

Oral Biology Ph.D. Program
Handbook for Graduate Students and Faculty
The Ohio State University
2019-2020



THE OHIO STATE UNIVERSITY

COLLEGE OF DENTISTRY

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INTRODUCTION TO GRADUATE STUDY IN ORAL BIOLOGY

Oral Biology has emerged as the focal point for scientific investigation and research training in Dentistry and craniofacial biology. It is defined as the realm of scientific inquiry that focuses on the structure, development and function of the tissues of the oral cavity; the interrelationships of these tissues with the other organ systems; and the materials that are used to restore them. Oral Biology is an interdisciplinary scientific pursuit that has emerged from the more traditional biomedical areas to concentrate research on problems related to the oral complex. With this in mind, the Oral Biology Doctoral Program at The Ohio State University was established in May, 1990.

The major focus of the Oral Biology Ph.D. program is laboratory-based education in conducting research, but it also includes a track for preparing students for a career in clinical/translational oral research. The ability to develop a hypothesis, design a logically consistent research protocol, collect and analyze scientific data, and explain scientific findings through both written and spoken words form the key elements of the program. The program educates students to understand current and classic scientific facts and principles that, in the broadest sense, relate to the craniofacial region. The program also teaches students how to choose and study significant scientific problems using modern scientific approaches. Graduates of this program will be prepared for research and teaching careers in either a university or an industrial setting.

The ability to conduct creative, independent research is the principal degree requirement in the Oral Biology Ph.D. program. Initially, the advisor is the source of ideas, problem-solving approaches, and methodology. However, the student must demonstrate independence in research after developing the necessary skills and experience. It is the responsibility of the advisor, with the aid of the student's Advisory Committee, to assure that the nature, scope and quality of the research is appropriate. It is the responsibility of the student to make certain that his or her data are accurate and reproducible. A graduate student must keep systematic notes that are properly dated and must preserve all data pertaining to and collected during work on a research problem. All such notes and data must be made available to the advisor. Research records must be kept at the University and are considered property of the University.

The Oral Biology doctoral program (<http://dentistry.osu.edu/prospective-students/advanced-education-graduate-programs/phd-programs/phd-oral-biology>) is offered under the auspices of the Graduate School of The Ohio State University. The program abides by University rules and those set forth in the Graduate School Handbook (<http://gradsch.osu.edu/handbook>)

Admission to the Program

The Graduate Studies Committee (GSC) will review applications from prospective students beginning in autumn semester of each year. Applications from individuals found to be acceptable candidates for the program will be available for all program faculty to evaluate. Faculty members interested in a prospective student should notify the GSC of their willingness to accept a new student in their laboratory.

Financial Assistance

Graduate students in the Ph.D. program may be eligible for a Graduate Associate (GA) appointment. These are awarded annually and are renewable, contingent on the availability of funds and satisfactory progress in the program. All GA appointments are for 12 months, but will be terminated by the GSC for poor performance or scientific misconduct.

ORAL BIOLOGY CURRICULUM

The scope of the Oral Biology program is intentionally broad, spanning the realm from basic cell biology, to systems biology, to biomaterials. All students are expected to be well versed in the basics of cell function. As such, every student is required to successfully complete a core curriculum of 16 hours that includes the following courses:

STAT 5301 Intermediate Data Analysis I (4 credit hr)

DENT 8840 Current Issues in Oral Biology (2 hr). A minimum of 6 credit hours is required. Students can substitute a seminar from another graduate program with approval of the GSC.

BIOPHRM 7510 Professional and Ethical Issues in Biomedical Sciences (2 hr) Similar courses are offered by other units and may be substituted with GSC approval.

DENT 7920 Oral Biology Seminar (1 hr). Although a minimum of 4 credit hours is required, students are expected to participate in seminars throughout the program.

DENT 7921 Oral Biology Journal Club (variable, 1-2 hr). Although a minimum of 4 credit hours is required, students are expected to participate in seminars throughout the program.

While the following course is not a part of the core curriculum, students may earn credits from:

Dent 8901 Oral Biology Laboratory Rotations (0.5-2 hr). These rotations provide a useful exposure to research during the first year, but are not required.

In addition to the course listed above, students should develop in conjunction with their advisor, track-specific coursework that will enhance their depth of understanding in a specific area appropriate to their research interests. Identified tracks include neuroscience, biomaterials science, inflammation and immunity, or cell and molecular biology. Representative course offerings for each of the five Oral Biology Tracks are detailed below. In consultation with their advisor, students will select a minimum of 20 credit hours of coursework from one of the tracks outlined below. The remainder of the credit hours for completion of the Ph.D. can come from coursework or research (Dent 8999). Students must be enrolled in Dent 8999 in the semester in which they graduate.

Human Pathobiology

BSGP 7000 Biomedical Sciences Survey (6 hr)

BSGP 7040 Research Problem Solving in Biomedical Science (4 hr)

Neuroscience

NEUROSC 7001 Foundations of Neuroscience I (6 hr)

NEUROSC 7002 Foundations of Neuroscience II (6 hr)

NEUROSC 7050 Neurobiology of Disease (3 hr)

NEUROSC 7500 Neuroimmunology (2 hr)

PSYCH 5898 Seminar in Behavioral Neuroscience (3 hr)

PSYCH 7898 Advanced Seminar in Behavioral Neuroscience (1-3 hr)

Biomaterials and Hard Tissues

BIOMEDE 5110 Fundamentals of Biomedical Microscopy (3 hr)

BIOMEDE 5305 Biomaterials (3 hr)

BIOMEDE 5310 Advanced Biomaterials (3 hr)

BIOMEDE 5353 Hard-Tissue Biomaterials (3 hr)

HTHRHSC 8891 Advanced Skeletal Biology (3 hr)

Inflammation and Immunity

BIOPHRM 7810 Animal Models of Human Disease (1 hr)

BSGP 8050 Research Techniques and Resources (4 hr)

CBG 5000 Evolution of Emerging Viruses (2 hr)

CBG 7470 Fundamentals of Muscle Biology (1-2 hr)

CBG 7741 Molecular Biology and Pathogenesis of Viruses (5 hr)

CBG 8040 Mass Spectrometry and Proteomics (3 hr)

CBG 8010 Selected Topics in Advanced Immunology (3 hr)

MICRBIO 6010 Principles of Microbiology (2 hr)

MICRBIO 6080 Advanced Microbial Genetics (3 hr)

MICRBIO 7010 Cellular and Molecular Immunology (3 hr)

Molecular, Cell and Developmental Biology

BIOCHEM 5615 Biochemistry and Molecular Biology III (3 hr)

BIOCHEM 5701/MOLGEN 5701 DNA Transactions and Gene Regulation (4 hr)

BIOPHRM 7781 Animal Models of Human Disease (1 hr)

BMI 5750 Methods in Biomedical Informatics and Data Science (3 hr)

MOLGEN 5608 Genes and Development (3 hr)

MOLGEN 5733 Advanced Human Genetics (2 hr)

Clinical Research*

BMI 5710 Introduction to Biomedical Informatics (3 hr)

BMI 5750 Methods in Biomedical Informatics and Data Science (3 hr)

MICRBIO 7724 Molecular Pathogenesis (3 hr)

MOLGEN 5701 DNA Transactions and Gene Regulations (4 hr)

PUBHBIO 6210 Design and Analysis of Studies in the Health Sciences I (3 hr)

PUBHBIO 6211 Design and Analysis of Studies in the Health Sciences II (3 hr)

PUBHBIO 6212 Regression Methods for the Health Sciences (3 hr)

PUBHEPI 6410 Principles of Epidemiology (3 hr)

**This coursework is flexible and will vary with the research interests of the trainee. A hallmark of this track is a dual focus on human biology and epidemiology/statistical methods. The courses listed above are appropriate for a focus on clinical oral microbiology, but coursework can be developed for other clinical disciplines.*

General

BSGP 7070 Fundamentals of Grant Writing (4 hr)

REQUIREMENTS FOR Ph.D. PROGRAM

Program-specific requirements

The Oral Biology Ph.D. program requirements include:

1. Satisfactory completion of the Oral Biology Core curriculum.
2. Production of a NIH-style research proposal that demonstrates the student's potential to independently develop suitable research hypotheses and specific aims based on the literature.
3. Completion of a body of original research suitable for publication in appropriate peer-reviewed journals.

4. Successful presentation of a seminar, based on the student's original research, geared to the faculty and students of the program but open to other interested individuals within the University.

University requirements (Note: Section 7.14 of the Graduate School Handbook is the best source of information about current requirements)

1. Satisfactory completion of the candidacy examination and submission of the approved Report on Candidacy Examination form.
2. Registration for at least three graduate credit hours during the semester or summer term when the candidacy and final oral examinations are taken and during the semester or summer term in which graduation is expected.
3. Submission of the application to graduate form to [GRADFORMS](#) no later than the third Friday of the semester (or third Friday of summer term) in which graduation is expected.
4. Completion of a minimum of 80 graduate credit hours, at least 50 of which must be completed beyond the master's degree. For a master's degree earned at another institution to count toward the 80 hours, it must be officially transferred. Of the 50 post-master's hours, at least 24 graduate hours must be taken at this university.
5. Graduate cumulative point-hour ratio of at least 3.0.
6. Approval of dissertation draft by the dissertation committee members and submission of the Application for Final Examination and the dissertation draft to the Graduate School at least two weeks before the date of the final oral examination.
7. Satisfactory completion of the final oral examination and verification that the Report on Final Examination form has been approved (via GRADFORMS) by the published deadline.
8. Electronic submission of the approved dissertation and a separate 500-word or less abstract by the published deadline for the semester or summer session of graduation.
9. Committee approval of the report on Final Document and completion of Survey of Earned Doctorates after electronic submission and acceptance of dissertation by the published deadline for the semester or summer term of graduation.
10. Completion of Ph.D. requirements within five years after being admitted to candidacy.
11. Receipt of final grades in the University Registrar's Office by the published deadline.
12. Completion of Ph.D. degree requirements established by the Graduate Studies Committee.
13. Payment of the doctoral hood and microfilm processing fees by the published deadline for the semester or summer term of graduation.

PROGRAM RESPONSIBILITIES AND ADMINISTRATION

Graduate Studies Committee

The Graduate Studies Committee (GSC) consists of five faculty members, each elected to a five-year term starting at the beginning of autumn semester and concluding at the end of summer term, and one doctoral candidate student member elected by the graduate students for a term of one year. Nominations from the

Oral Biology Program faculty will be solicited each summer. The ballot will be prepared by the GSC and transmitted to the complete membership of the program. The individual receiving the majority of the votes will be elected to replace the senior member of the Committee. In case of a tie, the GSC will select the new member by a secret ballot. An individual can be re-elected to additional terms if he or she is willing to serve and is elected by the membership.

In addition to the elected members, the GSC includes three ex-officio members: the Chair of the Division of Biosciences, the Director of the Comprehensive Training in Oral and Craniofacial Sciences (CTOC) Program, and the Associate Dean of Advanced Education and Graduate Studies. Ex-officio members have the same voting rights as elected members. This arrangement provides a basis for coordinating the graduate program with major sources of stipend and tuition support for its students.

The Chair of the GSC will be elected by GSC members and will organize the agenda and call meetings at appropriate intervals throughout the year.

The responsibilities of the GSC are described in Section 14.1 the Graduate School Handbook and include: (1) admission of new students to the program; (2) nomination of students for fellowships and Graduate Associate appointments; (3) evaluation of student progress annually or as needed; (4) evaluation of faculty credentials for membership on the graduate faculty; and (5) overseeing appeals and grievance procedures when necessary.

Annual Review of Students

All Oral Biology students will be reviewed annually by the Graduate Studies Committee. In spring semester of each year, students will be asked to submit an updated curriculum vitae, data on their academic and research performance and copies of the publications to the GSC. During late spring or summer the committee will meet with each student and their advisor to discuss their progress in the program and concerns about the program.

Policy and Procedures Concerning Misconduct in Research or Scholarly Activities

Graduate students and graduate faculty aspire to professional behavior that is consistent with the highest ethical and moral standards. The Graduate School at The Ohio State University expects that graduate students will demonstrate responsibility and integrity in pursuing their creative and scholarly interests. The academic enterprise is dependent upon such behavior. Graduate students are responsible for learning about appropriate standards for ethical research and scholarly conduct and for following all university policies related to ethical research and scholarly conduct. Appendix C.1 of the Graduate School Handbook provides an overview of the Graduate Student Code of Research and Scholarly Conduct.

All Ohio State University students are subject to provisions of The Ohio State University Code of Student Conduct. Issues of professional misconduct occurring in the College of Dentistry are managed according to the protocol outlined in the College of Dentistry Code of Honor and Professional Conduct. Issues of academic misconduct are referred to the Associate Dean of Academic Affairs for appropriate action. Issues related to scholarly misconduct by graduate students are the responsibility of Graduate Studies Committee and the Dean of the Graduate School. Guidelines for the Review and Investigation of Scholarly Misconduct by Graduate Students are included in Appendix C.2 of the Graduate School Handbook.

Grievance Procedures

If a graduate student has a grievance, he or she should first discuss the problem with the appropriate faculty member, course director, program director, academic advisor, or the individual directly involved, to seek resolution of the issues. If satisfactory resolution is not feasible, the graduate student can submit a written petition to the Chair of Oral Biology Graduate Studies Committee requesting a hearing by the full Committee. This Committee, chaired for this special situation by the Associate Dean for Academic Affairs, or by a designated Committee member if circumstances require, will obtain written descriptions of the matters under consideration from the petitioner and other principal parties. The GSC will meet as soon as possible, but no later than 30 days after receipt of the complaint, to review this written documentation and will request all appropriate individuals involved to verbally present their viewpoints. The petitioner may have an advisor present at the Committee meeting. The advisor may only counsel the student and not actively participate in the hearing, unless clarification is needed by the Committee. Each individual witness, or requested witness groups, will meet separately with the Committee. After all witnesses have been heard, the Committee will discuss all written and oral testimony and render a decision regarding the petition. The decision requires a majority vote of the Committee members present. The decision will be communicated to the petitioner in writing as soon as possible.

If the petitioner feels that the grievance has not been satisfactorily resolved by the GSC, a written petition for review of the grievance may be submitted to the Dean of the Graduate School within 5 business days. The procedures for graduate student grievance reviews are outlined in Appendix D of the Graduate School Handbook.

Faculty Advisor

The Chair of the Graduate Studies Committee will act as the provisional advisor for each new student until the time the student chooses a permanent faculty advisor.

During the initial semester of enrollment, students should meet with faculty members in order to become acquainted with the research activities of the program faculty. In addition, students are strongly encouraged to participate in laboratory rotations as part of the Oral Biology core curriculum. The laboratory rotations will serve as an introduction to oral biology and will range from two weeks to two months. During this time the student will have an opportunity to work closely with a faculty member to organize and perform a meaningful laboratory experience. Once acquainted with the research programs of the faculty, the student should select a graduate advisor. Any faculty member with a current full-time appointment in the Oral Biology Program and holding the category P rank on the Graduate Faculty may serve as an advisor. The student-advisor relationship is established by mutual agreement between the student and the faculty member, and is formalized by written approval of the GSC.

The faculty advisor will serve as the Chair of both the candidacy examination committee and the doctoral examination committee. The advisor will attend to all organizational matters that are required for the conduct of the examination.

CANDIDACY EXAMINATION

Timing- Students should strive to take the candidacy examination at the earliest possible time after completion of their formal course work. Typically, this is during their 5th or 6th academic term in the program.

Examination Committee- The advisor, in conjunction with the student, is responsible for selecting the faculty who comprise the examination committee. This committee should be formed well in advance of the proposed examination date and presented to the GSC for their approval. The Committee should include the advisor and at least three additional faculty members. It is recommended that one faculty member should come from outside of the Oral Biology program. It is important that biological perspective, central to the focus of the program, be strongly represented on each committee.

Examination Format- The Candidacy Examination consists of a single examination which includes two portions, written and oral, administered under the auspices of the GSC in conjunction with the student's Advisory Committee and the Graduate School. The student's Advisory Committee submits questions, determines the content and conducts the examination. The content and scope of the Candidacy Examination is at the discretion of the Advisory Committee but primarily covers the student's program track and area of research.

The Written Component- *Development of an NIH (6 - 10 page R03/R21 style) grant proposal.* Although the research proposal can provide the basis for the intended dissertation research by the candidate, the proposal itself, as part of the candidacy exam, must describe original studies not proposed by the thesis advisor. While dissertation research may overlap a thesis advisor's research program, the research proposal submitted by the candidate must represent an original experimental plan developed by the candidate. The candidate's ability to generate and defend a meaningful scientific plan is an essential component of the examination process.

The grant proposal should have a strong emphasis on the current literature and should include three specific aims in the proposal. The student will need to show a strong command of the literature and scientific aims. A letter from the student's advisory should be included that states that the student did a significant amount of the research themselves. When achievable, the student will be strongly encouraged to apply for NRSA funding.

The Oral Component- The oral component of the Candidacy Examination must be held within one month of the written portion. Prior to the oral portion, the student will be given the opportunity to review the answers, comments and criticisms on the written portion of the examination. The student's Advisory Committee plus the Graduate School representative conduct the oral examination. Questions asked during the oral portion of the Candidacy Examination may include any aspect of Oral Biology and may also refer to questions asked on the written portion of the examination. For the results of the oral portion of the examination to be considered "satisfactory", the report of the Candidacy Examination Committee must be unanimous. If the student fails the Candidacy Examination, it can be taken a second time if the Candidacy Examination Committee so recommends. No student is permitted to take the Candidacy Examination more than twice.

Research

Students are expected to begin working in a laboratory at the earliest possible time, i.e., prior to completion of didactic courses. The research experience forms the core of the doctoral education process, and must lead to work that can be presented at appropriate scientific meetings and published in high quality scholarly journals.

DISSERTATION, SEMINAR AND FINAL ORAL EXAMINATION

The dissertation is a scholarly contribution to knowledge in the area of the student's specialization. For a student in the Oral Biology program, the dissertation is based on analysis and interpretation of data derived from the student's original research. The caliber of the research is expected to be high; the research should demonstrate a creative and original approach to a specific scientific problem. Approval of the dissertation rests with the student's Advisory Committee. The format of the dissertation can follow that of a scientific publication, but it must conform to the Graduate School format requirements, as described on the Graduate School website (<https://gradsch.osu.edu/completing-your-degree/dissertations-theses/document-preparation>).

The Oral Biology program encourages the prompt publication of research findings. The decision on which data to publish is determined jointly by the student and advisor. However, the final decision to publish and determination of authorship rest with the advisor. In situations where a category M faculty member is co-advising while serving as the primary mentor for a student, he or she should have the final decision on publication.

The student's Advisory Committee and the Graduate School representative constitute the Final Oral Examination Committee. The Final Oral Examination tests originality, independence of thought, ability to synthesize and interpret, and quality of the research presented. The examination focuses primarily, but not exclusively, on the subject matter of the dissertation.

The student provides the Advisory Committee with a draft of the dissertation. After an approved draft is submitted to the Graduate School, the advisor makes arrangements for the Final Oral Examination. Sufficient advance notice must be given to the Graduate School to allow selection of a Graduate School representative. The student provides the representative with a copy of the dissertation at least one week prior to the Final Oral Examination.

Prior to the Final Oral Examination, the student will present a research seminar to the program's faculty, students, and any other interested individuals. The Final Oral Examination may be scheduled immediately after this seminar or delayed until a later date if agreeable to the Examination Committee. All members of the Final Oral Examination Committee must be present during the entire examination and are expected to participate fully in questioning during the course of the examination and in the discussion and decision on the result. To comply with Graduate School regulations, the Final Oral Examination is limited to a maximum duration of two hours.

Only members of the Final Oral Examination may be present for the discussion of the student's performance and the decision about the outcome. The student is considered to have completed the Final Oral Examination successfully when a unanimously affirmative vote by the Final Oral Examination Committee is given. A written appeal for review of the examination can be initiated by the student or a member of the Final Oral Examination Committee to the Executive Committee of the Council on Research and Graduate Studies.

The student is responsible for providing copies of the dissertation to all of the committee members. After the final draft of the dissertation has been accepted the student must supply one bound copy to the Graduate Studies Committee. As a matter of courtesy, the student should also provide a bound copy of the dissertation to each of the committee members.

PROGRAM CONTACTS

Questions related to the Oral Biology PhD program may be addressed to any of the following individuals:

Graduate Studies Committee: Oversees operation of the program.

Dr. Purnima Kumar Chair (term ends 2020)

Dr. John Bartlett (2022)

Dr. Brian Foster (2021)

Dr. Binnaz Leblebicioglu (2019)

Dr. Zongyang Sun (2023)

Dr. Peter Rieser (ex-officio)

Dr. John Sheridan (ex-officio)

Dr. John Walters (ex-officio)

Graduate Student representative

Graduate Studies Office: Assists with admission, registration, records, class schedules and forms

Jessica Maloney (maloney.223@osu.edu), Program coordinator

Dr. John Walters (walters.2@osu.edu), Associate Dean

PROGRAM FACULTY AND RESEARCH INTERESTS

Sudha Agarwal, Ph.D. (Emeritus faculty, Division of Biosciences): Mechanisms of actions of biomechanical signals involved in musculoskeletal tissue repair and regeneration. My research group is focused on two problems: understanding how biomechanical signals regulate inflammation in the diseased tissue and how these signals regulate tissue regeneration. We have observed that biomechanical signals are potent anti-inflammatory signals and inhibit NF- κ B signaling pathway to suppress inflammation. These signals also regulate cell proliferation and differentiation by stimulating multiple signaling pathways that are involved in tissue repair and regeneration. By using a wide array of genomics and proteomics techniques researchers in my lab

are exploring transcriptional and posttranscriptional regulation of pro-inflammatory and regenerative genes in response to biomechanical signals.

Michael Bailey, Ph.D. (Department of Pediatrics and Division of Biosciences): Studies in Dr. Bailey's laboratory focus on determining the impact that the intestinal microbiota have on the local mucosal immune system, and on immune reactivity at systemic sites, particularly during periods of psychological stress. In past studies, they have shown that exposure to different types of psychological stressors change the community structure of microbiota in the intestines. Their goal now is to demonstrate that these changes have significant effects on the health of the host.

John Bartlett, Ph.D. (Division of Biosciences): Dental enamel development and the gene expression program that is required to form teeth; Molecular events that cause dental fluorosis; Cellular interactions that are required for healthy enamel formation.

Clifford Beall, Ph.D. (Division of Biosciences): The human oral microbiome.

Shareef Dabdoub, Ph.D. (Periodontology): Microbial ecology of the oral environment, including: profiling the peri-implant microbiome in health, mucositis, and implantitis, host-microbial interaction, resistance and resilience of the microbiome to environmental perturbations. Whole metagenome and RNA-Seq analysis, fluorescent microscopy, scientific data visualization, visual analytics, software development, and reproducibility in science.

Prosper Boyaka, Ph.D. (Department of Veterinary Biosciences): Innate regulation of mucosal immune responses, Adjuvants and mucosal vaccines, Mucosal immunity and allergy, Microbiota

Shareef Dabdoub, Ph.D. (Division of Periodontology): Microbial ecology of the oral environment, including: profiling the peri-implant microbiome in health, mucositis, and implantitis; Host-microbial interaction; Resistance and resilience of the microbiome to environmental perturbations; Whole metagenome and RNA-Seq analysis; Data visualization; Visual analytics; Software development; Reproducibility in science.

Brian Foster, Ph.D. (Division of Biosciences): Cellular and molecular regulation of tooth development, with a focus on periodontal formation, mineralization of hard tissues, function, and novel regeneration strategies. Factors of interest include enzymes and extracellular matrix proteins involved in development and disease processes of the skeleton and craniofacial region.

Ann Griffen, D.D.S., M.S. (Division of Pediatric Dentistry): The human microbiome, especially as it relates to chronic periodontitis and dental caries; Acquisition of the human oral microbiome and its role as part of the human-microbe “super-organism.”

William Johnston, Ph.D. (Emeritus faculty, Division of General Practice and Materials Science): Chemical, physical and biological properties of dental biomaterials; Optical properties of esthetic biomaterials and the theoretical bases for determining optical characteristics; Mathematical modeling of properties of biomaterials; Optimization of chemical compositions; Research design.

Do-Gyoon Kim, Ph.D. (Division of Orthodontics): Mechanisms of bone disease, using a mechanobiologic approach.

Purnima Kumar, B.D.S., Ph.D. (Division of Periodontology): Oral bacterial profiles associated with periodontal health and disease, including a) characterization of subgingival microbial profiles of periodontally healthy smokers and smokers with periodontitis, and b) the role of host genetics on oral bacterial colonization.

Binnaz Leblebicioglu, D.D.S., Ph.D. (Division of Periodontology): Peri-implant wound healing during early phases of osseointegration; Clinical and histological treatment outcomes following guided bone regeneration procedures; Periodontal health during pregnancy in relation to psychological stress.

John Lannutti, Ph.D. (Department of Materials Science and Engineering): Materials considerations during tissue engineering; osteoblast behavior at the surface of synthetic hydroxyapatite *in vitro*; compositional and microstructural issues in the degradation of calcium phosphates in clinically relevant configurations; thermal generation during contact between hard tissues and orthopedic tools; bone microcirculation, osteoblast production and overall viability.

Beth Lee, Ph.D. (Physiology and Cell Biology): We have interests and expertise in both skeletal and renal biology. Most recently, major projects are focused on the role of cytoskeletal proteins in regulating the function of cells responsible for the formation and maintenance of bone, the osteoblasts and osteoclasts. The use of mouse genetic models, coupled with a variety of cell biology techniques, allows us to determine the function of cytoskeletal proteins in skeletal growth and health.

Gene Leys, Ph.D. (Division of Biosciences): Molecular and population genetics of periodontitis-associated and other oral bacteria.

Alan Litsky, M.D., Sc.D. (Orthopedics and Biomedical Engineering): Hard-tissue biomaterials (natural and synthetic), endoprosthesis fixation, implant micromotion, fatigue of dental implants, ethical issues in biomedical research.

Susan Mallery, D.D.S., Ph.D. (Division of Oral and Maxillofacial Pathology and Radiology): Chemoprevention of oral cancer by natural products, using a continuum of experimental designs

that range from cell and animal models to human clinical trials to provide mechanistic insights and determine chemopreventive efficacy, with a focus on controlled-release, local delivery methods.

Angelo Mariotti, D.D.S., Ph.D. (Division of Periodontology): Actions and interactions of sex steroid hormones on cellular proliferation and growth in sex accessory tissues and the oral cavity. Issues related to dental health care economics.

Peter Reiser, Ph.D. (Division of Biosciences): Comparative muscle biology, with a specific interest in craniofacial (jaw-closing, extraocular and laryngeal) muscles. A combined physiological-biochemical approach is used to study the function of the rich diversity in contractile protein isoform expression in these muscles among a broad range of vertebrate species.

Abhay Satoskar, Ph.D. (Department of Pathology, College of Medicine): Our laboratory is interested in understanding the immune mechanisms that determine outcome of "New world" cutaneous and visceral leishmaniasis caused by *L. mexicana* and *L. donovani* respectively. We are particularly interested in studying the role of cytokines in regulation of immune responses during these two species of *Leishmania* and the use of cytokine and cytokine receptor gene deficient mice has been a very powerful tool in these studies. Our long-term goal is to identify the basic mechanisms by which cytokines regulate T cell responses and host immunity to cutaneous leishmaniasis caused by *L. mexicana* and visceral leishmaniasis caused by *L. donovani* and utilize this knowledge to develop a vaccine against these diseases.

Scott Schricker, Ph.D. (Division of General Practice and Materials Science): Development of new polymers and monomers to improve dental materials and biomaterials; Development of nanostructured block copolymer surfaces to control protein and cellular interactions.

Robert Seghi, D.D.S., M.S. (Emeritus Faculty, Division of General Practice and Materials Science): Statistical fracture mechanics based failure analysis of dental crowns, with particular interest in fracture mechanisms of all-ceramic materials and the influence of the cement interface on failure.

John Sheridan, Ph.D. (Division of Biosciences): Brain and body interactions as they relate to modulation of peripheral physiological systems and behavior. This includes neuroendocrine regulation of gene expression in inflammatory and immune responses, and stress-induced susceptibility to infectious and malignant diseases.

Zongyang Sun, D.D.S., Ph.D. (Division of Orthodontics): Craniofacial tissue engineering using autologous stem cells and growth factors in a pig model; Craniofacial bone distraction osteogenesis; Alveolar bone reduction after tooth loss - mechanisms and prevention; Impact of

functional loading on craniofacial structures; Cone beam CT application in dentistry - advantages and limitations.

Joseph Travers, Ph.D. (Division of Biosciences): Taste plays a critical role in the decision to ingest palatable, nutritious food or to reject oftentimes bitter, poisonous substances. The fundamental neural circuits responsible for this decision are in the brainstem and include neurons in the reticular formation that are necessary for coordinated oromotor function. Our lab is using neuroanatomical, neurophysiological and neuropharmacological approaches to analyze how these circuits process sensory information to switch between multiple behaviors.

Susan Travers, Ph.D. (Division of Biosciences): Research in my lab investigates how the central nervous system processes sensory signals arising from the mouth. The oral cavity is richly innervated and supplies the organism with information critical to regulating eating and drinking. Our focus is the sense of taste, but we also study oral tactile and thermal sensations because all these modalities interact to give rise to the complex experience of flavor.

John Walters, D.D.S., M.M.Sc. (Division of Periodontology): Inflammation and phagocyte biology; Efficacy and pharmacology of antimicrobial and anti-inflammatory agents, focusing on the role of transporters in the distribution of these agents in periodontal tissues; Analytical biochemistry.

Christopher Weghorst, Ph.D. (Division of Environmental Health Sciences, College of Public Health): Molecular mechanisms of oral cancer development in humans and experimental tumor models, with an emphasis on identifying therapeutic and chemopreventive approaches aimed at specific gene targets. He currently has two translational clinical trials underway to assess the molecular effects and chemopreventive potential of black raspberries on human oral cancer development.