GIVING YOU AN INSIDE LOOK AT THE EXCITING WORLD OF STUDENT RESEARCH AT IUSD

A message from this year’s Student Research Group President

UZI KAMAL, D4

It is always nice to see our students from the IU School of Dentistry get recognized for their hard work and commitment to research and this year is no different. Our pre-doctoral and PhD students are performing ground breaking research relating to endodontic regeneration, cariology, markers in orthodontic tooth movement and material science, just to name a few.

Over the past few decades, IUSD has produced numerous papers and publications and without the dedication from our hard working students and guidance from our faculty, this would never be possible. The advancements we make each year make up the changes we see in patient care, dental education, and the practice of dentistry. Like I always say, being a part of the student research group is being a part of evidence-based-dentistry in action!

There are so many ways to get involved as a pre-doctoral DDS student! This past year, IUSD funded over a dozen pre-doctoral research projects. School of Dentistry research fellows receive a generous stipend, research funding support and travel reimbursement. We send our students to conferences hosted by the American Academy for Dental Research (AADR) and the IADR. We also help fund trips through grants, scholarships and fellowships. Locally, our students have the opportunity to participate in Research Day, where students showcase their research projects and their findings to their peers and faculty. Having been involved myself since my freshman year I encourage everyone to participate! There are so many opportunities to win awards and be recognized!

I invite you to attend our bi-weekly student research presentation meetings and to explore this newsletter. These meetings take place on Wednesdays at 12:15 PM and students present their research in a constructive environment, helping them to prepare for future presentations and to refine their research methodology.

My sincerest thanks goes out Sharon Kuriakose lype and Pranali Patel for their fantastic efforts in putting together our annual newsletter and her patience. Please do not hesitate to contact me (ukamali@iu.edu) if you have any questions regarding our research program at IUSD.

Uzi Kamal,
SRG President, Class of 2018

IUSD Student Research Day 2017

A glimpse of the accomplishments of student researchers at IUSD! Way to go!

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STUDENT RESEARCH INITIATIVE
The IUSD Student Research Group

What is the Student Research Group (SRG)?
We are a student-run organization here at IUSD with two wonderful mentors. Our aim is focused towards providing a platform for students with inquisitive minds and an interest towards research, and to connect them with appropriate research mentors and projects. Our organization is affiliated with the American Association for Dental Research (AADR), and the International Association for Dental Research (IADR). What do we all have in common with research? Our curiosity!

From the editors: Sharon lype ('18) and Pranali Patel (Orthodontic resident)

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IUSD Technological Innovations
Know about IUSD’s initiative in the field of dental informatics from the director of Dental Informatics Core at IUSD and see how these advances will help in better management and patient care.
The Student Research Group is sponsored by our mentors - Dr. Angela Bruzzaniti and Dr. Richard Gregory. Biweekly meetings are conducted wherein speakers share their ongoing research with other student members.

Explore Innovative Ideas!
Research is an exciting and fulfilling endeavor that is open to all dental students. Opportunities include biofilm studies, dental materials testing, cariology investigation, bone research, craniofacial imaging, pediatric surveys, smoking cessation and much more!

STUDENT RESEARCH FAST FACTS
Percentage of fellowships funded
70%

10
Number of SRG fellowships awarded in 2016-2017 (10 proposals funded out of 15 received)

$3,500
Stipend awarded to each research fellow for the successful completion of a research proposal and subsequent experiments.

Research Day 2017
By Sharon Iype, D4 and Pranali Patel, Orthodontic resident

Research Day at the Indiana University School of Dentistry has been a rich tradition for over 25 years. The event gives students from all departments the opportunity to showcase their research efforts and learn more about various topics on the forefront of dental research. This year, 77 students had an opportunity to present their research projects on Research day. The keynote speaker for the event was Dr. George Stookey, a living legend at IUSD and worldwide in the field of preventive dentistry and cariology.

Following the keynote address, students, faculty, and staff were honored for their hard work and research contributions with the award ceremony. Michelle Bissonnette Priest, Clinical Director of Dental Assisting in the Department of Periodontics and Allied Dental Programs was awarded the Distinguished Faculty Award for Teaching.

Dr. Thankam Paul Thyvalikakath, Director of Dental Informatics Core Initiative was awarded the Distinguished Faculty Award for Research.

The pre-doctoral awards were presented to DDS, MSD, PhD, hygiene, and dental assisting students for their outstanding contribution to IUSD through their research projects.

Loan Anh Do received the Procter & Gamble Award for Excellence in Preventive Oral Health Care. The IUSD Student Research Group Award and AADR Student Research Day Award was awarded to Jennifer Wu.

Mark Vaughn received the Cyril S. Carr Research Scholarship.

The American Dental Association/Dentsply International Student Clinician Award was presented to Robert Holland, for his project “Expression of osteoblast differentiation markers in the periodontal ligament following orthodontic tooth movement.”

The King Saud University Travel Award was presented to Afshar Yasaman, a predoctoral dental student and Lindsay Desantis, a graduate student from the Dept. of Orthodontics.

The Indiana Section of the American Association for Dental Research Staff Award was presented to Terry Wilson, Director of Public Relations and Marketing.

Stephanie Kawak was awarded the Johnson & Johnson Undergraduate Student Award for her project “The Effects of Brain-Derived Neurotrophic Factor on Osteoclast Differentiation” with Dr. Bruzzaniti.”
Lindsay DeSantis, a master’s student in the graduate Orthodontics program was awarded the Delta Dental Award.

The Indiana Dental Association Best Clinical Case Report Award was presented to Dr. Peerapat Kaweewong Prasert, a master’s student in prosthodontics for his research project “Immediate Loading Complete Maxillary Implant Rehabilitation Utilizing Computer Guided Surgery.”

The Maynard K. Hine Award for Excellence in Dental Research for Best Research Manuscript was awarded to Dr. Mohammad Aldosari.

The GlaxoSmithKline PhD Student Oral presentation Award was awarded to Afnan Al-Zain. Upon completion of the awards ceremony, students had the opportunity to listen to poster presentations in the exhibit hall. Additionally, students had the chance to meet with sponsors and interact with vendors including: Delta Dental Foundation, GSK, Johnson & Johnson, Procter & Gamble, Crest, Indiana Dental Association, All Dental Studio and many others.

Research Day 2017 at IUSD was a huge success and it has uplifted the spirits amongst students at IUSD to remain involved in research projects. Stay tuned and look out for other innovative research projects at IUSD on Research Day 2018!

Jennifer Wu (Center), receiving an AADR Student Research Day Award from Dean John Williams (Left) and Dr. Warner (Right).

Students presenting their posters on Research Day!
SRG FELLOWSHIP RECIPIENTS

Year: 2016-2017

Mark Vaughan
Research Title:
Effect of probiotic species on planktonic growth and metabolism of Streptococcus mutans
Facuity Mentor:
Dr. Gregory, Department of Biomedical and Applied Sciences

Sharon Iype
Research Title:
Salivary cytokines and toll like receptors in chronic periodontitis
Facuity Mentor:
Dr. Srinivasan, Department of Oral Pathology

Yasaman Afshar
Research Title:
Coaxial Electrospun PVA/PDS Nanofibers
Facuity Mentor:
Dr. Bottino, Department of Biomedical and Applied Sciences

Loan Do, Anh
Research Title:
Role of Kalirin in Osteocyte Morphology and Function
Facuity Mentor:
Dr. Bruzzaniti, Department of Biomedical and Applied Sciences

Willard, Alec
Research Title:
Phase Transformation Kinetics of eMax CAD Dental Ceramic
Facuity Mentor:
Dr. Chu, Department of Biomedical and Applied Sciences

Kamal, Uzi
Research Title:
Characterization of the Effects of Salvadora Persica on Matrix Metalloproteinases and collagen Degradation
Facuity Mentor:
Dr. Windsor, Department of Biomedical and Applied Sciences

Holland, Robert
Research Title:
Expression of osteoblast differentiation markers in the periodontal ligament following orthodontic tooth movement
Facuity Mentor:
Dr. Utreja, Department of Orthodontics

Kim Sung Kyung, Joan
Research Title:
Dual Role of Nerve Growth Factor on the Activity of Osteoblasts and Nerve Cells
Facuity Mentor:
Dr. Bruzzaniti, Department of Biomedical and Applied Sciences

Voris, Alexander
Research Title:
Effects of Electronic Cigarette Liquids after Vaporization on Matrix Metalloproteinase and Expression from Human Gingival Fibroblasts
Facuity Mentor:
Dr. Windsor, Department of Biomedical and Applied Sciences

Year: 2017-2018

Sarah Buedel
Research Title:
Influence of Fluoride Concentration and Remineralization Time on Eroded Enamel and dentin
Facuity Mentor:
Dr. Hara, Department of Department of Cariology, Operative Dentistry and Dental Public Health

Jennifer Wu
Research Title:
The Effects of Pyk2 inhibitors, Estrogen, and SERMs on Bone Marrow Derived Stromal Osteoblasts
Facuity Mentor:
Dr. Bruzzaniti, Department of Biomedical and Applied Sciences

Patrick McIntyre
Research Title:
Effects of Radiopaque Agents in DAP/Methylcellulose on DPSCs
Facuity Mentor:
Dr. Bruzzaniti, Department of Biomedical and Applied Sciences

Staller, Sable
Research Title:
Soluble toll like receptor-2 in saliva in healthy mouth
Facuity Mentor:
Dr. Srinivasan, Department of Oral Pathology

Loan Do, Anh
Research Title:
Osteoblast-Osteocyte Specific Contributions of Kalirin to Dendritic Morphology and Bone Mass
Facuity Mentor:
Dr. Bruzzaniti, Department of Biomedical and Applied Sciences

Holland, Robert
Research Title:
The Effect of Increased Lrp5 Co-Receptor Expression on Orthodontic Tooth Movement
Facuity Mentor:
Dr. Utreja, Department of Orthodontics

Kim Sung Kyung, Joan
Research Title:
NGF as a major player in osteoblast proliferation and mineralization
Facuity Mentor:
Dr. Bruzzaniti, Department of Biomedical and Applied Sciences

Willard, Alec
Research Title:
Determination of phase transformation of eMax CAD dental ceramic
Facuity Mentor:
Dr. Chu, Department of Biomedical and Applied Sciences

Hoaiburg, Brian
Research Title:
Fluoride varnish, white spot lesions and orthodontic resin animal shear bond strength
Facuity Mentor:
Dr. Platt, Department of Biomedical and Applied Sciences

McKinney, Reed
Research Title:
Effects of nicotine metabolites on growth of Streptococcus mutans
Facuity Mentor:
Dr. Gregory, Department of Biomedical and Applied Sciences
**One on one session with our SRG superstars**

**Dr. Angela Bruzzaniti**

Most common question: Tell us about yourself and WHY RESEARCH??

Research has always been of great interest to me, even as child. I always enjoyed science and biology classes. I completed my Ph.D. in Protein and Molecular Biology in Melbourne, Australia. After that I came to the US as a postdoctoral fellow and joined the Neuroscience laboratory at Johns Hopkins in Baltimore. My research was based on understanding how neuropeptides were cleaved and activated by enzymes known as the prohormone convertases. Although I had never worked in neuroscience, I had plenty of experience working with these enzymes and I even cloned a new member of this family of enzymes during my Ph.D. After completing my fellowship, I joined Yale University as an Associate Scientist, where I was studied bone cell Biology. It was there that I became committed to a career in academia and research. I was fortunate to join IUSD in 2008 and became involved in teaching musculoskeletal biology and molecular cell biology; two areas related to my research interests. I have always enjoyed interacting with students and being a research mentor to students. That is one of the reasons I joined academia. I like being in a teaching environment where I hope to inspire students to become involved in research. Collaborations are very important in research. It makes science fun when you can interact with people and it keeps you motivated when you need it the most. I have a good collaborative circle in school as well as outside.

What is your current research on?

My research overall is in understanding the mechanism of bone loss and bone formation. My favorite bone cells are the osteoclasts, which are responsible for degrading bone, and their actions lead to osteoporosis, periodontitis and other diseases that cause low bone mass. It is important to understand how osteoclasts are formed and what other cells can activate the osteoclasts as these factors control how many osteoclasts are formed and therefore how much bone could be lost. Osteoblasts on the other hand, counterbalance bone loss by making bone. Therefore, my research is also involved studying the proteins that control the actions of osteoblasts as well as other cells present in the bone marrow niche that interact with the bone cells. I am currently looking at projects collaborated with Endodontics to look at ways to disinfect the canal and on regeneration in the canal. I am also involved with projects related to regeneration in the Periodontal field related to osteoclasts and osteoblasts and diseases like osteoporosis and periodontal related bone loss.

What advice do you have for students interested in research?

Students need to be open minded and try research but be prepared to start from the very beginning. Students often feel that research is repetitive. You need patience to get past the steep learning curve. I would recommend any student who likes to ask questions nd has the drive to learn more to become involved in research. There are endless possibilities for research projects based on your interest. For example, research can take place at bench in the basic sciences, or focused in the clinic. Both bench research and clinical research rely on evidence-based studies!

What are your long-term goals?

I always try to look into the positive side of life. It is hard when grant applications are not funded but it is important to be open to criticisms regarding my science. I believe that perseverance and self-improvement is the key to success in all areas. I would like to continue to grow as a scientist and a teacher/mentor. I also hope that my scientific discoveries will one day help treat disease and improve the lives of individuals.

**Dr. Richard Gregory**

What is your current research on?

As a child I was always interested in how things work. It comes from observing my father who was an engineer. In high school I had this unique teacher - Mr. Adams that taught our Microbiology class. After few classes, it made me wonder; how this amazing one cell microorganism can do everything a human being can do with trillion of cells. It made me then ponder how and why God creates us this way. Prior to this class, I admit I wasn't that bright or inquisitive. After his class I got interested in school and I became his assistant. I double majored in Medical Technology and Chemistry. My love was always Microbiology and I wanted to work in a hospital laboratory. In order to achieve this, I realized I needed to get a Master's degree. I got enrolled in Southern Illinois University. My mentor offered me a chance for a PhD. and I guess he must have seen something in me. I took this opportunity in Microbiology and Immunology and focused on Streptococcus mutans. That got me into what I am doing now. I have been working with Streptococcus mutans since 1976. I am still amazed at how this organism can cause dental caries and we know how complex caries is. I love working with this complexity.

What is your vision for the Student Research Group?

I am of the opinion that we should have a scholarship requirement for students. However, some students are not that interested in research. I would like to resume the requirement for a mandatory paper submission in the senior year. Every student will have to focus on a paper on a topic in the dental field. Students who are currently involved and doing research will be excluded from this requirement. A research that is well documented has a enriching experience for everyone of us.

What are your long-term goals?

I plan on teaching and conducting research till I reach 70 and then retire happily with my wife. In ten years I will have retired and downsized my house. I love my job most days and my favorite part of my job is working with students in the research laboratory.

By: Sharon Iype and Pranali Patel
Many students presented their work on Research Day and have shared their experiences with poster presentations. Here are few students with their posters.

**D3 Student, Sung-Kyung JoAn Kim** presented her work, “Role of Nerve Growth Factor In Osteoclast Differentiation and Function”.

She worked with **Dr. Angela Bruzzaniti** on the project. Her research day experience in her own words, “It was an amazing and intriguing time to listen to the speech of the actual inventor of Stannous Fluoride! It was also a valuable opportunity for me to present my research to my colleagues and professors. I was impressed by the quality, depth and variety of research that my school is involved in.”

**D3 Student, Robert Holland** presented his project: Expression of Osteoblast differentiation markers in the periodontal ligament following orthodontic tooth movement. He worked with **Dr. Achint Utreja**, Department of Orthodontics.

While sharing his experience, he said, “Research day was an exciting experience; not just to present my own research, but to see all of the studies being conducted within IUSD. There are many bright and motivated students, residents and graduate student researchers. The knowledge pertaining to dentistry is continuously growing.”
D4 Student, Loan Anh Do had a great time presenting her Poster.

Her research topic is “Effects of Nerve Growth Factor on Osteocyte Morphology”. She worked with Dr. Angela Bruzzaniti.

While sharing her experience she said, “A lot of time and effort went into our research and I was glad to have the opportunity to share it and show it off. My most memorable experience was being grilled about my research from some of the D1’s. It was awesome how interested they were and their thought provoking questions lead to some very insightful conversations about the research I was doing. I loved their refreshing energy and I had such a fun time presenting”

SOME INTERESTING FACTS TO KNOW!

Indiana Dental Student Research Group (DSRG)
Research Fellowships: 2002-2017

- Average proposals funded/year: 12
- Probability of being funded: 70%
- Total fellowship amount: $5000
  ($3,500 stipend; $1,000 travel; $500 lab)
Dr. Thyvalikakath is the director of the new Dental Informatics Core Initiative at the Indiana University School of Dentistry. As a core director, she is creating a program designed to pursue the School's missions with research, teaching, information technology services and clinical care. She is a clinician and an informatics researcher. In addition to her directorship, she teaches Predoctoral students as an Associate Professor in the School's Restorative Dentistry Department. She is also a research scientist at the Center for Biomedical Informatics (CBMI), Regenstrief Institute, Indianapolis and an Adjunct Associate Professor in the Department of Bio-Health Informatics, School of Informatics & Computing, Indiana University, Indianapolis. During the last ten years, Dr. Thyvalikakath has been involved primarily in human-computer interaction research and cognitive studies pertaining to dentistry. She is the recipient of two career development awards from the National Institutes of Health (NIH). Currently, she is working on a National Dental Practice-Based Research Network study funded through the NIH to explore the feasibility of using dental electronic health data (EHR) data from private practices to evaluate treatment outcomes and for clinical research. Her dedication in the dental informatics field is impressive and IUSD is fortunate to have her! She graciously accepted an interview and shared some information with me about her life, achievements, and wisdom within the field of dental research.

Q: What is your educational background?

A: I earned my dental and Master's degree in Oral and Maxillofacial Surgery from the University of Kerala and Calicut, India. After a few years in clinical practice, I pursued a Master's program in Biomedical Informatics at the University of Pittsburgh. Subsequently, I secured a PhD degree in Biomedical informatics from University of Pittsburgh School of Medicine. I also earned my dental degree from the University of Pittsburgh School of Dental Medicine.

Q: What made you interested in research?

A: After completing a Masters’ degree in Bioinformatics at the University of Pittsburgh, I received an institutional career development award that motivated me to establish a career in Research. I got so much involved in the field that I became more curious to learn about informatics and its practical applications. Research is all about critical thinking. In our career whether it is a clinical setting or research lab, there will be situations which will demand critical thinking and problem solving skills.
Q: What current projects are you working on?

A: Currently there are two main focus areas of my research projects.
1) How to create clinical systems that can support clinicians to work efficiently and meanwhile, enable them to educate their patients to facilitate shared decision making (Interactive treatment planning knowing patient’s expectations via digital media)
2) Feasibility of using Electronic Dental Records for clinical research. The data we capture would help us to learn from our own data and to implement necessary changes to perform better in the future. We have recruited 99 practices nationwide to share their Electronic Health Record with us and then to analyze those data whether we can answer the following questions:
1) Longevity of posterior composite resins.
2) Tooth loss after Root canal therapy

Moreover, a major challenge in dental clinics is to gather accurate and complete medical information from the patients. So, one of our research foci is to compare patient-reported medical history with their medical record data.

Q: As a director of Dental informatics Core and principal investigator in informatics research studies, how do you see the role of Informatics and technology in Dentistry in this digital age?

A: I believe that before incorporating any technology into daily practices, one should first assess what positive impact it will create. One should not incorporate new innovations blindly and therefore, comes the role of critical thinking. Prior to technological innovations, slow-speed hand pieces were used which got later replaced with high speed cutting hand pieces, that drastically decreased clinical time and improved patient outcomes. Technology should be adopted to improve work process and patient outcomes.

Q: What advice would you give to aspiring student researchers?

A: Students should look at research as an opportunity to develop critical thinking skills, which will be very helpful while facing difficult clinical scenarios in the real world. Research experience will provide the basic foundation in solving day-to-day problems. Moreover, it will help to apply basic science concepts in to daily clinical practices. If you are involving yourself in a research project, it is important to set aside dedicated time because commitment is the key to success.
Thank you for your interest in the latest edition of the Student Research Initiative. We would like to extend our most sincere gratitude to Indiana University School of Dentistry and its faculty and staff for their ongoing support of student research. We aspire to continue production of this newsletter to help keep the campus informed of all of the exciting student research efforts going on in the dental community. The Student Research Initiative team would like to extend a special thank you to our faculty mentors, Dr. Angela Bruzzaniti and Dr. Richard Gregory for their photographs, inspiration, and guidance in producing this fourth edition of the newsletter.

**IUSD Student Research Group Officers**

**President:** Uzi Kamal, D4  
**Vice President:** Robert Holland, D3  
**Treasurer:** Alexandar Voris, D4

**Newsletter Editor-in-Chief:** Sharon Iype, D4 and Pranali Patel, Orthodontic Resident

*If we knew what it was we were doing, it would not be called research, would it?*  
*(Albert Einstein)*