VICKI ROSEN, PHD, RECEIVES NIH-NIAMS R01 AWARD

Vicki Rosen, PhD, professor of Developmental Biology and interim dean of HSDM, received an NIH-NIAMS R01 Award for, “BMP2 Regulation of Periosteal Function.”

The periosteum, a highly specialized tissue microenvironment on the outer surface of bone, has a key role in ensuring the survival and self-renewal of a unique population of resident stem/progenitor cells that are responsible for appositional bone formation and fracture repair. Injuries that disrupt periosteal function are common, with 12-15 million fractures occurring yearly in the U.S. that lead to 18 million doctor visits and result in 60 million workdays lost. Although most fractures heal successfully, due in large part to the innate regenerative capacity of the periosteum, healing is slow and ineffectual (nonunion) for more than 5% of patients, and failure to heal can be as high as 10% for fractures that occur in weight-bearing long bones that are crucial for mobility. Recalcitrant fractures are challenging to treat and current therapies produce unpredictable outcomes, leaving almost 600,000 patients each year with significant disability.

The Rosen Lab’s published work identifies BMP2 as a potent physiological regulator of periosteal function. Mice lacking BMP2 expression in Prx1+ stem/progenitor cells exhibit severe defects in all known periosteal activities. In the absence of BMP2, bones fail to grow in width proportional to their growth in length, creating structural instability that results in spontaneous fracture; once fractured, the periosteum fails to initiate repair and cannot support bone graft incorporation. In addition, treatment with anabolic agents such as intermittent PTH or anti-sclerostin antibody fails to stimulate cortical bone formation in the absence of periosteal BMP2. As such, we hypothesize that the dynamic spatio/temporal expression pattern of BMP2 within the periosteal niche constitutes an essential mechanism determining active versus quiescent states of the periosteum throughout postnatal life.

SAMANTHA JORDAN, MPH, DMD, INTERIM DIRECTOR IN DENTAL PUBLIC HEALTH

Dr. Samantha Jordan, dental director of the Lowell Community Health Center and lecturer on Oral Health Policy and Epidemiology, has agreed to serve as interim director of the Advanced Graduate Education in Dental Public Health (DPH) program effective July 1, 2020.

Dr. Jordan is a 2014 graduate of HSDM’s DPH program and a 2013 graduate of the Harvard T.H. Chan School of Public Health, having received her MPH in health and social behavior. She received her Doctor of Dental Medicine degree in 2011 from Tufts University School of Dental Medicine. Her work focuses on leveraging the unique potential of community health centers to promote oral health equity and developing best practices for oral health integration. Her valuable experience building a dental clinic and leading an integrated oral health program at a major community health center in Lowell, Massachusetts, will enrich the DPH program. Furthermore, she will be a great asset in implementing the newly-awarded HRSA training grant, “Catalyzing Oral Health Workforce for Rural and Vulnerable Populations.”
MUTATIONS IN COMP CAUSE FAMILIAL CARPAL TUNNEL SYNDROME

Dr. Yingzi Yang, associate dean for Translational Research, professor of Developmental Biology, and director of Biological Sciences in Dental Medicine at HSDM, was recently published in Nature Communications. The international, collaborative study, titled, “Mutations in COMP Cause Familial Carpal Tunnel Syndrome,” uncovers a previously unrecognized mechanism in Carpal tunnel syndrome (CTS) pathogenesis, providing insights into potential treatment for CTS.

CTS is the most common peripheral nerve entrapment syndrome, affecting a large proportion of the general population. Genetic susceptibility has been implicated in CTS, but the causative genes remain elusive. Dr. Yang and colleagues report the identification of two mutations in cartilage oligomeric matrix protein (COMP) that segregate with CTS in two large families with or without multiple epiphyseal dysplasia (MED). Both mutations impair the secretion of COMP by tenocytes, but the mutation associated with MED also perturbs its secretion in chondrocytes.

Further functional characterization of the CTS-specific mutation reveals similar histological and molecular changes of tendons/ligaments in patients’ biopsies and the mouse models. The mutant COMP fails to oligomerize properly and is trapped in the endoplasmic reticulum, resulting in endoplasmic reticulum stress-induced unfolded protein response and cell death, leading to inflammation, progressive fibrosis and cell composition change in tendons/ligaments. The extracellular matrix organization is also altered. Dr. Yang and colleagues’ studies have uncovered the first non-neuronal genetic cause for primary CTS.


**ORAL AND MAXILLOFACIAL SURGERY**


**RESTORATIVE DENTISTRY AND BIOMATERIALS SCIENCES**


**ORAL HEALTH POLICY AND EPIDEMIOLOGY**


**MULTI DEPARTMENTAL**


Brittany Seymour, DDS, MPH, and OHPE Faculty Receives DentaQuest Foundation Award

Brittany Seymour, DDS, MPH, associate professor of Oral Health Policy and Epidemiology at HSDM, is the principal investigator on, “Three Delays—Research Framework for Uncovering Hidden Barriers to Dental Service Utilization in the COVID-19 Era” a project funded by the DentaQuest Foundation.

Dr. Seymour is working with co-investigator, Shenam Ticku, BDS, MPH, instructor in Oral Health Policy and Epidemiology, and investigator, Christine Riedy, PhD, MPH, chair and Delta Dental of Massachusetts associate professor of Oral Health Policy and Epidemiology. The team is collaborating with Jane Barrow, MS, associate dean for Global and Community Health and lecturer on Oral Health Policy and Epidemiology.

This project aims to uncover and describe persistent and novel systemic deficiencies with dental care utilization in the COVID-19 era. It proposes a systems-based design approach from the health care user perspective that recognizes the social determinants of health; works toward a stronger sociocultural model of oral health care; and identifies evidence-based opportunities for intervention related to each of the key components of a well-functioning health care delivery system and aligns with a globally recognized goal of universal health coverage. The “Three Delays” model is a well-established global public health framework, where each delay represents a series of factors affecting service utilization: Delay #1- Deciding to seek care, Delay #2- Reaching an appropriate facility, Delay #3- Receiving adequate care without incurring financial hardship.

The team hypothesizes that factors affecting utilization prior to COVID-19 will persist and new factors will arise as we move into re-opening dental offices during the pandemic. Adapting the “Three Delays” model will allow for moving beyond describing not only ‘what’ factors affect service utilization but also illustrate the hidden ‘why,’ the answer to which is less straightforward. This project will be a collaboration with the HSDM Office of Global and Community Health, the National Dental Association, the American Association of Dental Public Health, and the DentaQuest Partnership.

Photographed below (left to right) include—Shenam Ticku, Christine Riedy, and Jane Barrow.

75 Years of Fluoridation—U.S. and Global Perspective

According to the Centers for Disease Control and Prevention (CDC), for three-quarters of a century, people in the United States have been drinking water with added fluoride and enjoying the benefits of better dental health. Fluoride is one of the most abundant elements found in nature. Community water fluoridation is the most efficient and cost-effective way to deliver fluoride to everyone in a community, regardless of their age, income, or education, and therefore, it especially benefits those without access to regular dental care. It is a powerful equalizer in the fight for social justice and health equity.
75 YEARS OF FLUORIDATION

Eugenio Beltrán-Aguilar, DMD, MPH, DrPH, senior research fellow at the Surveillance, Investigations and Research Branch, Division of Oral Health at the CDC, states that community water fluoridation may also reduce oral health disparities. Children and adults from socioeconomically disadvantaged backgrounds are more likely to suffer from dental caries and are less likely to be treated for the disease. When added to drinking water, fluoride can be delivered to community residents regardless of socioeconomic status or ability to access dental services. Brittany Seymour, DDS, MPH, associate professor of Oral Health Policy and Epidemiology at HSDM, states, “Community water fluoridation is one of the most studied public health interventions and has been named by the CDC as a 20th century top public health achievement. It is the single most effective public health measure to prevent cavities.”

As the United States is celebrating 75 years of fluoridation programs, researchers have studied its impact over seven decades among Latin American and Caribbean fluoridation initiatives. The United States was the forerunner and the driving force for Colombia, Chile, Venezuela, and Brazil to start their first programs. Steffany Chamut, DDS, MPH, instructor in Oral Health Policy and Epidemiology at HSDM, published with colleagues Mutis, Moron, and Davila, the “Status of the Epidemiological Surveillance Systems for Salt and Water Fluoridation Programs in Latin America and the Caribbean.” They recommend a new stage of international accompaniment by various agencies to resume fluoridation programs in countries where structural, economic, or political factors affected the implementation or continuation of fluoridation programs in the 21st century.

The field of Dental Public Health has been pivotal in preventing common oral disease (i.e. dental caries), promoting dental health through organized community efforts, developing public policies, and evaluating the impact of preventive interventions. As we celebrate 75 years of fluoridation programs, it is evident that preventive dentistry is still indispensable for improving oral health. Myron Allukian Jr., DDS, MPH, associate clinical professor of Oral Health Policy and Epidemiology, has been called “the social conscience of dentistry,” and has often stated, “Fluoridation is still the most cost-effective prevention measure for dental disease and needs to be promoted. More dentists and hygienists need to become members of their local boards of health and continue to educate patients and community leaders about the safety and effectiveness of community water fluoridation.”