CBD) products in the marketplace. Of the 25 or so identified alkamides in *E. purpurea* root, 4 or 5 are generally cited as therapeutically useful cannabimimetic, immunomodulatory and/or anti-inflammatory agents. To our knowledge, none of the alkamides have been shown to be antiviral in the literature to date. During this presentation, we will discuss the antiviral *in vitro* activities of *E. purpurea* whole root ethanol extracts and the antiviral activity of four different alkamides against rhinovirus-treated cells. We will also discuss the activity of the caffeic acid derivatives for comparison. Our research suggests that the root ethanol extract of *E. purpurea* exhibits antiviral activity against rhinovirus and that this activity may be due to specific alkamides found in *E. purpurea* root.

Talk objectives:

- Understand the complexities involved in studying *Echinacea spp.* as a medicinal plant, including specific species, plant parts, extraction methods and individual chemical constituents
- Understand the main steps of a plaque assay and its role in determining the quantity of infectious virus in treated cells
- Understand the difference in antiviral activity between *E. purpurea* root ethanol extract and other plant part extracts *in vitro*
- Understand the phytochemical class of alkylamides found in *E. purpurea* root and their potential role in inhibiting rhinovirus

Statement of relevance to medical practice:

Echinacea has been and continues to be one of the most popular herbal selfcare treatments on the market today for treating conditions such as the common cold and flu, despite a lack of understanding of the antiviral mechanism(s). Although the herb has low potential for drug interactions or patient harm, further clarifying which species, plant parts, constituents, and specific extraction methods are

responsible for the antiviral activity is critical to developing more standardized, safe, and efficacious products. Current recommended treatments for the common cold often include immune support and home care measures like rest and hydration. Unlike antibiotics, there are very few antiviral treatments available for most common viral infections. Echinacea is reported to be antiviral, but the mechanisms are not yet fully defined. This research, if clinically supported, may aid in creating more specific and targeted treatments for the common cold.

A brief bio for Keely Puchalski, ND:

Dr. Keely Puchalski received her doctorate in Naturopathic Medicine from SCNM in December 2020. She received her Bachelor of Arts from Bethel University in St. Paul, Minnesota. She has been conducting research at SCNM, and now the Ric Scalzo Institute, for the past four years. Her work has been published in peer-reviewed journals and she has presented at local conferences. She recently completed a yearlong botanical field study in medicinal herbs of the American Southwest. She is passionate about pursuing continued education in herbalism and always staying connected to the plants.

A statement summarizing speaker’s qualifications:

Dr. Puchalski is a Naturopathic Physician and an assistant research scientist at the Ric Scalzo Institute for Botanical Research. She has been conducting research under the mentorship of Dr. Langland, Ph.D. for the past four years, primarily focusing on the antiviral and antimicrobial activities of botanicals. Her work has been published in peer-reviewed journals and she has presented at several local conferences.

Notes: _____

Potential botanicals for the prevention of mastitis in cattle

Presented by: Heather Dirkmaat and Ashley Langland
Contact email: h.dirkmaat@scnm.edu, avlangland2424@gmail.com

A brief lecture description:

In cattle, mastitis leads to the inflammation of the mammary gland and udder tissue. It typically occurs as an immune response to bacterial invasion of the teat canal by variety of bacterial sources present on the farm. Mastitis is a multifactorial disease, closely related to the production system and environment that cows are kept in. Mastitis in cows is the most economically significant disease in the dairy industry. The disease can be treated with antibiotics and supportive measures. Management, control, and prevention are essential for the mastitis of a dairy farm. Our research investigated the ability of several botanical oils, botanical extracts, and other natural remedies to inhibit the replication of the most common bacteria associated with mastitis. From this, a formulation is being developed to hopefully be tested clinically for the prevention on mastitis in cattle.

Talk objectives:

- Understand the clinical signs and significance of mastitis in cattle.
- Understand the current treatment procedures for mastitis
- Understand the value of preventative therapies for mastitis
- Understand the effect of botanical and natural therapies for the inhibition of bacterial commonly associated with mastitis

Statement of relevance to medical practice:

Mastitis in cows is the most economically significant disease in the dairy industry. The disease can be treated with antibiotics and supportive measures, however, management, control, and prevention are essential for the mastitis of a dairy farm. This research demonstrates the ability of several botanical oils, botanical extracts, and other natural remedies to inhibit the replication of the most common bacteria associated with mastitis. From this, a formulation is being developed to hopefully be tested clinically for the prevention on mastitis in cattle.

A Brief bio for Heather Dirkmaat:

Heather Dirkmaat is currently a student at the Southwest College of Naturopathic Medicine working on her doctorate degree in naturopathic medicine. She graduated with Bachelors of Arts in English from the University of Utah in 2009. She moved to Colorado and attended the University of Colorado-Denver where her career in research began. Under the supervision of Dr. Michael Greene, she started a project identifying novel factors that might attribute to the decline in estradiol protection in pre-menopausal women. She reviewed thousands of charts between the Arapahoe and Denver County Medical Examiners Office and found possible contributors for the early development of advanced atherosclerosis. This research was awarded a grant and won two undergraduate awards in research. This research was the just the beginning. She became a Research Assistant at the Veterans Association Hospital for two years where she helped elucidate connections between transmembrane proteins and early Alzheimer's. Shortly after her time at the VA, she attended University of Northern Colorado where she earned a Master of Biomedical Science and also participated in the research examining unsaturated fats and its effect on bovine luteal cells. She continued in her education

graduating from Johns Hopkins University with a Master of Biotechnology. Shortly after this educational experience she applied to Southwest College of Naturopathic Medicine where she is currently a 3rd year student. She has been a Teacher Assistant for Dr. Langland and involved in various projects. She hopes to continue research after graduating and plans to apply to Arizona State University for PhD in Molecular Biology.

A Brief bio for Ashley Langland:

Ashley Langland is a current undergraduate student attending Arizona State University majoring in Pre-Veterinary Medicine. She is in her second year of school and plans to graduate in May 2024. After school, she will then go to Veterinary school in hopes of pursuing a career as a veterinarian. She has always had a love for animals growing up as well as a fascination for science. Growing up with such a strong science background, she became involved in several District Science Fairs in middle school as well as high school. She has been exploring her love for animals through volunteering at the Phoenix Zoo. She has been volunteering at the zoo for more than 6 years now, with more than 650 hours. She has been able to work with the zoo veterinarians in assisting with surgeries, physical exams, and maintain husbandry skills within the animal enclosures up in the hospital. She is working as a Veterinary Assistant at VCA Animal Referral and Emergency Center of America. She is learning more within the veterinary field each time she comes in and sees a new kind of case to deal with. She became involved with a research study during the summer with Dr. Langland covering botanicals against Mastitis in cows. With this experience in the lab and participating in research studies, she hopes to gain more knowledge and further insight for her veterinary path ahead. Her interest in naturopathic medicine has expanded once she began working hand-in-hand with them and seeks to integrate that in her future hospital within veterinary medicine.

A statement summarizing speaker's qualifications:

Heather Dirkmaat is currently a student at the Southwest College of Naturopathic Medicine working on her doctorate degree in naturopathic medicine. Ashley Langland is currently a student at Arizona State University working on her bachelor's degree in pre-veterinary medicine. Together, they have been investigating the ability of various natural remedies to inhibit the replication of bacteria associated with mastitis. This work has been supervised under the guidance of Dr. Jeffrey Langland at SCNM.

Notes: _____

Anti-coronavirus activity of *Artemisia annua* extracts and fractions

Presented by: Johanne Gerstel, NMD

Contact email: j.gerstel@scnm.edu

A brief lecture description:

The recent pandemic that was caused by the coronavirus, SARS-COV-2, led to an increase in research regarding this virus. Our lab has been testing various botanical extracts on the replication of this virus and several top botanical extracts that have shown to effectively inhibit the replication of SARS-COV-2 with minimal cell toxicity. These top botanicals have also been tested against MHV (mouse hepatitis virus), another member of the coronaviridae family. We have seen similar effective inhibition of MHV with some of the botanicals but others did not show any inhibition. This may suggest a different mechanism of action for these botanicals between these two coronaviruses. Of these botanicals, *Artemisia annua* was found to be highly effective against MHV and SARS-COV-2. We also tested a known active compound in *Artemisia*, artemisinin, and found that artemisinin was highly effective against SARS-COV-2 but ineffective against MHV. This difference in activity of *Artemisia* and artemisinin against SARS-COV-2 and MHV suggests *Artemisia* extracts may contain multiple anti-coronavirus compounds. Further research in this area has been targeted towards isolation of the active constituent in *Artemisia* that is effective against MHV, which may also be active against SARS-COV-2. The hope of this research would be to isolate and identify compounds from *Artemisia* that have either narrow or broad-spectrum anti-coronavirus activity.

Talk objectives:

- Understand the activity of botanical extracts on coronavirus (SARS-COV-2 and MHV) replication.
- Understand the differences in antiviral activity of *Artemisia annua* and its active constituents on coronaviruses (SARS-COV-2 and MHV).
- Understand the differences in antiviral activity of fractions from *Artemisia annua* against coronaviruses (SARS-COV-2, 229E, and MHV).
- Understand the importance of finding active constituents from *Artemisia annua* that would be effective against the coronavirus family.

Statement of relevance to medical practice:

Artemisia annua has been historically used to treat malaria. The discovery of artemisinin and its antimalarial properties by the Chinese scientist, Tu Youyou, led to the award of the 2015 Nobel

Prize in Physiology or Medicine. Since the outbreak of SARS-COV-2 in 2020, various botanical extracts have been tested against this virus in order to evaluate their antiviral properties. By discovering active constituents that are effective against SARS-COV-2 and the coronavirus family, it will be able to potentially provide another alternative treatment in order to curtail the spread of this disease.

A brief bio for *Dr. Johanne Gerstel, NMD*:

Dr. Johanne Gerstel, NMD, received her doctorate of Naturopathic Medicine from Southwest College of Naturopathic Medicine (SCNM) in June of 2019. She completed her Bachelor of Science degrees in Biology and Psychology from Arizona State University (ASU) where she performed undergraduate research in the area of neuroscience and the use of various treatments against side effects of recreational drug use. After graduating from ASU, she worked as a health coach and case manager in the behavioral health field. Upon acceptance into SCNM she continued to be involved in multiple research projects but this time in the area of microbiology, botanical medicine, and immunology. She is currently working on completing her Ph.D in the area of Molecular and Cellular Biology at ASU. She also continues to write up publication articles and present at integrative conferences in regards to the research performed at ASU and SCNM. While she is completing her Ph.D, her clinical practice focuses on seeing patients in regards to mental health, counseling, and pain management. Her research continues to be centered on botanical medicine, immunology, and infectious diseases. As a graduate student, adjunct faculty, and naturopathic physician, Dr. Gerstel will continue to provide evidence-based medicine to her patients and community.

A statement summarizing speaker's qualifications:

Dr. Gerstel has been performing research since 2009. She first started in her undergraduate degree at ASU where she was exposed to animal studies in the area of testing proteins and treatments that could potentially reverse the effects of recreational drug use. When she started her Naturopathic degree program at SCNM in 2015, her research focus switched over to botanical medicine, infectious disease agents, and cell culture system models. She continues to expand her research techniques and knowledge of antiviral and antimicrobial botanicals while she is obtaining her PhD at ASU in the field of Molecular and Cellular Biology. She has presented at multiple integrative conferences nationally and is submitting publications to peer-reviewed journals.

Notes: _____

Phytochemical investigation of *Artemisia annua*

Presented by: Bobby Baravati, PhD

Contact email: b.baravati@scnm.edu

A brief lecture description:

Artemisia annua is most well known for the anti-malarial drug artemisinin, particularly effective against drug-resistant cases. Although it is well characterized with over 600 secondary metabolites, novel compounds continue to be discovered, and the medical applications of most of these compounds remain underexplored. This presentation will discuss ongoing efforts at RSIBR to identify novel antivirals against Coronaviruses using bioassay guided fractionation

Talk objectives:

- Provide an overview of the phytochemistry of *A. annua* and its known medical uses
- Briefly introduce techniques used in compound isolation and structural determination
- Summarize progress in bioassay guided fractionation of antiviral compounds in *A. annua*

Statement of relevance to medical practice:

Since the emergence of COVID-19, the need for improved antivirals has become much greater. The aim of this research is to expand the treatment options available, in particular with naturally occurring antiviral compounds in *A. annua*, and to find lead compounds for the development of more effective antivirals.

A brief bio for *Dr. Bobby Baravati, Ph.D.*:

Dr. Baravati received his Bachelor's degree from the University of California, Los Angeles, and Doctorate degree from Arizona State University in Chemistry. His doctorate research was on structure and dynamics of viral membrane proteins using nuclear magnetic resonance (NMR) spectroscopy. His research areas at RSIBR are natural products isolation and structure determination of novel compounds using NMR spectroscopy.

A statement summarizing speaker's qualifications:

Dr. Baravati has over 10 years of research experience utilizing chromatography and nuclear magnetic resonance (NMR) spectroscopy in various research areas. He has been published in peer-reviewed journals and has presented his research at international conferences.

Notes: _____

Quantification of cannabinoids in some *Cannabis* samples

Presented by: Abiola Jimoh, Ph.D.

Contact email: a.jimoh@scnm.edu

A brief lecture description:

Cannabis is a prolific producer of unique medicinally relevant metabolites, commonly referred to as cannabinoids. More than 100 cannabinoids have been identified in cannabis so far. As a result of its chemical complexity, robust and standardized methods for the quantification of cannabinoids within botanical and drug forms is a critical step forward for an emerging Cannabis-based pharmaceutical industry, which is poised for rapid expansion. Despite a growing body of analytical methods for the quantification of cannabinoids, few have been validated using internationally accredited guidelines. Moreover, standardized methods have yet to be developed for application at various stages of manufacture as well as for different levels of cultivation and processing.

During this presentation, we will discuss the current efforts toward providing reliable tools for identification and quantification of cannabinoids in extracts and botanical products. The analysis was done using an Agilent 1290 LC coupled with an Agilent 6135B single quadrupole mass spectrometer. The method was validated for specificity, linearity, limit of detection (LOD), limit of quantitation (LOQ), precision, accuracy, and robustness in accordance with the Validation of Analytical Procedures: Text and Methodology Q2 to meet the requirements of the International Council for Harmonization (ICH).

Talk objectives:

- Understand the phytochemistry of cannabis and the factors that affect cannabis testing.
- Highlight an in-house method that has been developed to efficiently identify and quantify cannabinoids in cannabis extracts.
- Understand how we validated the method and determined more than 10 cannabinoids in cannabis extracts.

Statement of relevance to medical practice:

Cannabis is a chemically complex plant with over 100 cannabinoids and immense medicinal properties. The selection of the optimal of Cannabis strains for a variety of medical therapies solely relies on adequate and robust testing of the plant materials and products. This will also help healthcare providers to give accurate dosing to patients.

A brief bio for *Dr. Abiola Jimoh, Ph.D.:*

Dr. Abiola Jimoh, Ph.D., received his doctorate degree from University of South Florida in Organic chemistry in 2020. During his PhD, was focused on the transition metal catalyzed reactivities of heterocyclic organic molecules like triazoles, isoxazolines and oxazoles. As a Research Scientist at the Ric-Scalzo Institute for Botanical Medicine, Dr. Jimoh brings new insights into the analysis of plant based organic compounds. He is currently involved in the isolation, purification, and characterization of phytochemicals.

A statement summarizing speaker's qualifications:

Dr. Jimoh is a scientist with decade experience studying organic molecules and their chemical reactivities. He is fascinated by high chemical diversity in plants and the benefits therefrom. He looks to identify novel phytochemicals using the resources within and outside of SCNM. He has 6 publications in peer-reviewed journals, 2 patents, and has presented his research at national and international conferences.

Notes: _____

_____.

Phytochemicals from yarrow for metabolic syndrome management

Presented by: Yalda Shokoohinia, PharmD, Ph.D.
Contact email: y.shokoohinia@scnm.edu

A brief lecture description:

Metabolic syndrome affects more than thirty percent of Americans according to the CDC. Current pharmacotherapies for prevention and treatment of metabolic disorders have severe adverse effects, high costs and insufficient accessibility, which make them less effective. To help resolve this medical dilemma, Yarrow (*Achillea wilhelmsii* C. Koch) a member of the Asteraceae family is explored for its unique properties in the prevention and treatment of metabolic syndrome. Yarrow has been traditionally used in Persian and Native American medicine predominantly for GI related disorders. In this presentation, our research on Yarrow's chemical composition and compound

derivatives will be discussed. We will explore our methodology of the bioactive constituents of Yarrow through intensive analytical tools including NMR and GC/MS and walk you through these biological and analytical processes. Lipid lowering effects of *Achillea wilhelmsii* C. Koch derivatives *in vitro* will be discussed. Lastly, we will elaborate on specific compounds of Yarrow in the therapeutic use for metabolic syndrome.

Talk objectives:

- Learn about the clinically benefits of *Achillea wilhelmsii*
- Learn about the potential benefits of *Achillea wilhelmsii* in the metabolic syndrome
- Explain the isolation and identification of phytochemicals from *Achillea wilhelmsii*
- Explain the bioassay methods used for determination of *Achillea wilhelmsii* effect on metabolic syndrome

Statement of relevance to medical practice:

Yarrow (*Achillea wilhelmsii* C. Koch) a member of the Asteraceae family has been traditionally used as a digestive herb, diuretic, diaphoretic, as well as for its antimicrobial, anti-inflammatory, anti-spasmodic and anti-catarrrhal properties. More traditional uses of Yarrow include treatment for hemorrhage, pneumonia, rheumatic pain, wound healing and as emmenagogic agents. Metabolic syndrome is a condition estimated to affect more than thirty percent of adults in the United States. This research on Yarrow can help with developing the natural drugs which can be used along with chemical drugs in the prevention and treatment of metabolic syndrome.

A brief bio for Dr. Yalda Shokoohinia, PharmD, PhD:

Dr. Shokoohinia is currently a Professor of Pharmacognosy and Phytochemistry at Southwest College of Naturopathic Medicine (SCNM). In addition to teaching Pharmacology and Research to medical students, she also serves as a scientist of the newly established SCNM Botanical Research Institute. Dr. Shokoohinia received her Professional doctorate in Pharmacy, Pharm D, and Ph.D. in Pharmacognosy from Isfahan University of Medical Sciences, Iran in 2005 and 2010, respectively. She also completed fellowships in Phytochemistry (Eastern University of Piedmont, Novara, Italy, 2009) and Medicinal Plants Analysis (University of Mississippi, Oxford, MS, 2017). Over the last seventeen years, she has served in various research, teaching, Pharmacist, and leadership roles. She was a researcher, faculty member, the chair of the Department of Pharmacognosy & Biotechnology, the head of the School of Pharmacy, the Director of Pharmaceutical Sciences Research center, and the head of Continuous Medical Education. Her research areas are phytochemistry, natural product chemistry, and multidimensional chromatography.

A statement summarizing speaker's qualifications:

Dr. Yalda Shokoohinia has been a researcher and instructor in natural products and pharmaceutical sciences for the last seventeen years. She had discovered over 100 pure constituents, among them, 30 were recorded to be new compounds. She has over seventy publications on natural products and has supervised more than 40 grad theses in Pharmacy and Natural Medicine.




