

## ORAL SCIENCES GRADUATE M.S. PROGRAM

### FACULTY PARTICIPANTS AND SUMMARIES OF RESEARCH INTERESTS

#### **Sebastiano Andreana, DDS, MS**

Associate Professor and Director, Implant Dentistry

Projects focus on all aspects of implant dentistry, including retrospective and prospective studies, behavioral studies, in addition to laboratory, in vitro, and in vivo studies. Additional projects focus on Dental Lasers and OTC products.

#### **Robert E. Baier, Ph.D.**

Professor, Department of Oral Diagnostic Sciences

Research interests include the surface characterization and improved preparation of dental restorative materials, with particular emphasis on new, safe and effective methods for sterilization such as glow discharge (plasma) treatment. Material/biosystem interactions are emphasized, employing a broad spectrum of advanced analytical techniques ranging from electron microscopy/spectroscopy to critical surface tension determination. Prevention of bioadhesion (such as dental plaque accumulation) or promotion of bioadhesion (for dental implants, for instance) can be controlled by tailoring materials surface properties to meet control criteria revealed by these methods.

#### **Sebastian G. Ciancio, D.D.S.**

Professor and Chairman, Department of Periodontology

Research interests are in the area of acid mucopolysaccharides, plaque control agents, clinical dental pharmacology, the role of antibodies in the management of periodontal disease, and treatment of dental hypersensitivity.

#### **Robert E. Cohen, D.D.S., M.S., Ph.D.**

Professor, Departments of Periodontology and Oral Biology

Our laboratory is studying the immunochemistry and cellular biochemistry of inflammatory and neoplastic diseases of the salivary glands, perio-dontal tissues, and other related structures such as kidney and skin. The goals of our reserach are to identify regulatory mechanisms important in gingival and salivary gland inflammation, to assist in the diagnosis and management of poorly differentiated salivary gland tumors, and to provide a foundation for genetic and pharmaceutical therapy of these disorders.

#### **Heidi Crow, DMD, MS**

Associate Professor and Chair, Department of Oral Diagnostic Sciences

Research interests: Temporomandibular disorders (TMD) and Burning Mouth Syndrome. Specifically in TMD I am interested in imaging characteristics of the TMJ and am involved in TMD treatment protocols.

**Elaine L. Davis, Ph.D.**

Professor, Departments of Oral Diagnostic Sciences

Current research focuses on access to care, dental student attitudes, and attitudes and behaviors related to oral health.

**Rosemary M. Dziak, Ph.D.**

Professor, Department of Oral Biology

Research is concerned with the cellular regulation of bone metabolism with emphasis on the mechanics of physiological and pathological bone loss. The role of intracellular mediators in the control of bone formation and resorption is studied directly using enriched populations of osteoblastic and osteoclastic cells isolated from rat calvaria. The effects of various bone resorptive and formative agents on changes in calcium uptake and nucleotide production, as well as prostaglandin and calmodulin in the mediation of hormonal effects.

**Mira Edgerton, D.D.S., Ph.D.**

Research Professor, Departments of Restorative Dentistry and Oral Biology

Innate immunity and antimicrobial defense mechanisms. Oral candidiasis is an increasing health issue. Incidence of oropharyngeal candidiasis has increased dramatically in the past 20 years due to increased antibiotic and pharmaceutical drug use and longer survival of people with compromised immune systems and cancer patients. Mortality from systemic *C. albicans* infections in immunocompromised patients is nearly 30%, even with aggressive treatment with antifungal drugs. These data point to a pressing need for improved drug therapies or means of enhancing innate immune mechanisms in immunocompromised and cancer patients. Understanding mechanisms by which salivary antimicrobial proteins exert candidacidal activity and use of these bioactive peptides as therapeutic agents has been the objective of our research program.

**Yoli Gonzalez-Stucker, DDS, MS**

Associate Professor, Department of Oral Diagnostic Sciences

Dr. Gonzalez's interests lie in the field of Temporomandibular Disorders (TMD) and Orofacial Pain conditions; more specifically, in the areas of examiner training, reliability, assessment and diagnosis of these disorders. She continues to participate as co-investigator in multicenter studies addressing the diagnostic systems for TMD, longitudinal studies evaluating risk factors for the development of TMD and Orofacial Pain, and evaluation of biomechanics characteristics of the TMJ. In addition, she is involved in treatment modalities used in the management of TMD.

**Violet Haraszthy, DDS, PhD**

Professor, Department of Oral Biology

Dr. Haraszthy's research is mainly focuses on product testing, such as toothpastes mouthrinses. Most of these studies have a clinical component. The subjects would use the assigned product for a period of time or a control product and we obtain samples such as saliva, plaque from the subject's mouth and perform a clinical exam. We also test these products in the laboratory for their effectiveness under in vitro condition. We test their effects on biofilm formation, of eliminating biofilm and killing oral bacteria. We are also

involved in the identification of halitosis (bad breath) associated bacteria and testing products for effective treatment of this condition. Periimplantitis treatment is also an ongoing project. We grow biofilm on titanium discs and test various methods to eliminate the biofilm from the surfaces of the discs. We use electro-microscope to look at the surfaces before and after treatment. We also use culturing techniques to evaluate the effectiveness of the treatment.

**Jason Kay, PhD**

Assistant Professor, Department of Oral Biology

The focus of the Kay lab is to increase our understanding of the cell biology of macrophages and dendritic cells, important players in all innate immune responses, including those that occur within the oral environment. Our studies focus on the mechanisms of the maturation, and cross-talk with other cellular processes, of phagocytosis, as well as the interactions between macrophages/DCs and oral microorganisms and how such microorganisms can alter the phagocytic process and maturation. We rely on a variety of techniques, including flow cytometry, microscopy, biochemistry, microbiology and molecular biology. Increasing our understanding of macrophage/DC and oral microbe interactions will increase our ability to effectively prevent and treat oral infections and their effects on systemic diseases.

**Michelle Kay (Visser), PhD**

Assistant Professor, Department of Oral Biology

The oral cavity is a unique environment, with large numbers of bacteria present as a polymicrobial biofilm in close contact with host tissues including epithelial cells, connective cells and underlying immune cells. One group of bacteria associated with this biofilm are oral spirochetes, such as *Treponema denticola*. One area of research in my laboratory focuses on determining how *T. denticola* and other spirochetes remain “under the radar” to evade the normally protective neutrophil response and impair associated key cellular processes such as directed cell migration (chemotaxis) and actin dynamics.

**Hyeongil Kim, DDS**

Associate Professor, Department of Restorative Dentistry

Prosthetics and biomaterials

**Jill Kramer, DDS, PhD**

Assistant Professor, Department of Oral Biology

Dr. Kramer focuses her research on autoimmune conditions affecting the oral cavity. Present Research Interests include Initiating events in the development of Sjogren's syndrome with emphasis on innate immune dysregulation; B cell dysfunction in Sjogren's syndrome; Identification and targeting of chemotactic factors that contribute to disease pathogenesis.

**ChunHao (Chris) Li, MD, PhD**

Professor, Department of Oral Biology

Bacterial genetics and Pathogenesis: My research is trying to understand the biology, genetics and pathogenesis of pathogenic spirochetes, including *Borrelia burgdorferi* (Lyme disease), oral *Treponema denticola* (periodontal infections), and *Brachyspira* species (swine dysentery and human diarrheal disease).

**Abhiram Maddi, DDS., PhD**

Assistant Professor, Department of Endodontics and Periodontics

Dr. Maddi's current research work involves the study of cell wall biogenesis in *Candida albicans*, an oral pathogenic fungus. He is interested in developing therapeutics to target the cell wall in *Candida albicans* to treat oral and systemic candidiasis.

**Thomas Mang, PhD**

Research Associate Professor, Oral and Maxillofacial Surgery

The research conducted in Dr Mang's lab is focused on the application of Photonics in biological applications. Currently activities include; participating in clinical studies involving the investigation of Low Level Laser Therapy for the treatment of Orofacial pain; traumatic brain injury and effects on individual astrocytes in vitro; the use of Photodynamic Therapy (PDT) for the treatment of infectious microorganisms and biofilm and the application of PDT for the diagnosis and treatment in oral oncology. Other interests include the development of new laser devices and laser tissue interactions for diagnostic and surgical applications.

**Willard D. McCall, Jr., Ph.D.**

Professor, Department of Oral Diagnostic Sciences

Research in this laboratory deals with neurophysiologic and bioengineering issues that impact on our understanding of jaw function and on the etiology, diagnosis, and treatment of temporomandibular disorders. Special emphasis is given to the trigeminal neuromuscular system. Research interests include: electromyographic (EMG) studies of normal subjects and TMD patients; electrical activity of trigger points; computer processing of electromyographic data; bite force measurements; and computer modeling of TMJ loading.

**Anne E. Meyer, Ph.D.**

Research Associate Professor, Department of Oral Diagnostic Sciences

Projects focus on interactions between biological systems and materials, in order to develop means to predict and control biological adhesion. Surface analytical techniques are applied to implants, biological fouling biomaterials, interfacial failure analysis, and contamination detection. The research addresses environmental, biomedical, and other industrial problems. In-vitro model systems include the use of parallel plate flow cells for control of fluid velocity, shear rate, and turbulence.

**Richard Ohrbach, D.D.S, Ph.D.**

Professor, Department of Oral Diagnostic Sciences

Our current research includes experimental psychophysiological approaches to understanding the role of cognitive and affective components of stress as they relate to chronic pain experience and chronicity. This experimental work also includes methodological approaches that are more phenomenological in nature. We are also interested in methods of assessing masticatory behavior from the perspective of central control as influenced by cognitive and emotional states, and how that behavior within the masticatory system might be generalizable to motor systems elsewhere in the body impacted by pain experience, such as the lower back. Included with these experimental approaches is some emphasis on more basic methodological issues such as muscle activity measurement. We are also interested in

clinical research: (1) ecological models of symptom change and longitudinal outcomes in TMD pain, and what factors influence those outcomes; (2) the statistical problem of how to manage longitudinal data analyses; (3) clinical assessment of pain disorders, and (4) validity of diagnostic taxonomic systems.

**Dana Keblawi, DDS, MS**

Clinical Assistant Professor, Department of Restorative Dentistry

Implant Dentistry, Prosthodontics, Esthetic dentistry

**Rose-Anne Romano, PhD**

Assistant Professor, Department of Oral Biology

My laboratory is interested in understanding the regulatory mechanisms of cell fate and lineage choices of epithelial stem and progenitor cells. We utilize genetic and genomic approaches to better understand tumorigenesis in tissues of the oral cavity and salivary glands.

**Stephan Ruhl, DDS**

Professor, Department of Oral Biology

Research in my laboratory encompasses the general area of oral infection and immunity with a major focus on adhesin-mediated interactions of oral bacteria with host salivary or cellular receptors. We investigate the proteins in saliva that are recognized by lectin-like microbial adhesins. It is our long-term goal to better understand the modulating role of salivary glycoproteins in supporting tissue tropism of a benign commensal oral microflora to the human oral cavity and in host defense against pathogenic microorganisms.

**Camila Sabatini, DDS, MS**

Associate Professor, Department of Restorative Dentistry

Operative and Restorative Dentistry: Cosmetic dentistry, dental materials, techniques and research

**Frank A. Scannapieco, D.M.D., Ph.D.**

Professor and Chair, Department of Oral Biology

Basic Research - the major focus of this ongoing project is to determine the role of saliva in dental plaque formation. Specifically, we are interested in identifying and characterizing salivary components that interact significantly with numerically prominent dental plaque bacteria. Clinical Research - This project is directed toward understanding the role of oral hygiene in the pathogenesis of hospital acquired pneumonia. Associations are sought between oral hygiene status of hospitalized patients and colonization of dental plaque by respiratory pathogens. Further studies are directed toward determining the effect of oral hygiene measures on oral respiratory pathogen colonization. Ultimately, we hope to diminish the risk of pneumonia in these patients by improving oral hygiene.

**Ashu Sharma, PhD**

Professor, Department of Oral Biology

Sharma lab investigates bacteria that cause periodontitis. Two major areas are currently being

pursued: (a) molecular-genetic analysis of the periodontal pathogen *Tannerella forsythia* to understand its physiology and biochemistry, and (b) investigation into the mechanisms by which periodontal pathogens evade host immune surveillance in order to colonize and survive in the subgingival environment.

**Othman Shibly, DDS, MS**

Clinical Professor, Department of periodontics and Endodontics

Research interests involve mainly human clinical trials in gingivitis and periodontal disease, focusing on the role of chemical agents (local and systemic) as adjuncts to periodontal therapy. Specific studies involve clinical evaluation of safety and efficacy of oral hygiene devices, such as toothbrushes and irrigation devices, and chemical agents used in dentifrices, mouth rinses, and other delivery devices. Studies also involve the evaluation of pharmacologic medications and their impact on the diagnosis and treatment of periodontal disease. Additional research involves evaluation of implants on periodontally compromised patients, and tobacco use cessation protocols and their impact in oral diseases.

**M. Margaret Vickerman, DMD, PhD**

Professor, Departments of Periodontics and Endodontics, and Oral Biology

Vickerman lab is focused on the biological roles of commensal streptococci within complex mixed species biofilms on oral surfaces. Our current interest is on interbacterial communication mediated by signaling peptides that enhance bacterial colonization and the exchange of DNA encoding virulence determinants and/or antibiotic resistance. Projects employ molecular genetic approaches to investigate factors that favor maintaining the ecological balance of healthy bacteria on oral surfaces, and specifically targeting pathogenic microorganisms in oral infections.

**Ding Xu , PhD**

Assistant Professor, Department of Oral Biology

The main interest of the lab is to understand how proteins interact with heparin sulfate (HS), a highly negatively charged linear polysaccharide, and the physiological significance of the interactions in bone remodeling, inflammation and vascular biology.