UW School of Dentistry
University of Washington

DEPARTMENT OF ORAL BIOLOGY

Defining the frontiers of dental research, education and patient care

SELF STUDY DOCUMENT

OCTOBER, 2004

DEPARTMENT OF ORAL BIOLOGY SELF-STUDY
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SECTION A. GENERAL SELF-EVALUATION

1. Departmental mission and role within the institution, strengths and evidence of excellence and leadership in the field.

School of Dentistry Mission Statement.

"The School of Dentistry shares the University's overall mission to generate, disseminate, and preserve knowledge, and to serve the community. The School is an integral part of the Health Sciences Center, and is an oral health care center of excellence serving the people of the State of Washington and the Pacific Northwest. Our primary mission, through educational, research, and service programs, is to prepare students to be competent oral health care professionals. The School's research programs contribute to the fundamental understanding of biologic processes and to the behavioral, biomedical, and clinical aspects of oral health. The service mission is to improve the health and well-being of the people of the community and the region through outreach programs that are especially attentive to minority and underserved populations. The School values diversity in its students, staff, faculty, and patient populations. It seeks to foster an environment of mutual respect where objectivity, imaginative inquiry, and the free exchange of ideas can flourish to facilitate personal development, professionalism, and a strong sense of self-worth."

This mission statement also applies to the Oral Biology Graduate Program, which is an integral part of the teaching mission of the School. The mission statement for the Oral Biology department reflects our role in the School of Dentistry and the dental research community

"The primary mission of the Department of Oral Biology is to bridge between the Basic Sciences and the clinical practice of Dentistry through excellence in teaching, in research and in the education of dental scientists for academic and research positions of leadership. Recent advances in basic sciences, the human genome project, and the new recognition of multidisciplinary contributions to the understanding of oral health and disease processes and treatment, place the Department of Oral Biology in an excellent position to contribute to the national effort to establish the genomics and proteomics of oral and craniofacial health and disease, relate these findings to overall health, and translate these advances into improved dental care and oral health. To address this mission the Oral Biology faculty participate in the discovery and teaching of current concepts and molecular findings in oral cell and tissue structure, function, and development, oral pathology and oral diseases with genomic and/or microbial etiologies. The department offers the PhD program for the School of Dentistry and is committed to the education of dentists as well as non-dentists, who seek advanced research training and careers in dental academia and research."

Strengths of Oral Biology programs. The strengths of our unit are our graduate and DDS teaching programs, our research programs, and our service programs. The department is charged with serving as a bridge between the basic sciences and dental clinical sciences. Our teaching, research and research training programs reflect this charge. The Oral Biology graduate programs strive to produce dental educators and researchers, while the undergraduate teaching program focuses on teaching development, structure and function, and diseases of the oral tissues to dental students. The research and research training programs focus on dental science-related research topics, and the public service programs include an oral pathology biopsy service for practicing dentists and a dental forensic consultant service for the King County Coroner's office. Each of these areas will be considered below.

a. Strengths of Oral Biology Graduate Programs. The Graduate program in Oral Biology serves as the School of Dentistry's PhD program in experimental biology and might more accurately be named "Oral and Craniofacial Sciences." The PhD program can now be combined with the DDS program. The ultimate goal of the PhD and DDS/PhD programs are to

produce the next generation of dental educators and dental researchers. In addition to the PhD program, the department also offers a Master of Science (thesis) and a Master of Science for Dental Hygiene Educators (non-thesis). Our Masters programs also emphasize training for academic careers. The major strengths of our graduate programs are the excellent faculty, the success of our students, and the suitability of our programs to serve the needs of the academic and professional community.

1) Faculty. The Oral Biology faculty for consists of all School of Dentistry faculty with advanced training in experimental biology who wish to mentor PhD students. Faculty with interest in dental research topics in other Schools also serve as mentors for students in the Oral Biology program and become associated with this program by adjunct appointments. Thus, we have a solid core of regular, joint and adjunct faculty in the department. Our faculty have expertise in the areas of biochemistry, physiology, molecular biology, developmental biology, bioengineering, microbiology, and immunology, all of which are relevant to state of the art modern studies in the area of oral sciences. They are nationally and internationally known. The excellence of our faculty is more fully described in Sections B, C, and D.

2) Oral Biology graduate students. The typical Oral Biology graduate student in the PhD program is a dentist who seeks a career either in dental education or in dental research. US-trained dentists who matriculate in the Oral Biology Masters program also generally plan to serve on the clinical faculty in a US dental school. These students may also concurrently be enrolled in a clinical specialty training program. Our department is successful in training individuals for academic and research careers as shown in Appendix E. During the past 10 years (since the late review) our department has graduated nine PhDs and we anticipate two additional PhDs in this academic year. Of the nine PhDs who have completed their degrees, seven also had concurrent advanced clinical training. Five of these individuals have full-time faculty or research positions, three have part-time or affiliate faculty positions, one is currently in advanced clinical training. Part-time and affiliate faculty play an important role in the School of Dentistry because they deliver care in the specialty clinics, and they deliver clinical instruction to dental and dental specialty students. Similarly, our Master of Science program has had six graduates of whom four have full or part-time faculty positions, one is in public health dentistry, and one in private practice. Our Master of Science for Dental Hygiene educators has had four graduates and all remain in academics. Oral Biology students who are US-trained dentists, and who plan to teach in a US dental school generally enroll in the Oral Biology PhD program and in a clinical dental specialty program. This dual training gives them the strong backgrounds in clinical dentistry and dental research required for a successful career at a US institution. The NIH supported this type of training through the Dentist Scientist Award (DSA) program from 1986-2001. Current emphasis is on the DDS/PhD program in order to identify individuals who are committed to academic dentistry at an earlier stage in their training (see below for more explanation for this change). The Oral Biology department under the leadership of Dean Somerman has revised and re-instituted the DDS/PhD program in the School of Dentistry. This program allows dental students to combine their DDS and PhD training, and provides financial support to encourage students to pursue careers in dental education and research. Both the University of Washington and the Washington State Dental Association have been fully supportive of this program and have made financial contributions to it.

Oral Biology graduate students: Foreign-trained dentists. The Oral Biology graduate program also accepts foreign-trained dentists. Many of these students are sponsored by their governments, which may cover tuition costs and provide a stipend as well. In return, these students are obligated to return to their homelands and to spend a given number of years teaching in a dental school or performing dental research. These students do very well in their graduate studies here, and become leaders in education and research in their home countries.

More recently a new trend has evolved regarding the career goals of foreign-trained dentists. This group has emerged as a major source of candidates for faculty positions in US dental schools. This is currently a very important group due to the need for dental faculty within the US.

3) Suitability of our programs to serve the needs of the academic and professional community and the need for dental faculty.

The PhD and MS Programs. A report published by the American Dental Education Association indicates there were 344 vacant budgeted faculty positions in the nation's 54 dental schools in 2001-2002 (Haden et al., *J Dent Educ* 66, 1102-1113, 2002). Fourteen dentals schools had 10 or more vacant budgeted positions, 16 schools had 5 to 9, and 24 schools had 4 or less. Hence, this is a national pattern. The two major reasons for these vacancies are retirement and the option of private practice. In terms of retirement, 50% of the US dental school faculty are 50 years of age or older, and 20% are 60 or older. If the full time faculty who are currently 60 or older retire in the next decade, this will result in 900 vacancies. Moreover, if the economy should improve, the rate of retirement will likely increase. In addition, many dental faculty separations are now for entry into private practice. In terms of actual numbers, about 350 dental school faculty members entered private practice in 2000-2001, but in 2001-2002, 1011 faculty left; a nearly 3-fold increase. This latter figure represents 9% of the total (full and part time) faculty. Faculty loss due to retirement was relatively steady at about 140 individuals per year, but faculty loss to private practice increased dramatically between 2001 and 2002 (Haden et al., 2002).

The most obvious reason for the exodus of dental faculty is because of the difference between private practice and dental school salaries. To illustrate this point, the latest figures available indicate for 2002 the gross income for general dentists in Pacific coast states averaged $673,806 (2003 Dental Economics Practice Survey, R. Willeford; http://de.pennnet.com/home.cfm) or $236,000 net salary assuming an overhead rate of 65%. In contrast, the current average salary for the UW School of Dentistry is $96,792 for Associate Professors (UW records). Hence, locally, the average practicing dentist makes 2.4X the salary of an Associate Professor with at least 6 years of service. The same is true nationally. Thus, it is not surprising that dental educators are tempted to leave faculty positions to enter private practice. We fully recognize that the type of individual who is committed to an academic career must be identified, nurtured, and effectively mentored throughout their training. Our department has been successful in training dental academics and researchers (see Appendix E for current positions of our students)

New dental graduates do not choose academic careers. The large difference in salaries between dentists in private practice and dental school salaries coupled with the fact that the average dental student in a public university now graduates with an education debt between $100,000 and $150,000 (ADEA (American Dental Education Association) Dental Education At-A-Glance

2004, www.adea.org/DEPR/2004_Dental_Ed_At_A_Glance.pdf) has led to a precipitous drop in the number of US trained dentists who seek careers in dental education. The National Institute of Dental and Craniofacial Research (NIDCR) recognized the need for new dental faculty several years ago and initiated the Dentist Scientist Award (DSA) program. This program paid substantial stipends (>$40K) to dentists to obtain training in a dental specialty as well as in research training at the PhD level. Although many US-trained dentists matriculated in these programs nationwide, the number who pursued careers in academia following completion of their training was disappointing. Consequently, the DSA program was discontinued by the NIDCR, and enrollment of US-trained dentists in PhD programs dropped dramatically. We are still in the post-DSA climate, and there are currently relatively few applications from qualified US-trained dentists to our PhD program. Hence, it is not immediately obvious how the next generation of dental educators in this country will be recruited. The new emphasis on DDS/PhD programs nationally is expected to help alleviate this problem but the number of these individuals is small and they are currently in a long training period.

The School of Dentistry currently has a research training grant from the National Institute of Dental and Craniofacial Research (NIDCR), headed by Dr. Izutsu, Chairman of the Department of Oral Biology. This supports graduate-level research training of dentists and others interested in careers as dental educators and/or dental researchers. The number of applications from qualified US-trained dentists is very low compared with the numbers during the DSA program era; our best applicants are those trained in basic sciences who see an opportunity for a career in dental research.

The statistics above indicate an impending crisis in faculty manpower for US dental schools. Based on the experience from our graduate program, we believe that foreign-trained dentists will play an important future role in dental education in this country. We have observed that foreign-trained dentists often seek careers as dental educators because they view University teaching to be an important public service and a prestigious career. Students from Asian and Middle Eastern countries especially seek careers as dental educators and researchers. Foreign-trained dentists in our program have been academically competitive, talented in research, and often elect to receive both research training and advanced clinical specialty training. The latter training makes them eligible for licensing to practice dentistry in this country, and their overall training makes them competitive applicants for faculty positions. Several foreign-trained dentists who completed our graduate program now have faculty positions in US dental schools or related institutions (Drs. D'Silva, PhD, University of Michigan; Hua, PhD, Meharry; Yilmaz, PhD, University of Washington, Pathobiology; and Bharat, MS, Lake Washington Technical College Dental Hygiene program). At least two of our current graduate students who are foreign-trained dentists (Drs. Cai and Sun) are also interested in seeking careers teaching in dental schools in this country. Both students are taking or applying to dental clinical specialty programs in addition to completing their PhD in order to prepare for such careers. One of these students is receiving financial aid from our School in recognition of his potential as a future dental educator (Dr. Shiwei Cai). We predict that the training of foreign-trained dentists via the Oral Biology graduate program can become a major source of faculty for US dental schools in the immediate future. We draw on the world as our base for recruitment of outstanding students for our PhD and Master's programs.

Master of Science for Dental Hygiene Educators program. The department also has a Masters program designed to train Dental Hygiene educators, i.e. individuals who seek more in depth academic training in order to teach in Dental Hygiene programs throughout the country. In order to teach in a dental hygiene program accredited by the Commission on Accreditation of Dental and Allied Dental Programs, a faculty member must hold a degree above the degree that is being granted. For example, colleges with programs leading to the AAS degree must have instructors with at least a Bachelors degree. Programs awarding the Bachelors degree must have faculty with at least a Masters degree; and programs awarding a Masters degree must have faculty with the PhD degree.

There are currently 7 programs in the state that offer the AAS degree in dental hygiene: Clark College (Vancouver), Columbia Basin CC (Pasco), Lake Washington Technical College (Kirkland), Pierce College (Lakeview), Seattle Central CC (in development), Shoreline CC, and Yakima CC. In addition, 2 programs offer the BS in dental hygiene at various locations: Eastern Washington University (Clark College, Shoreline CC and Pierce College) and University of Washington School of Dentistry (Degree Completion Program). Only one program in the state offers the Masters in Dental Hygiene: the Oral Biology Dental Hygiene Educators Masters program. Thus, graduates of our program play an important role in teaching in both the AAS and Bachelors dental hygiene programs in this state, and elsewhere. There are only a few programs in the country that train Dental Hygiene educators at the Masters level. The 10 most visible of these have formed the Consortium of Graduate Programs in Dental Hygiene. Members include Baylor College of Dentistry, Idaho State University, University of Michigan, University of Missouri, University of North Carolina, University of New Mexico, University of Texas at San Antonio, University of Maryland, Old Dominion University (Virginia), and West Virginia University.

There is a great demand for dental hygienists in most metropolitan areas, including Seattle. Dental hygienists are important assistants in a dental practice. In the state of Washington they are capable of performing many expanded duties under the supervision of a dentist, and they perform the great majority of routine dental maintenance care (such as tooth cleanings). The average salary for dental hygienists is high enough that hygienists working as dental hygiene educators generally take a cut in pay (similar to the situation with dental faculty). In the Seattle area, dental hygienists averaged $78,720 a year when working 40 hours/week in 2003; from the Washington State Dental Hygienists' Association website (http://www/wsdha.com/pubs/144_562_2296.cfm). Hence, individuals generally have altruistic reasons for choosing a career in dental hygiene education and our applicants are very committed individuals. Because of this economic constraint, we receive relatively few applications to our dental hygiene educators Masters program, however, every individual accepted into the program has obtained a teaching position somewhere in the US or remained in research training.

Our Dental Hygiene Educators Masters program does not teach students how to perform clinical functions. Our program is designed to make the student proficient in subject areas that are taught in the Dental Hygiene programs. These topics include: histology, structure, function and development of the oral tissues; immunology, microbiology, pathology of the oral tissues; sedation; and more recently, methodologies of dental research. Graduates of this program have also gone on to assume administrative positions at their institutions.

b. Strength in Professional education.

Didactic Training. The department is responsible for teaching oral science-related basic science courses to dental students. These courses include structure, function and development of the oral tissues (ORALB 510), molecular microbiology and oral diseases (ORALB 520), medical microbiology and immunology (ORALB 521) and clinical oral pathology conference (ORALB 540). In addition, Oral Biology faculty member Eileen Watson is course director for PHARM 434, one of two introductory pharmacology courses required for dental students. These courses aim to give dental students basic knowledge about how the oral tissues develop and function, about the major infectious organisms of the body and mouth, and how the body reacts to such infections, about other pathological conditions that arise in the mouth, and about drugs that are used to treat these various conditions.

The success and effectiveness of departmental courses is measured by the superb results of UW dental students on the National Board Examinations given at the end of the second year (Part I) and during the fourth year (Part II). These tests are an integral part of the licensing procedure in Washington and other states. In order to become a licensed dentist, candidates must pass an educational requirement, a written examination requirement and a clinical examination requirement. The written examination for all 50 states, the District of Columbia, Puerto Rico and the Virgin Islands consists of this two part examinations given by the Joint Commission on National Dental Examinations. Hence, these examinations serve as a measure of a candidate's professional progress and reflect the success of the School in teaching effectiveness. The scores for Part I are broken down into Anatomic Sciences, Biochemistry-Physiology, Microbiology-Pathology, and Dental Anatomy and Occlusion. A ranking is given of how our dental students compare with students in other dental schools across the above 53 jurisdictions. The overall test score for Part I has been in the upper quintile for the past 5 years. The score for the section covered by our oral tissues course has been above the national average for the past 5 years, and the scores for the section covered by our microbiology courses have been above the national average for 4 of the past 5 years. (This score fell below the national average when general microbiology was removed from the curriculum and made a prerequisite for admission to dental school. When the School re-instituted a medical microbiology and immunology course the UW scores for this section then increased above the national average, and have remained there for the past 4 years).

Our students' knowledge of pharmacology is tested in Part II of the National Boards. Our students have ranked in the highest quintile in Pharmacology for the past 5 years. Moreover, our students ranked number one out of all of the national dental schools last year for Part II of the National Boards. These results indicate that the School is doing an excellent job in educating our dental students and that the Oral Biology department contributes to this success for the future dentists of the state.

Research opportunities for undergraduate and DDS students. Undergraduate students may contact Oral Biology faculty members and arrange to do a laboratory research project. Students receive credit for this activity through ORALB 449 (undergraduate research). Dental students participate in research through the Summer Research Fellowship (SURF) program and get elective credit for their efforts. The department encourages faculty to mentor both undergraduate

and DDS students in laboratory research, and most faculty have participated in these programs. A list of recent SURF projects with Oral Biology faculty is included in Section F.4.

c. Strength in Research.

The faculty of the Oral Biology graduate programs are very active and successful in research. The department has had an annual research and research training grant budget of approximately 1.5 million dollars for the past several years. The Adjunct faculty in Oral Biology have research grant funds that are several fold greater than that of the department. Research activities and funding are fully described in Section C. Research and Productivity. The Department of Oral Biology has had both a formal and informal association with major research initiatives in the School of Dentistry and the Health Sciences that have been funded by the National Institute of Dental and Craniofacial Research. The Center for Research in Oral Biology (1975-1988), was begun by Leo Sreebny, the first Chairman of the Oral Biology department. This developed into the Research Center for Oral Biology (RCOB, 1987-2000). Beverly Dale-Crunk became director of the RCOB in 1996. She then headed the Development phase of the Comprehensive Center for Oral Health Research (CCOHR)(1997-99), and became then Scientific Director of the CCOHR (1999 – 2004). An NIH supported Training Grant in Salivary Secretions (1975-2002) has now become the Cross Disciplinary Dental Science Research Training Grant for Dental Scientists, headed by Dr. Izutsu (2002-present). It combines the previous training grants from both Oral Biology and Periodontics and supports predoctoral and postdoctoral students and short term research by dental students. The Department of Oral Biology now has active interdisciplinary research and training initiatives with Bioengineering and with Pediatric Dentistry.

Our faculty are widely respected and sought after for timely review articles in their fields, and as reviewers for journals and grants. They have served as program directors of Gordon conferences (Dale-Crunk, Narayanan) and national and international meetings (Herring, Darveau) and invited symposia (all senior members of the department). They serve as members of editorial boards and NIH advisory groups. Two members of the Oral Biology faculty were the recipients of NIH MERIT awards (Watson and Dale-Crunk) and two were recipients of International Association of Dental Research Awards (Herring and Dale-Crunk), and one former faculty member received the IADR Young Scientist Award (Lamont).

d. Strength in Service.

The faculty of the Oral Biology Graduate Program perform service to the University and community in several ways. This service can be to the community, to professional organizations, to the NIH, or to journals. Much of this service is based on their recognized expertise in their clinical and/or their research areas. Service of individual faculty members on editorial boards, as reviewers for journals or NIH grants, or to serve as officers in professional organizations based on their nationally recognized expertise on a specific research topic or area is summarized in the Table of Service at the end of this section. Our faculty members are well recognized in this respect, and serve in all of the above capacities. The major service areas are briefly discussed in the following paragraphs.

1) Oral Pathology Service. Dr. Tom Morton (of the Oral Biology faculty) performs a public service because of his recognized expertise in oral and maxillofacial pathology and in forensic dentistry (odontology). In the School, Dr. Morton teaches oral pathology to dental

students, to Oral Biology MS and PhD students, and to students in the graduate clinical specialty programs in the School of Dentistry. Dr. Morton also serves as Co-Director of the Oral and Maxillofacial Pathology Biopsy service. This service evaluates over 5,000 biopsies per year from Northwest general dentists, dental specialists who are trying to establish the diagnosis of various oral diseases including cancer in their patients. He also consults on cases from NW hospitals and general pathology services. This is an extremely vital service that the Northwest relies on to preserve the general and oral health of their patients.

2) King County Medical Examiner Division. Dr. Morton also serves as a consultant forensic odontologist for the King County Medical Examiner Division of the Department of Health. In this capacity, Dr. Morton has used dental remains to identify more than 300 individuals over the past three decades, including over 40 victims of the Green River killer. Dr. Morton is one of two local specialists who perform this function for the King County Medical Examiner and one of a few forensic dental experts that serve as a consultant for City, County police and sheriff jurisdictions in Western Washington and throughout the state. During the Green River murder investigation he also assisted with the identification of unknown cases from other Western States. He is frequently invited to present talks of forensic dentistry to local schools and colleges as well as to local dental professional groups, state and national dental organizations, and to public health and medical specialty groups.

3) Overview of faculty service to the national and international professional community. Faculty members serve as officers in their professional organizations, they serve on Program Committees for national meetings of their professional organizations, they serve on NIH study sections either as regular members or on an ad hoc basis, they also serve as grant reviewers for the NSF as well as science organizations in other countries, and they serve as reviewers for journals. Faculty have served as grant reviewers for: the National Institute of Dental and Craniofacial Research; of Gerontology and Rehabilitation; of Allergy and Infectious Diseases; of Arthritis, Musculoskeletal and Skin Diseases. In addition, faculty have served as grant reviewers for the National Science Foundation, the Environmental Protection Agency, the Medical Research Council of Canada, the Israeli Academy of Sciences and Humanity, the US Civilian Research and Development Foundation, the Welcome Trust, etc. Faculty have served as officers or meeting organizers for the Gordon Research Conferences, the International Association of Dental Research, American Society of Human Genetics, the American Society of Microbiology, the American Association for the Advancement of Science, the Teratology Society, Society for Investigative Dermatology, the American Association of Anatomists, International Society of Vertebrate Morphology, etc. Faculty serve on the editorial boards of the Journal of Dental Research, Journal of Biological Chemistry, Cells, Tissues, Organs, Journal of Morphology, Integrative and Comparative Biology, and Archives of Oral Biology. Faculty have also reviewed manuscripts for a host of journals covering dental research, genetics, microbiology, teratology, dermatology, infectious diseases, oral biology, anatomy, physiology, etc. Thus, the Oral Biology Graduate Program faculty are extremely active in their service to the NIH and to professional organizations and journals, a reflection of national recognition of scientific expertise.

2. Measures of success.

All of the above contributions are measures of success of the unit as a whole. Our teaching, research and service performance are similar to or surpass those of other successful Oral Biology programs in the country. The units that we consider to be our peers include the University of Michigan, University of California at San Francisco, University of Texas Health Science Center, San Antonio, State University of New York, Buffalo.

Program effectiveness at the level of professional (DDS) education is shown by the outstanding scores of University of Washington students on National board exams. Program effectiveness at the graduate level is measured by competitiveness of our students in the conjoint courses taken with graduate students from all health sciences departments and given by the Cell and Molecular Biology Program. Our students conduct research with regular Oral Biology faculty and adjunct faculty throughout the Health Sciences and published their research in highly regarded scientific journals. Program effectiveness is also indicated by the number of students who receive postdoctoral offers or faculty positions at other schools. All of our PhDs are maintaining affiliations with dental schools. Student and peer evaluation of departmental courses is routinely very favorable. Exit surveys show satisfaction with our graduate programs and that level of satisfaction has improved over the last 10 years. Our faculty are successful as shown by awards, national professional responsibilities, and publications as well as by service to the community, state, and region.

3. What are our weaknesses?

Our unit does have weaknesses. Recruitment of excellent students, student support, continuity of research funding, and the need to update equipment all represent problems for us. The current low rate of recruitment of US-trained dentists into our graduate programs is a nationwide problem for Oral Biology and Oral Sciences programs for the reasons cited above. This situation probably will not change until there is a change in the economic climate. For example, if dental school salaries increase significantly, or if the salaries of practicing dentists fall because of the economic downturn, then more US-trained dentists would find dental education to be an attractive career alternative. In the meantime, we will pursue our strategy of training the best US and foreign dentists to assume faculty positions in US dental schools and to recruit to our DDS/PhD program. Another weakness is that the faculty of the department are dependent on NIH research grants to support their work at a time when NIH funds are projected to decrease due to other national priorities. The department would greatly benefit from an endowment to help cover research costs during periods between grants, to help junior faculty with start-up funding, and to support promising new directions in research. An endowment would also help purchase costly new technologically advanced instruments, such as a phosphor-imager, a confocal microscope, and a mass spectrometer, that would benefit multiple users. A significant weakness for our graduate program is that the department has no student assistantships that it can use for recruitment purposes; we have only one quarter of funding through the Graduate School Top Scholar program. Several Teaching Assistantships would especially be helpful: one in support of Dr. Popowics' morphology and development course, another to support Dr. Darveau's microbiology courses, and a third for Dr. Presland's molecular biology laboratory course. Finally, the department needs to develop a faculty recruitment strategy to replace faculty who are

expect to retire in the next few years, but lacks the state-line positions to move ahead with recruitment.

The underlying problems associated with the first three of these problems are not going away in the near future. However, our department has a number of goals associated with the School of Dentistry development program now getting underway. Thus, partnership with Pediatric Dentistry and Dental Public Health Sciences in the Early Childhood Oral Health Center is expected to help to develop research infrastructure and we hope that it will provide funding for an endowed chair that will benefit both our department and Pediatric Dentistry. We are also hopeful that Teaching Assistantships may be forthcoming for our students in response to this Self Study and program review.

4. Changes in teaching, research and service in the field. Goals for the future.

There has been a substantial change in the aim of the Oral Biology graduate program since its inception. It has evolved from a PhD and graduate program based on the Department of Oral Biology faculty to a PhD program for the School of Dentistry faculty. This change occurred with the guidance of previous Deans Omnell and Robertson, and current Dean Somerman. This change has greatly increased the inherent value of the graduate program, and it now plays an important role in producing future dental educators for this country.

The emergence of molecular biology as a major paradigm for studying biological questions has led to recruitment of regular and adjunct faculty familiar with genetics, genomics and molecular biology approaches. This has resulted in an updating of all of the department's courses as well as addition of new courses focused on these techniques and approaches (e.g., the new Molecular Biology series taught in conjunction with Microbiology). Moreover, as these new concepts are applied to clinical dentistry, more teaching collaborations have developed between Oral Biology (Dr. Presland) and clinical departments, especially Periodontics (Dr. Roberts). Other clinical departments have also come to realize the likely importance of molecular biology in the future of their disciplines. In response, they have made ORALB 591-3 (Advanced topics in Oral Biology and Medicine) directed by Sue Herring a required course for their clinical specialty programs. This course aims to update clinicians on the molecular advances that have been made in the cell biology of the tissues they are clinically involved with on a daily basis. Hence, the "mind-set" of the clinical faculty of the School of Dentistry has undergone a major change in the past decade. The faculty of the clinical departments now embrace the application of basic science to their specialties, and support addition of cell biology courses such as ORALB 591-3 and dentist-scientist training pathways such as the DDS/PhD program in their own programs and in the School in general. These courses have become part of the Core curriculum for several graduate dental specialty programs.

Advances in the basic sciences, the human genome project, and the recognition of multidisciplinary contributions to the understanding of human disease have led to a revision of the way in which our department views its role in dental research. This is reflected in our recently revised Mission Statement and our emphasis on molecular mechanisms and interdisciplinary approaches to oral problems.

Recent years have also seen a greater national emphasis for applying laboratory findings to the clinic. The department's recognition of this change has led to our attempts to build increased ties with clinical departments and with Bioengineering. Hence, our Cross-Disciplinary Dental Research Training grant, our combined research seminar series, and our increased research collaborations with Bioengineering faculty are part of our attempt to find more clinical applications for existing laboratory findings. A second type of collaboration is in the development of a Center for Early Childhood Oral Health that is part of the School of Dentistry goals for the new development efforts. Our department will be part of this center that will emphasize new investigations on susceptibility to oral disease. We expect these collaborations to continue and to be expanded in number in the future.

The goals of the Oral Biology graduate program in the coming operating period are:

1) To educate as many highly qualified dental educators as possible in order to meet the predicted coming shortfall in faculty numbers arising from the separation of current dental school faculty to private practice and retirement. This will be accomplished by i) vigorous recruiting for the DDS/PhD Combined Program, ii) by vigorous recruiting of US trained dentists for careers in dental education, and by collaborating with the Department of Pediatric Dentistry to use the NIDCR Education Debt Forgiveness program as an inducement to matriculate graduate students interested in pediatric dental research; iii) by recruitment of quality foreign trained dentists as future dental educators in the US.

2) To increase research training of students in clinically relevant research. This will be done by i) stressing disease-related research directions and training, ii) by encouraging our collaborative research training efforts with Bioengineering that is focused on producing clinically useful disease detection and intervention procedures, iii) by encouraging research related to early childhood diseases by working with the Center for Early Childhood Oral Health.

Progress has already been made on the first strategy as individual researchers have aimed their research projects towards clinical ends in order to have more competitive NIH research grant proposals because of the recent more stringent NIH requirement for clinically relevant and directed research. Progress has also already been made on the Bioengineering collaboration strategy with the funding of the jointly prepared Cross-Disciplinary Dental Research Training grant, the joint research seminar program, the initiation of discussions to establish the Bioengineering pathway for dentists and biologists, and the collaborative research proposals and projects that have been generated by Bioengineering and School of Dentistry faculty.

The strategy for development of the Center for Early Childhood Oral Health is currently in the fund-raising stage. It is a part of the Campaign UW: Creating Futures fund raising campaign of the School of Dentistry. The Department of Oral Biology has joined with the Departments of Dental Public Health Sciences and Pediatric Dentistry to work to develop a University of Washington School of Dentistry Center for Early Childhood Oral Health (CECOH). This Center is designed to impact on childhood dental caries, which the Surgeon General called the "silent epidemic" and the "greatest unmet need in childhood". The drive to create this Center is led by Dr. Joel Berg, Professor and Chair of the Department of Pediatric Dentistry. The CECOH will organize, plan and disseminate important research to address the devastating childhood dental

caries problem faced by many families, especially those of lower social-economic status. Funding for the CECOH will create important endowed chairs in Pediatric Dentistry, Oral Biology, Dental Public Health Sciences, and Pediatrics in order to attract and retain recognized experts in caries research and childhood oral health; create a physical Center wherein service delivery training models can be developed and disseminated; train UW dental students to manage oral health in infants and toddlers, and create administrative support to manage major clinical operations as well as to support clinical research in this area. If financial targets are met, the Department of Oral Biology will collaborate with the CECOH in an effort to recruit an Oral Biology faculty member with internationally recognized expertise in childhood caries biology in order to train graduate students in this important research area, as well as to educate clinicians about ways to decrease the incidence of caries and to prevent cases of debilitating rampant childhood caries.

3) To begin designing the Oral Biology departmental faculty of the near future. While it is true that the department currently has no identifiable funding sources to recruit new faculty, it is attempting to add at least one new faculty member through the CECOH initiative of the current UW fund drive campaign. In addition, the department's senior faculty are reaching an age such that it is highly probable that many of them will be retired when the next program review takes place. There may be as many as four retirements in the next decade. Since this is the case, it would be highly beneficial to the department if new individuals could be recruited in such a way as to allow several years overlap in service.

4) To work to increase underrepresented minority applicants to School of Dentistry programs by participating in the RISE grant recruitment efforts at the Heritage College and by working with the School to support the Yakima Valley ConneX Program, by recruiting for the School's DDS/PhD Dentist Scientist program, by promulgating information about School programs amongst faculty and students of the Department of Bioengineering, and by using departmental, School and Graduate School funds to attempt to recruit underrepresented minorities who apply to our graduate program.

5. Differences and concordance of the role of Oral Biology in the School of Dentistry and the University. How are any differences being resolved?

The previous Graduate School review of the Department of Oral Biology stated that graduate education within the School of Dentistry "is often construed to mean largely Masters level training" (MSD with emphasis in a clinical areas). "Until recently there was little support for combining training in basic research and clinical applications." We are pleased to report that this attitude has improved. Many of our students do both basic science and clinical training. The new DDS/PhD program has seen wide support from the Dean, clinical department chairs, and the University. Our future goals include improvements in bringing basic science to clinical applications as in the Cross Disciplinary Training Grant and the Early Childhood Oral Health Center mentioned above. Nevertheless, there is still ample room for improvement and better communication and interaction between clinical and basic science departments within the School of Dentistry. The role of Oral Biology as a basic science department in the University is clearly concordant with University goals of emphasis on quality teaching, research, and service.

Table 1. FACULTY SERVICE AND HONORS

FACULTY MEMBER	FACULTY SERVICE AND HONORS
Bordin, Sandra	Ad Hoc member of Advisory Committees for the Medical Research Council of Canada (91-present) Ad Hoc Reviewer Israeli Academy of Sciences and Humanities (92) Ad Hoc Reviewer NSF (96) Ad Hoc Reviewer NIH, Gerontology and Rehabilitation Program (98) Ad Hoc Reviewer NIH, Gerontology and Rehabilitation Program (01) Mentor, 2nd prize, AADR/Warner Lambert Hatton Competition (02) Editorial Board of Journal of Dental Research (03-05) Mentor, 1st prize, The California Society of Periodontists (04)
Byers, Margaret	Int. Assn. Dental Res., Distinguished Scientist Award (Pulp Biology) (95) Kanagawa Odontological Society, honorary membership (95) Honorary member: American Association of Endodontists (99) Member, Special Emphasis Panel, NIDCR (1990-present) Member, Wellcome Trust IADR, Pulp Biology Group, Vice President, President (1992-95) NIDCR Small Grants Study Section (1998-2002) Editorial Board: J Dental Research (1997-2000); Anatomical Record (1988-1998)
Byers, Peter	Established Investigator, American Heart Association (79-84) Reviewer for American Journal of Human Genetics, Human Molecular Genetics, J Clinical Investigations. President-Elect/President, American Society of Human Genetics (04-05) Editorial Board, J Medical Genetics Grant reviews for: March of Dimes; Norwegian Science Foundation
Cangelosi, Gerard	Grant Review Panels: U.S. EPA ORD (99-00, 03-04) Ad Hoc Grant Review Service: National Institution of Health (99) U.S. Dept. of Veterans' Affairs Merit Review (97) U.S. Dept. of Defense (99) U.S. Civilian Research and Development Foundation (CRDF) (00) The Wellcome Trust (01) Steering Committee Co-Chair, ASM/AAM Critical Issues Colloquium of Environmental Pathogens, Portland, OR (04) Organizer, Symposium on Environmental Pathogens American Association for the Advancement of Science (AAAS) Annual Meeting (04)

Chung, Whasun	Student Travel Grant, American Society for Microbiology (97) Dean's Student Travel Award, School of Public Health and Community Medicine, Univ of WA, (97 & 98)
Cunningham, Michael	Recipient of The James G. Wilson Award-Excellence in Research, Teratology Society (93) Recipient of The F. Clarke Fraser, New Investigator Award, Teratology Society (01) Chair, Partnering Committee, Teratology Society, (96-98) Strategic Planning Committee, Teratology Society (96-99) Liaison Representative to the American Cleft Palate -Craniofacial Association, Teratology Society (96-03) Planning Committee, 2001 David W. Smith Workshop on Malformations and Morphogenesis (00-01) Scientific Planning Committee, 2002 Teratology Society Meeting (01-02) Scientific Planning Committee, 2002 American Cleft Palate Craniofacial Society Meeting (01-02) Deputy Editor, Birth Defects Research: Clinical and Molecular Teratology Reviewer for the following journals: American Journal of Medical Genetics Annals of Epidemiology Cleft Palate-Craniofacial Journal Development Journal of Dental Research Journal of Medical Genetics Journal of Neurosurgery Journal of Pediatrics Pediatric and Development Pathology Pediatrics Teratology
Dale-Crunk, Beverly	NIH Merit Award (87) Chair, Gordon Conference on Epithelial Differentiation (91) Program Comm., Soc. Invest. Dermatol. (87-91; Chair 91-92) Board Member, Soc. Investigative Dermatology (92-97) AADR, Publications Committee (94-95) NIDR, Board of Scientific Counselors (94-98) IADR Oral Biology Research Award (99) Editorial Board, J Biological Chemistry
Darveau, Richard	Invited speaker at Invermere Conference on Infectious Disease (88) Invited speaker, Internal Seminar Series sponsored by the Pres of Bristol-Myers Squibb Pharm Res Inst (91) Invited speaker at Future Trends in Chemotherapy Conference, Geneva, Switzerland (92) Invited speaker at International Endotoxin Society Third Conference, Helsinki, Finland (94) Invited speaker at Interactions in Periodontal Disease conference, St. Petersburg, FL (96)

	Invited participant Workshop on Infectious Disease Planning Workshop, NIH, NIDR, Bethesda, MD (97) Appointed to Steering Comm for Amer. Academy of Microbiology Colloquia on commensal bacteria (00) Member NIDCR Oral Biology and Microbiology Study Section (00-present) Organized Beneficial Microbial Workshop for the NIDCR held in Seattle, WA (01) Chairperson, Special Study Section for Partnerships for Novel Therapeutic, Diagnostic and Vector Control Strategies in Infections Diseases Part II, NIAID, NIH (02) Chair, Organizing Committee for ASM Beneficial Microbe Conference (04) Reviewer for the Journal of Immunology Infection and Immunity Clinical Experimental Immunology Chair for the organizing committee for the upcoming American Society of Microbiology meeting on Beneficial Microorganisms
Eyre, David	Member, NIH Study Section on Orthopaedics and Musculoskeletal (90-94) Chairman, Gordon Research Conference on Bioengineering and Orthopaedic Science (92) Elected Fellow of the American Association for the Advancement of Science (92)
Fatherazi, Sahba	Reviewer for J Dental Research PhD Scholar, University of London Scholar of the American Association of University Women.
Geurtsen, Werner	German Society of Dentistry and Oral Medicine Scientific Counselor (92-02) Chair, Annual Meeting, German Society of Dentistry and Oral Medicine (02).
Herring, Susan	Editorial Board, *Acta Anatomica* (now *Cells, Tissues, Organs*); Associate Editor (89-04) Oral Biology and Medicine II Study Section and NIH Health Reviewers Reserve, NIH (86-93) Elected Fellow, AAAS (92) Editorial Board, *Journal of Dental Research* (95-98; & 03-present) Editorial Board, *Journal of Morphology* (97- present) Associate Editor, *American Zoologist (*now *Integrative and Comparative Biology)* (99-present) IADR Craniofacial Biology Research Award (99) Editorial Board, *Archives of Oral Biology* (03) Am. Soc. Zoologists (now Soc. Integ. Comp. Biol.): (83-84), Chair, Div. of Vertebrate Morphology; (86), Chair, Regional Mtg.; (88-89), ASZ Executive Comm.; 1991-4, Program Adv. Comm., (00-2) Am. Assoc. Anatomists: (85-90), Basmajian Award Comm. (Chair, (88-90); Symposium Organizer, (92) Int. Assoc. Dental Research: (91-96), Sec.-Treas., Seattle Sect.; (93, 93-94), Local Comm. for International Mtg.; (93-96), Director, (95-97), Vice President- President, Craniofacial Biology Group Int. Soc. Vert. Morphology: (92-94), Convener, ICVM-4; (94-97), President; (97-01) Exec. Comm.

Izutsu, Kenneth	NIDR Special Grants Study Section (85-88) Chief Ph.D. Examiner, Margareta Muller, U. Stockholm (87) "Analytical EM in Secretory Cells", President's Symposium, Electron Microscopy Society of America, (85) "Analytical EM in Secretory Cells", Opening symposium, International Congress of Oral Biology (86) President, Salivary Research Group (93-94) Editorial Board, J. Dental Research (95-97) Member, NIDR OBM Study Section (95-99) Ad Hoc Reviewer, Special Emphasis Panel, NIDCR (00-03) Ad Hoc Reviewer: J. Invest. Dermatol, Am J Physiology, Proc Soc Expert Biology, Arch. Oral Biology.
Jackson, Douglass	Bright Smiles, Bright Futures Faculty Recognition Award, awarded at the annual meeting of the National Dental Association, New Orleans, LA, (03)
King, Gregory	Member of NIH Oral Biology and Medicine Study Section (AHR) (81-85) Member NIH Oral Biology and Medicine Study Section (OBM-2) (89-92) Recipient of American Association of Orthodontists Milo Hellman Research Award (80)
Morton, Thomas	Reviewer for the Journal of Contemporary Dental Practice (3 years) Reviewer for The Journal of Dental Education (03-04) NIH Consensus Development Proj on Criteria for Clinical Trials in Chronic Graft-versus Host Disease (04)
Narayanan, A. Sampath	Earl Johnson Periodontal Regeneration Award, American Academy of Periodontology (96) Editorial Board, Journal of Dental Research (94) Editorial Board, Journal of Periodontal Research (86) Chairperson, Gordon Research Conferences on Periodontal Diseases (81)
Popowics, Tracy	Fulbright Grant, University of Helsinki, Finland (94-95) Faculty of the Year, Classes 2003, 2005 , 2006.
Presland, Richard	Career Development Award, Dermatology Foundation (95-98) Travel Award, Japanese Soc. for Investigative Dermatology, Kyoto, Japan, 1993. Grant reviewer, NIH-NIAMSD, 2003 Reviewer, J Invest Dermatology,
Ramsay, Douglas	Reviewer for the following: J. Academy of General Dentistry Angle Orthodontist Psychopharmacology J. Periodontal Res. Pharmacology, Biochemistry & Behavior J. Dental Res. (Editorial Board (99-02; 7) American J. Orthodontics and Dentofacial Orthopedics J. Experimental Psych: ABP Psychological Review JADA Physiology & Behavior Behavioral Neuroscience

	Archives of Oral Biology Brain Res. J. Physchosomatic Res. J. Pharmacol & Experimental Therapeutics Grant Reviewer (ad hoc) for the following: National Science Foundation (94) National Institutes of Health Study Section [Basic Behavioral Science Research (NIDA-D) Behavioral Processes (BBBP-1), Special Emphasis Panel (SSS-C), Human Genome (GNOM-E)], NIDA extramural contract review program (01-02) Canadian Institutes of Health Research (02) NIDA's CERBA program (03)
Robinovitch, Murray	Oral Biology and Medicine Study Section (76-80) Chairman, Oral Biology and Medicine Study Section (78-80) Salivary Researcher of the Year, Salivary Research Section ,IADR (93)
Rose, Timothy	Yamagiwa-Yoshida Memorial International Cancer Study Grant, International Union Against Cancer (83) Exceptional Research Fund Award, M.J. Murdock Charitable Trust(95) Shannon Award, National Institutes of Health (96) Grant Reviewer for the following: Royalty Research Fund-University of Washington Special Emphasis Panel, Center for Scientific Review, NIH The Wellcome Trust Washington Primate Center Research Advisor Committee: Project Reviews Manuscript Reviewer for the following: FASEB Journal Gene Genomics Journal of Infectious Diseases Lancet Journal
Rutherford, Bruce	Editorial Board Journal of Dental Research (95-98) Invited Presentations: Regeneration of Oral Tissues Using Recombinant Protein/ Carrier Molecule Combinations. Symposium title Controlled Drug Delivery: Applications in Oral Disease Therapy (94) Role of Osteogenic Protein-1 in Dentin Regeneration. International Congress of Oral Biology (94) Role of Osteogenic Protein-1 in Dentin Regeneration. Inserm Odont (94) Role of Bone Morphogenetic Proteins in Reparative Dentin Formation. International Symposium on Molecular Mechanisms in Periodontal Disease (95) New Approaches to Vital Pulp Therapy. Scientific Frontiers in Clinical Dentistry. National Institute of Dental Research (96) Oral Tissue Engineering (98- 2 days course)

SECTION B. TEACHING

1. Summary of faculty teaching.

Information on teaching for each faculty member is shown in Table 1 at the end of this section: Faculty Teaching in Oral Biology – Representative Year.

2. How are teaching responsibilities allocated?

The Department of Oral Biology is charged with bridging between the basic sciences and dentistry. Hence, faculty members have backgrounds and degrees in Biochemistry, Microbiology, Pharmacology, Genetics, Physiology, Anatomy (Biological Structure), etc. The teaching activities of the faculty depend on the nature of their appointment and their individual expertise to teach particular courses. In addition, 4 of the 6 tenured or tenure-line faculty in the department were hired to teach courses that are fundamental in the School curriculum, and this is a contractual responsibility. Two other faculty members are tenured because they were recruited to fulfill administrative responsibilities, e.g. to organize the graduate program. Thus, teaching responsibilities may be allocated somewhat differently than in other basic science departments.

Courses for the DDS curriculum. Faculty recruited to teach particular courses that are considered to be fundamental in the School curriculum are supported by tenure-line positions supplied by the School of Dentistry. These courses include a 2 quarter course that covers the embryology and structure of the oral tissues (ORALB 510, Development, Structure and Function of Oral Tissues); two dental microbiology courses: ORALB 520 (Molecular Microbiology and Oral Diseases) and ORALB 521 (Medical Microbiology and Immunology); an advanced course in Oral Pathology (ORALB 540, Clinical Oral Pathology Conference) and teaching in the Pharmacology series (PHARM 434, 435). Dr. Tracy Popowics teaches the oral embryology and histology course, Dr. Richard Darveau teaches the two dental microbiology courses, Dr. Thomas Morton teaches the oral pathology course, and Dr. Eileen Watson teaches one of two the Pharmacology courses. Each of these individuals has a PhD in the subject area relevant to their courses. All of this teaching is at the professional (dental student) level. Because only the Dean (through the Curriculum Committee) has the authority to deem a course to be fundamental to the dental student curriculum and to assign a tenure-line position to the course, these assignments are considered to be contractual. Consequently, only these individuals may serve as directors for these courses. These course directors can request assistance in teaching their courses from individuals with expertise on particular topics. If these participants are not tenure-line faculty, and have salary sources that preclude teaching activities, then the department will pay the portion of their salary necessary to cover their teaching contribution. Such arrangements depend on the availability of suitable funds to cover these costs. (See below.)

Other faculty course responsibilities. In contrast to the above faculty, two faculty members received tenure primarily for administrative responsibilities. Dr. Kenneth Izutsu was originally recruited to organize the graduate program in the department, and subsequently became Chair of the department in 1997. His teaching responsibilities are primarily at the graduate level. Dr. Izutsu teaches ORALB 581, the salivary gland course, in the graduate program of Oral Biology. He also lectures in ORALB 593 the Advanced Oral Biology and Medicine course given

by Dr. Herring. He also arranges the seminar series associated with the Cross-Disciplinary Research Training grant that support research training interactions between Bioengineering and School of Dentistry faculty. Dr. Izutsu is the Principal Investigator of the training grant. Dr. Beverly Dale-Crunk now serves as the Graduate Program Coordinator in the department and currently runs the graduate program. She previously administered the Institutional Dentist Scientist program and was Scientific Director of the NIDCR-sponsored Comprehensive Center for Oral Health Research. Dr. Dale-Crunk teaches ORALB 576 (Molecular Aspects of Epithelial Biology) in the graduate program. In addition, all faculty participate in teaching ORALB 449 (Undergraduate Research Topics in Oral Biology), ORALB 578 (Research Techniques in Oral Biology), ORALB 600 (Independent Research), and thesis (ORALB 600, Master's Thesis) or doctoral dissertation (ORALB 800) research.

Dr. Susan Herring is totally supported by a tenure line in the Department of Orthodontics, but participates in the Oral Biology teaching program because of her joint appointment. Dr. Herring teaches ORAL 591-3, Advanced Topics in Oral Biology and Medicine to graduate students in Oral Biology as well as to trainees in the clinical residency programs (Orthodontics, Endodontics, Periodontics) of the School of Dentistry. These faculty members comprise the tenured faculty in the department.

In contrast with tenure-line faculty, Research Faculty members are supported by self-generated research grant funds. This salary source prohibits them from doing significant teaching. None-the-less, these faculty have expertise that makes them valuable to the teaching mission of the department and the School. The department uses research grant-generated indirect costs or salary-recapture moneys to pay for the teaching activities of the Research Faculty. Thus, Dr. Whasun Chung, an oral microbiologist, teaches in ORALB 520, the Molecular Microbiology and Oral Diseases course for dental students, as well as in the graduate program of the department. Dr. Richard Presland, a molecular biologist, teaches ORALB 578 and ORALB 579, a dental molecular biology laboratory and lecture course aimed at graduate students in the clinical residency programs of the School as well as dentists who require an updating of their molecular biology backgrounds when entering the graduate program in Oral Biology. Dr. Presland also teaches an introduction to molecular biology component to dental students in the ORALB 520 (Molecular Microbiology and Oral Diseases) course. Dr. Sahba Fatherazi teaches in ORALB 581, the salivary gland course for oral biology graduate students. She also teaches laboratory methods and research methods to graduate students in Oral Biology as well as to undergraduate students interested in dentistry-related careers.

Departmental faculty members can develop new courses to be considered for the Dental School or the graduate program curricula. In order to have a course be accepted into the Dental School curriculum, the instructor must develop a class syllabus describing the materials and concepts to be covered, and the number of hours required including a schedule of lecture topics. The materials are then presented to and discussed with the Curriculum Committee, and the proposed course will either be accepted or rejected as an addition to the dental student curriculum. Most new required course proposals are not accepted as the School curriculum is currently filled and a new course cannot be added without dropping an existing course. However, elective courses may be added to the School catalog with the approval of the Curriculum Committee. New courses may also be proposed for the graduate program in Oral Biology. The same materials are prepared

for these courses, and they are presented to the Oral Biology Graduate Program Committee for consideration. The course may be proposed as an elective or as a required course for the different graduate degree programs. The recommendations of the Graduate Program Committee are then voted on by the full faculty.

3. Other than classroom teaching, how are faculty involved in undergraduate student learning and development (for example, advising, mentoring, and supervising independent study)?

Undergraduate students who are interested in applying to the School of Dentistry will often contact Oral Biology faculty (usually by email) to seek research training opportunities. The course ORALB 449 (Undergraduate Research Topics in Oral Biology) in designed to encourage undergraduate students in research and independent study. If the student contacts the department directly with no faculty mentor in mind, then the student is put in contact with Dr. Beverly Dale-Crunk, Graduate Program Director. She is knowledgeable about the research interests and resources of the Oral Biology Faculty and Adjunct Faculty, and will have the student contact a suitable faculty member and/or review the research interests of all faculty that are posted at the departmental website. Often students will directly contact individual faculty members, and the two will determine whether a suitable research project can be developed. Mentoring and advising of undergraduate students is done on an informal basis through this independent studies course.

4. How do faculty involve professional students in research and scholarship?

Dental students are primarily involved in research in the department through participation in the SURF (Summer Undergraduate Research Fellowship) program of the School of Dentistry. This program allows incoming and first year dental students (mainly) to earn a stipend while doing research with School of Dentistry faculty over the Summer. About two dozen dental students participate in the SURF program annually, and many seek to do their research with Oral Biology faculty. Students design their research projects with the guidance of their mentor, and then write an application for a SURF grant. The application is reviewed and evaluated by the Research Committee of the School of Dentistry, and most are eventually approved and funded. The students then perform the experiments over the Summer, present a poster at the School of Dentistry Research Day (September each year) and write a research report. Many of these students submit an abstract to the annual meeting of the American Association for Dental Research. The student then prepares a poster or a talk for presentation at the annual meeting. The School of Dentistry gives travel awards to students to cover the cost of attending the meeting. Hence, the student gains real experience in designing, performing and reporting on research. The Department of Oral Biology training grant supports six SURF positions per year in addition to pre and postdoctoral positions. Students supported by these positions can chose to work with faculty in any department in the School of Dentistry.

5. How does the department evaluate the instructional effectiveness of faculty?

Both external and internal assessments of student learning are in place to evaluate instructional effectiveness of the faculty. The scores on Parts I and II of the National Board Exams constitute the external assessment of student learning. Part I of the exams covers our embryology and

anatomy and microbiology course work, and Part II covers Pharmacology. Our students have performed at the highest level (quintile) on these examinations. On the occasion when School admission policy changes resulted in a decrease in the microbiology score, the change was immediately noted, and quickly corrected. Thus, the external assessment of our instructor effectiveness and student learning at a national level is an extremely valuable tool for maintaining an effective curriculum. In addition, the School and department have several internal assessment tools. First, the School mandates that all courses taught to dental students be evaluated by the students immediately upon completion of the course. This is done via a School website, and the evaluation is done anonymously. The evaluation data are then transmitted to the Curriculum Committee, which evaluates the data and determines whether any corrective steps should be recommended. The data and findings are then transmitted to the instructor and to the department Chair. If problems are noted the Chair and the instructor will confer about the findings, and generate a proposal to remedy course difficulties. This proposal is transmitted back to the Curriculum Committee. In this way, the School aims to evaluate the effectiveness of its courses, to detect courses with instructional problems, and to promptly generate solutions to the problems.

Faculty may also conduct their own student reviews of their courses. Dr. Morton is one of these faculty, and his course evaluation form is attached at the end of this section (Appendix for Section B, ORAL BIOLOGY 574 and ORAL BIOLOGY 574 evaluations forms). Dr. Morton uses feedback from this form to change elements in his course that cause difficulties for students.

Because students are not necessarily the best judge of course quality, all courses also undergo peer review. The evaluation is performed by a Peer Teaching Evaluation Review Committee (PTERC) as stipulated in the School of Dentistry Faculty Handbook for Assistant and Associate Professors (complete description in Section C.2.). This committee consists of two senior members of the department, and one faculty member from another department. This committee sits in on several sessions of the course, and completes a School-generated evaluation form, which includes room for comments. The Chair of the PTERC collects and summarizes the evaluations. The PTERC Chair will communicate the summary of findings to the instructor if no serious problems were noted. If problems are detected, then the PTERC will meet with the instructor, and make recommendations for improving the course. Individual PTERC evaluation forms are maintained in a departmental file and are not available to the instructor to insure candid evaluation. The PTERC also prepares a report on the instructor's teaching and improvement that is included in the teaching package for promotion. This material is evaluated by the School's APT Committee when considering the instructor's promotion. The PTERC is also expected to meet annually with each faculty member under the rank of Professor, to provide feedback on progress in teaching as well as on progress towards meeting the requirements for promotion. In this way, peer evaluations in addition to student evaluations are obtained for faculty. Both student and peer evaluations are taken very seriously in consideration for merit and promotion decisions.

Professors also utilize peer and student reviews as required by the Faculty Handbook. These forms are collected by each professor, and are reviewed with the Chair during the annual merit review session. Thus, the department has both an external and internal School-generated assessment tools in place to assess and improve instructor performance.

6. Please summarize the data you collect, possibly using OEA or CIDR, to evaluate the impact of your teaching on student learning. You might want to focus on illustrative examples. Please describe selected specific changes you have made in response to the data you have collected.

As noted above, the department uses the results of the National Board Examinations Parts I and II, the role of the Curriculum Committee in the School of Dentistry Curriculum Management Plan, the PTERC committee, and the Office of Educational Assessment (OEA) to evaluate the impact of teaching on student learning. Three illustrative examples of course revision in response to data collected by these routes are included below.

a. School of Dentistry Curriculum Management Plan. Dr. Sampath Narayanan holds an Adjunct faculty position in Oral Biology and is director of PATH 444, a general pathology course for dental students. Dr. Narayanan was recently made director of the course after having taught in the course under the previous director. This course received a low rating in the School's course survey in 2003, and illustrates how the School's teaching monitoring plan can affect class room teaching. Dr. Narayanan received a letter from the Curriculum Committee on August 6, 2003 informing him that his course had received a low rating for Winter quarter, 2003 summarizing student scores for achievement of educational objectives of the course as well as a summary of students' comments. Dr. Narayanan was asked to modify the course in order to address these issues, and to reply by a specific date. Dr. Narayanan replied to the Committee on August 22. He explained that many of the criticisms involved other lecturers whose participation in the course predates his own, but that he had developed a plan to deal with the problems in the course. Dr. Narayanan put his changes into effect in the following year, and on June 1, 2004, he received a letter from the Curriculum Committee informing him that the overall rating for the class had improved to 3.04. He was also told that the Committee greatly appreciated his efforts to improve the course. A summary of student comments were enclosed for his information only. This example illustrates how the School of Dentistry's curriculum management plan is able to provide rapid detection of a course that could be improved, and that interactions between the Curriculum Committee and the instructor and his department can result in improved instruction.

b. PTERC Effects on Teaching. The ability of an instructor's PTERC to affect his teaching is illustrated by the records of Dr. Presland. The PTERC rating of Dr. Presland's teaching effectiveness for two courses taught in Spring and Summer Quarters of 1999 was 3.8. The PTERC summarized Dr. Presland's strengths and weaknesses in teaching, and then made 5 specific constructively critical comments. These comments dealt with the quality of his teaching materials (overheads versus slides), his tendency not to summarize important points, eliciting student participation, and the quality of the handouts and visual aids. In August of 2000, Dr. Presland's PTERC again reviewed his teaching, and found a great improvement in teaching materials and methods. The average rating was now 4.7, and the PTERC noted that his handout materials and his visual aids were consistently of high quality. Dr. Presland was also more successful in eliciting student participation. Hence, the PTERC's remarks clearly had an important effect on Dr. Presland's teaching style and materials.

c. Student Feedback Effects on Teaching. Dr. Presland's molecular biology series (ORALB 578-9) also illustrates how our courses are changed in response to student feedback. This series was originally initiated by Dr. Presland in response to a request from Dr. Izutsu (Oral Biology Chair), who determined there was need for an introductory molecular biology course to improve the science background of older dentists who had matriculated in our graduate program in order to become dental researchers and educators. Many of these dentists had weak backgrounds in molecular biology but were precluded from enrolling in existing introductory molecular biology courses at the University because undergraduate students were given priority. The Departments of Oral Biology and Microbiology collaborated in initiating and giving the course because they recognized our enrollment difficulties. The course originally had an enrollment of about 8 students. Once initiated, the School recognized that graduate students in the clinical residency programs also needed to be familiar with molecular biology in order to keep abreast of research developments in their specialties. Hence, graduate students in these residency programs were also enrolled in this course. After the year with this combined class, the clinical residency students gave informal feedback that the course was difficult for them as it was "too basic science oriented", and many departments considered withdrawing their students from the course. Dr. Presland (a basic scientist) contacted Dr. Frank Roberts, a clinician scientist and a member of the Periodontics faculty, and together they redesigned the course so it would give a good introductory background in molecular biology to all students, with particular examples chosen from clinical dentistry to illustrate applications of the materials. The redesigned course made the concepts more accessible to the residency students, and all departments elected to continue requiring the course. The students also said that the textbook for the course was difficult for many clinically-oriented students, so Dr. Roberts and Dr. Presland elected to have two textbooks for the class. One was written at a more introductory level, and students were allowed to choose between them depending on their current and future needs. Dr. Presland has continued to make changes to the course in response to student feedback, and the class is now quite a success. Dr. Presland's course has become part of the School of Dentistry's graduate program core curriculum. Consequently, all graduate students in the School receive their introductory molecular biology training together, and the clinical departments now can concentrate on teaching discipline-specific molecular biology courses for their residents. Enrollment in this class has grown from about 8 students to 30-40 students. The course has also been made part of the School's Summer Institute that trains dentists from all over the country and the world in the basics of research design, biostatistics, epidemiology, and now, molecular biology. This course is a good example of how instruction in a course has been altered in response to student feedback to enhance learning of an important topic for modern dentists.

7. What procedures, such as mentoring junior faculty, does the department use to help faculty improve undergraduate teaching and learning? What training and support is provided to TAs to help them be effective in their instructional role?

The department uses the results of the National Board Exams Parts I and II, feedback from the students via the Curriculum Committee, and the PTERC (Peer Teaching Evaluation Review Committee, described in 5. above to help faculty improve undergraduate teaching and learning. The first two of these procedures were described in some detail above. This section concentrates on the mentoring role of the PTERC. This committee of the instructor's peers attends lectures and strives to use constructive criticism to help the instructor improve his/her teaching

effectiveness. It should be emphasized that the PTERCs in our department are intended to evaluate and provide feedback on teaching and lecturing effectiveness, and also to provide feedback on the instructor's progress towards promotion. Hence, the PTERCs evaluate classroom performance, make recommendations for improvement, and then evaluate the performance again when the course is next given. In this way, a record is kept of an instructor's improvement in a course. If no improvement is found, this is noted. But, in all cases, the recommendations have been useful, and an improvement has been noted in every instance. This PTERC record of an instructor's classroom performance is included in the faculty member's promotion package, and constitutes a critical element in the evaluation of the faculty member's teaching effectiveness. Mentoring of junior faculty is discussed in more depth in Section C2, below.

The department has no teaching assistantships to help in an instructional role. The department has a need for TAs for the Oral Tissues Structure and Embryology course, for the Microbiology courses, and the Molecular Biology courses.

8. How does the unit track and promote innovations and best practices in undergraduate and graduate student learning?

The department strongly suggests that all faculty take advantage of the teaching courses and aids offered by the University. The department would especially like to have faculty participate in the UW Teaching Academy, the Center for Instructional Development, and the Faculty Fellows Program described in Section C2, below. However, attendance to these programs is often limited, and our Research Faculty have not been allowed to register for some courses. Hence, while one of our tenure-line faculty has taken some of these courses, it would be useful if the courses were open to all of our faculty.

In the absence of University sponsored coursework, the faculty work to inform and encourage each other. The departmental faculty is a small one, and we interact frequently with each other. The way we communicate about teaching innovations is usually by general conversations or by attending departmental seminars. If someone uses an innovative approach, such as when PowerPoint was first introduced, or when PowerPoint slide notes was first used; it is quickly recognized by the rest of the faculty. Hence, the switch to PowerPoint presentations went quickly, and faculty members asked the department to purchase several digital projectors and portable computers. Similarly, the development of web-sites for course materials was done by faculty members who saw what others had done, and then developed course web-sites of their own.

Also, the department and the School are always ready to have seminar presentations covering new teaching methods or approaches. Several faculty have been using or experimenting with problem based learning in their courses. Dr. Morton uses this approach in his Oral Pathology courses. Many of our courses have websites accessible to the students. This has been very well received by the students. Within the next year all Oral Biology courses will have websites.

TABLE 2. FACULTY TEACHING IN ORAL BIOLOGY - REPRESENTATIVE YEAR

Independent Study Credits Noted as IS

Name	Courses Taught Per Year	Number of Credits Taught	Total Student Credit Hours
Beverly Dale-Crunk	ORALB 449 (IS) Undergraduate Teaching ORALB 576 Molecular Aspects of Epithelial Biology ORALB 578 (IS) Research Techniques in Oral Biology ORALB 600 (IS) Independent Study/Research ORALB 800 (IS) Doctoral Dissertation	2 credits 2 credits 4 cr., 4 cr. = 8 credits 2 cr., 5 cr., 14 cr., 6 cr. = 27 credits 2 cr., 2 cr., 2 cr. = 6 credits	2 Classroom Credits 43 Independent Study Credits
Richard Darveau	ORALB 520 Molecular Microbiology of Oral Diseases ORALB 521 Medical Microbiology and Immunology ORALB 562 (IS) Supervised Teaching ORALB 569 Advanced Oral Microbiology ORALB 578 (IS) Research Techniques in Oral Biology ORALB 600 (IS) Independent Study/Research ORALB 800 (IS) Doctoral Dissertation	3 credits 2 credits 2 credits 2 credits 4 credits 27 cr., 26 cr., 25, cr., 18 cr. = 97 credits 10 credits	7 Classroom Credits 113 Independent Study Credits
Whasun Chung	ORALB 550-R (IS) Special Studies in Dentistry	6 credits	6 Independent Study Credits

Sahba Fatherazi	ORALB 449 (IS) Undergraduate Research ORALB 578 (IS) Research Techniques in Oral Biology ORALB 581 co-teaches Secretory Process in Exocrine Glands ORALB 600 (IS) Independent Study/Research	5 credits 4 credits 2 credits 2 cr., 2 cr., 2 cr. = 6 credits	2 Classroom Credits 15 Independent Study Credits
Susan Herring	ORALB 591 Adv Topics in Oral Biology & Medicine ORALB 592 Adv Topics in Oral Biology & Medicine ORALB 593 Adv Topics in Oral Biology & Medicine ORALB 600 (IS) Independent Study/Research ORALB 800 (IS) Doctoral Dissertation	2 credits 2 credits 2 credits 2 cr., 9 cr.,9 cr. = 20 credits 19 cr., 10 cr., 10 cr., 10 cr. = 49 credits	6 Classroom Credits 69 Independent Study Credits
Kenneth Izutsu	ORALB 575 Oral Biology Seminar ORALB 581 Secretory Process in Exocrine Glands ORALB 600 (IS) Independent Study/Research ORALB 700 (IS) Master's Thesis ORALB 800 (IS) Doctoral Dissertation	1 credit x 3 quarters = 3 credits 2 credits 1 cr., 1 cr., = 2 credits 2 cr., 2 cr. = 4 credits 10 cr., 10 cr., 10 cr., 10 cr. = 40 credits	5 Classroom Credits 46 Independent Study Credits
Thomas Morton	ORALB 540 Clinical Oral Pathology Conference ORALB 550 B (IS) Special Studies in Dentistry ORALB 574 Clinical Stomatology	2 credits 2 credits 3 credits	21 Classroom Credits 4 Independent Study Credits

	ORALB 565 A Clinical Oral Pathology ORALB 565 B Clinical Oral Pathology ORALB 650 (IS) Extramurals	2 credits x 3 quarters = 6 credits 2 credits x 4 quarters = 8 credits 1 credit x 4 quarters = 4 credits	
Tracy Popowics	ORALB 510 Development, Structure, Function of Oral Tissues ORALB 561 Oral Tissue Development, Structure & Function	3 credits x 2 quarters = 6 credits 3 credits x 2 quarters = 6 credits	12 Classroom Credits
Richard Presland	ORALB 579 Molecular Biology ORALB 578 (IS) Research Techniques in Molecular Biology	2 credits 3 credits, 3 credits, 3 credits	3 Classroom Credits 9 Independent Study Credits
Eileen Watson	ORALB 577 Applied Therapeutics in Dentistry ORALB 550 D Directed Studies in Oral Biology ORALB 578 (IS) Research Techniques in Oral Biology PHCOL 534 General Pharmacology PHCOL 535 General Pharmacology	2 credits 1 credit 4 credits 2 credits 2 credits	7 Classroom Credits 4 Independent Study Credits

Appendix for Section B. 5. - Custom Evaluation Forms

ORALB 540 Clinical Oral Pathology

Morton Autumn 2003

Please use the following scale when rating this course:

1 – Poor *2 – Below Average* *3 – Good* *4 – Excellent*

1. As a whole, course organization was:	① ② ③ ④
2. Overall clarity of student responsibilities was:	① ② ③ ④
3. Student responsibility for the 28 case assignments was clear:	① ② ③ ④
4. The degree to which course objectives were clearly stated was:	① ② ③ ④
5. The appropriateness of course content to my level of knowledge was:	① ② ③ ④
6. The extent to which I was encouraged to meet my learning potential was:	① ② ③ ④
7. Overall, the reasonableness of the amount of assigned work was:	① ② ③ ④
8. Working through the diagnostic process with in class unknown cases was:	① ② ③ ④
Rate the format of the course (case-based):	
9. Style:	① ② ③ ④
10. Content:	① ② ③ ④
11. Appropriateness, relevance and integration of information to simulate the decision making process in your future practice was:	① ② ③ ④
12. The diversity of the cases covered was:	① ② ③ ④
13. Allowing students to leave 5-10 minutes early was:	① ② ③ ④
14. Allowing study time for the National Boards was:	① ② ③ ④
15. Turning in case assignments instead of midterm or final exams was:	① ② ③ ④
16. The contribution of this course to preparing you for your career:	① ② ③ ④
17. Rating for this course as a whole:	① ② ③ ④

18. What aspects of this course did you find the most valuable?

19. If you feel any portion of this course should be changed, what would it be and how should it be changed?

Please circle the adjectives which best describe this course:

interesting	challenging	boring	worthwhile	unorganized	fair
redundant	inconsistent	well-planned	irrelevant	demanding	compelling

General Comments (please use back of this page)

ORALB 574 **Clinical Stomatology**
Spring 2004

Morton Graduate

Please use the following scale when rating this course:
1 – Poor *2 – Below Average* *3 – Good* *4 – Excellent*

1. As a whole, course organization was:	① ② ③ ④
2. Overall clarity of student responsibilities was:	① ② ③ ④
3. Definition of assignments and other tasks was:	① ② ③ ④
4. The degree to which course objectives were clearly stated was:	① ② ③ ④
5. The appropriateness of course content to my level of knowledge was:	① ② ③ ④
6. The extent to which I was encouraged to meet my learning potential was:	① ② ③ ④
7. Overall, the reasonableness of the amount of assigned work was:	① ② ③ ④

Please rate the success of the problem based format of this course, using unknown cases in:

1. Meeting the objective of learning how to establish a differential diagnosis.	① ② ③ ④
2. Being a useful way to provide a presentation (speaking) opportunity.	① ② ③ ④
3. Being a more interesting way to learn material than additional lectures.	① ② ③ ④
4. Providing a format to observe other students' approach to problem solving.	① ② ③ ④
5. Helping maintain interest in the course throughout the quarter.	① ② ③ ④

Specific Topics

Oral Examination & Differential Diagnosis (Tom Morton)

1. Clarity of presentation for this topic was:	① ② ③ ④
2. Usefulness of this topics was:	① ② ③ ④
3. Understanding of this topic after presentation was:	① ② ③ ④

4. Time spent on this topic was: ☐Not Enough ☐About Right ☐Too Much

Benign & Malignant Soft Tissue Lesions (Tom Morton)

1. Clarity of presentation for this topic was:	① ② ③ ④
2. Usefulness of this topics was:	① ② ③ ④
3. Understanding of this topic after presentation was:	① ② ③ ④

4. Time spent on this topic was: ☐Not Enough ☐About Right ☐Too Much

Oral Cancer Update (D. Oda)

1. Clarity of presentation for this topic was:	① ② ③ ④
2. Usefulness of this topics was:	① ② ③ ④
3. Understanding of this topic after presentation was:	① ② ③ ④

4. Time spent on this topic was: ☐Not Enough ☐About Right ☐Too Much

Oral Bullous Vesicular Disease (Tom Morton)

1. Clarity of presentation for this topic was: ① ② ③ ④
2. Usefulness of this topics was: ① ② ③ ④
3. Understanding of this topic after presentation was: ① ② ③ ④
4. Time spent on this topic was: ☐Not Enough ☐About Right ☐Too Much

Psychological Factors in Oral Radiology (Lars Hollender)

1. Clarity of presentation for this topic was: ① ② ③ ④
2. Usefulness of this topics was: ① ② ③ ④
3. Understanding of this topic after presentation was: ① ② ③ ④
4. Time spent on this topic was: ☐Not Enough ☐About Right ☐Too Much

Laboratory Diagnosis for Dental Specialists (Bart Johnson)

1. Clarity of presentation for this topic was: ① ② ③ ④
2. Usefulness of this topics was: ① ② ③ ④
3. Understanding of this topic after presentation was: ① ② ③ ④
4. Time spent on this topic was: ☐Not Enough ☐About Right ☐Too Much

Lesions of Bone 1 (Tom Morton)

1. Clarity of presentation for this topic was: ① ② ③ ④
2. Usefulness of this topics was: ① ② ③ ④
3. Understanding of this topic after presentation was: ① ② ③ ④
4. Time spent on this topic was: ☐Not Enough ☐About Right ☐Too Much

Lesions of Bone 11 (Tom Morton)

1. Clarity of presentation for this topic was: ① ② ③ ④
2. Usefulness of this topics was: ① ② ③ ④
3. Understanding of this topic after presentation was: ① ② ③ ④
4. Time spent on this topic was: ☐Not Enough ☐About Right ☐Too Much

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Please circle the adjectives which best describe this course:

interesting	challenging	boring	worthwhile	unorganized	fair
redundant	inconsistent	well-planned	irrelevant	demanding	compelling

General Comments (please use back of this page)

SECTION C. RESEARCH AND PRODUCTIVITY

1.1. How does Oral Biology balance the pursuit of areas of scholarly interest by individual faculty with goals and expectations of department, School, and University?

The Department of Oral Biology has a diverse group of faculty including those on the tenure and research tracks, both joint and adjunct. These individuals make up a productive group of senior faculty with research programs that are well developed and junior faculty whose research programs are developing under mentorship of more senior faculty. Because the nature of the field of Oral Biology encompasses anatomy, microbiology, cell biology, molecular biology, developmental biology, immunology, biochemistry, physiology as they relate to the oral and craniofacial complex, our faculty represent these fields and bring their expertise to dental and craniofacial research. Biosketches for each regular and joint faculty members are included in **Appendix G**. The complete list of regular, joint, and adjunct faculty and their scholarly field of interest is shown in **Table 3**. **Appendix G.1.** shows current and pending research support of regular and joint faculty and demonstrates that our faculty have extensive support as well as interactions between those with different home departments.

Faculty scholarly interests are in several major areas of research: 1) biochemical, including studies on protein synthesis and secretion and the structure of salivary macromolecules, as well as studies on the structural proteins and differentiation of oral epithelial and epidermal cells; 2) pharmacological, including molecular mechanisms in the regulation of secretion; 3) physiological, including ion fluxes and their control in secretory tissues; 4) microbiological, including the molecular basis of bacterial interactions with epithelial cells and other oral surfaces; 5) pathological, including the growth and metastasis of oral tumors; 6) morphological, including studies on oral tissues and their development and function; 7) immunological, emphasizing innate immune responses of oral cells to commensal and pathogenic bacteria present in the oral cavity. This diversity of research interest is an important contribution to the School of Dentistry and to the profession allowing mentorship of students with a wide range of scientific and clinical interests. Training of both future dentist-scientist academicians and basic scientists who can contribute to the advancement of oral and craniofacial sciences is a major goal of the department and its contribution to the School of Dentistry and the University. The range of research interests of our faculty as well as their productivity is critical to achieving this goal.

1.2. How are decisions on faculty promotion, retention, merit increases made?

Decisions of faculty promotion, retention, and merit increases are made consistent with the guidelines and regulations of the School of Dentistry and the University of Washington. Faculty promotion decisions are considered by the voting members of the faculty based on teaching, scholarly activity and service, followed by review by the APT committee. The faculty member under consideration has an opportunity to comment on the written recommendation of the department submitted to the Appointments, Promotion, and Tenure (APT) committee. Within the Department of Oral Biology strong consideration is given to research publication and extramural funding in promotion decisions as well as to the quality of teaching.

Decisions concerning retention and merit are reviewed by the department with review of current CV and teaching evaluations where applicable. Retention of research faculty must also consider availability of funding. Merit decisions are discussed by faculty of higher rank than those being reviewed with those at the rank of Professor reviewing each other. Disparities in salary are also considered.

TABLE 3. Regular, Joint, and Adjunct Faculty and Their Scholarly Field of Interest

Faculty	Title	Research Interest
Margaret R. Byers, PhD	Adjunct Research Professor	Stomatosensory immunocytochemistry in tooth pulp and surrounding tissue
Peter H. Byers, MD	Adjunct Professor	Collagen expression and molecular genetics
Sandra F. Bordin	Adjunct Research Professor	Regeneration and repair of oral human connective tissue
Gerard Cangelosi, PhD	Adjunct Research Associate Professor	Molecular biology of tuberculosis
Whasun Oh Chung, PhD	Research Assistant Professor	Oral microbiology and defensin antimicrobial peptides
Beverly A. Dale-Crunk, PhD	Professor	Epithelial proteins and defensin antimicrobial peptides
Michael L. Cunningham, MD, PhD	Adjunct Associate Professor	Pathogenesis of human malformation syndromes
Richard P. Darveau, MS, PhD	Professor (Oral Biology & Periodontics)	Bacteria/host interactions, LPS biochemistry, host inflammatory response
David R. Eyre, PhD	Adjunct Professor	Biomineralization
Sahba Fatherazi, PhD	Research Assistant Professor	Electrophysiology
Werner Geurtsen, DDS, PhD	Adjunct Professor	Chemical-biological interactions between biomaterials and their components with oral and systemic tissues
Susan Herring, PhD	Professor (Oral Biology & Orthodontics)	Craniofacial biology
Kenneth T. Izutsu, PhD	Professor & Chairman	Ion channel roles in signaling in oral tissues
Douglass Jackson, DMD, PhD	Adjunct Associate Professor	Craniofacial Pain
Gregory J. King, DMD, DMSc	Adjunct Professor	Bone remodeling, bone cells
Thomas H. Morton, Jr., DDS, MSD	Professor	Oral pathology and secretory mechanisms
A. Sampath Narayanan, PhD	Adjunct Professor	Inflammation, fibrosis, wound healing
Tracy Popowics, PhD	Assistant Professor	Dental morphology
Richard B. Presland, PhD	Research Associate Professor	Molecular basis of epithelial cell differentiation
Douglas Ramsay, DMD, MSD, PhD	Adjunct Professor	Mechanisms of drug tolerance, mechanisms and psychophysics of pain
Murray R. Robinovitch, DDS, PhD	Professor	Salivary biochemistry and saliva-bacterial interactions
Timothy Rose, PhD	Adjunct Associate Professor	Molecular biology of tumor viruses, cell growth, differentiation and transformation
Bruce Rutherford, PhD	Acting Professor	Regeneration biology and tissue engineering
Martha Somerman, DDS, PhD	Dean, School of Dentistry	Cell behavior and molecular approaches to restoring tissue
Eileen L. Watson, PhD	Professor	Salivary gland pharmacology, signaling mechanisms, and regulation
Norma Wells, MPH	Adjunct Associate Professor	Dental Hygiene, Community issues in oral health

Note: The appointment of several additional adjunct faculty was approved by the department in October 2004. These include Frank Roberts, Periodontics, and Albert Folch, Ceci Giachelli, Xingde Li, Patrick Stayton, Paolo Vicini, Paul Yager, all Bioengineering. These faculty members already have associations with Oral Biology via the Cross Disciplinary Training Grant.

The department has made a great effort to insure that salaries are maintained at levels that are consistent with other basic science departments, are gender-equitable, and are not too divergent from clinical faculty of similar rank.

2. How are junior faculty members mentored?

Faculty mentoring is an important issue in long term quality of the department and its training programs. Junior faculty generally work closely with a senior faculty member as they develop their independent research program and seek extramural funding. Mentoring of junior faculty members is done both formally and informally. The formal mechanisms that are now in place for faculty mentoring include 1) the establishment of a PTERC (Peer Teaching Evaluation Review Committee) for the faculty member, 2) University sponsored mentoring sessions on teaching, 3) annual evaluation sessions with the Chair as part of the University-wide merit evaluation process, and 4) annual meetings with Dr. Timothy DeRouen, Executive Associate Dean for Research & Academic Affairs for the School of Dentistry. Informal mentoring consists of contacts with various members of the faculty and discussions with the Chair. Each of these points is discussed below.

The role of the PTERC. The PTERC was originally conceived by the School of Dentistry faculty as a mechanism for having peer evaluation of faculty teaching and has been in place for approximately 10 years. This was felt to be necessary because students often do not have enough knowledge or experience to fully evaluate the methods or materials presented in a particular course. Hence, the PTERC is designed to have faculty peers attend lectures, to provide constructive feedback, and to give positive reinforcement about things that are done well. The PTERC consists of two departmental faculty members (one of whom chairs the committee) and one faculty member from another department. PTERC members attend at least one lecture per year. The comments of the PTERC are provided to the APT Committee as part of the faculty member's teaching portfolio and make an important contribution to the APT decision. In addition, the Department of Oral Biology uses the PTERC as a mentoring tool to provide faculty members with feedback on progress towards promotion. In this capacity, the PTERCs evaluate faculty members' publication, teaching and grant progress and advise them on steps that could be taken to strengthen their CVs.

University sponsored faculty mentoring efforts. Regular faculty have an opportunity to participate in University sponsored mentoring activities such as the Faculty Fellows Program. One of our faculty participated in this weeklong orientation to the University's educational environment and found it to be extremely helpful in learning about the scope of the University's resources in teaching. This was information that she would have had difficulty in assembling on her own in the context of the School of Dentistry. Also, the week offered workshops and discussions on teaching strategies and the types of student problems likely to be encountered and how to deal with them. The Program was rated as an excellent orientation to the job of being an assistant professor. We would like for our Research faculty to be able to participate in programs such as the UW Teaching Academy and the Center for Instructional Development. Our Research faculty make a significant contribution to the teaching program in our department. In addition, Research faculty often are responsible for teaching at the laboratory bench. Finally, both junior

faculty and postdoctoral fellows are encouraged to take advantage of the grant writing workshops and monthly presentations of the Research Funding Service.

Annual Evaluation with Chair. Junior faculty meet annually with the departmental chairman to develop career goals and pathways for achieving both research and teaching goals. The Chair reviews the faculty member's CV and the findings and recommendations from the PTERC, and points out strengths and weaknesses in the faculty member's performance and ways to improve performance. The Chair then does everything possible to help the faculty member improve his/her performance. In Oral Biology, each faculty person is recruited because they have a contribution to make to some specific departmental mission, either in teaching or in research. Hence, every effort is made to assist the faculty person to achieve their departmental and career goals.

Annual meetings with the Executive Associate Dean for Research & Academic Affairs. Assistant Professors in the School of Dentistry meet annually with Dr. DeRouen, Executive Associate Dean to discuss progress toward promotion and to insure that each junior faculty understands the qualifications for and timing of retention and promotion decisions. Many faculty indicate that the annual meeting with Dr. DeRouen is very helpful. Dr. DeRouen views these meetings as a way to verify effective mentoring in the department, to insure that goals are consistent with those of the School of Dentistry, and to suggest activities that would further those goals. He also works to protect the faculty member's rights as a member of the University's faculty, and makes a real effort to ensure that the faculty member is aware of the criteria as well as the time-schedule for their promotion.

The department currently has four faculty members who have been or are currently benefiting from mentoring for career development.

- Dr. Richard Presland, Research Associate Professor, was initially a postdoctoral fellow in Dr. Dale-Crunk's laboratory. He was then appointed as Research Associate, then Research Assistant Professor. His contributions were of great importance to progress in molecular biological approaches in advances in epithelial biology and differentiation in Dr. Dale's lab and his current interests have developed from this work. He was independently funded via an NIH R29 (FIRST award) and currently has a funded R01. As the only trained molecular biologist in the School of Dentistry, he has made a significant contribution to the department and School by developing both lecture and laboratory courses in molecular biology.
- Dr. Tracy Popowics came to the UW in a postdoctoral position with Dr. Herring. She was appointed to fill an emergency vacancy for a teaching position, and subsequently competed successfully for the open faculty position. She was appointed as an Assistant Professor in 2001. She has a considerable teaching commitment to the undergraduate DDS program (see Section B). Her research area is the role of mechanical force in craniofacial structure and function. She has had startup funding through the School of Dentistry Research committee review process and has submitted and revised an NIH K22 Career Development grant. The revised project received a score that may be fundable within this cycle.

- Dr. Sahba Fatherazi received her PhD in Pharmacology from the University of London, and did postdoctoral work at the University of Pittsburgh and with Dr. Dan Cook in the Department of Physiology and Biophysics before joining Dr. Izutsu's laboratory because of a common interest in ion channel contributions to cell signaling. Dr. Fatherazi is interested in calcium ion channel signaling in salivary gland and epithelial cells, and how signaling changes contribute to pathophysiology. She has special expertise in patch clamping for physiological studies of signaling and uses molecular biological approaches in combination with these studies. Her work has been supported through NIH funding in collaboration with Dr. Izutsu. She is actively submitting new grants for independent support. In addition, she is contributing to the research program in Dean Somerman's laboratory.
- Dr. Whasun O. Chung completed her PhD in the Dept. of Pathobiology and came to our department as a postdoctoral fellow with Dr. Richard Lamont. Upon his decision to relocate to Univ. of Florida, Dr. Chung moved to Dr. Dale's laboratory where she made rapid progress in the area of signaling mechanisms of responses of epithelial cells to bacteria that result in expression of antimicrobial peptides. She was appointed as Research Assistant Professor and has submitted and revised an NIH K22 Career Development grant. The revised project was funded as of October 2004. Dr. Chung's main commitment is to research, however, she also contributes guest lectures in the Oral Microbiology course in her area of expertise, and has expressed willingness and interest to do additional teaching.

3. What has been the impact of your research on your field and more broadly over the past five years?

Each section below is written by an expert in the field of Oral Biology and includes the major ideas or concepts and important research findings to show the impact of the work of our faculty on the field and on the education and profession of dentistry. Each section also reports any awards or prizes, describes the impact of this research on education and the development of any new educational concepts, and coverage of this material in courses offered to dental students, graduate students, and continuing education.

- Immunology and the host response to oral bacteria.

This area includes Drs. Darveau, Dale-Crunk, Chung, and Roberts. Research in the laboratory of Dr. Darveau is evenly spilt between examining how the host immune system responds to dental plaque bacteria and how dental plaque bacteria may alter the host immune response. Specifically, we examine host responses to lipopolysaccharide (LPS) obtained from the oral pathogen, *Porphyromonas gingivalis*. LPS is an essential component of the cell wall of bacteria and with other bacteria it has been shown that this molecule induces a strong inflammatory response by the host. However, LPS from *P. gingivalis* did not induce a strong inflammatory response and in fact inhibited inflammatory responses induced by other oral bacteria. This basic observation has had an impact in our conceptualization of the relationship between both pathogenic and commensal oral bacteria with the host. It opened up the possibility that periopathogens contribute to disease by inhibiting the "healthy" innate defense status of the oral cavity brought about by commensal oral bacteria. This work was the foundation of a Workshop sponsored by the NIDCR in Seattle three years ago which brought together investigators in several different fields to

discuss the contribution commensal bacteria in human health. Based upon that meeting, a second meeting sponsored by the American Society of Microbiology is planned in April. In addition, at least two RFA's from the NIH (one from the NIDCR and one from NIAID) have arisen in part due to the workshop. Additional work in this area by Drs. Dale, Chung, and Roberts focuses on how epithelial cells in the oral cavity respond to bacteria, including their expression of antimicrobial peptides, the receptors utilized in the response, possible importance of genetic diversity in these receptors, and signaling pathways utilized by epithelial cells that support the concept that the cells of the oral cavity can distinguish between commensal and pathogenic bacteria and respond appropriately.

The concept that pathogens contribute to disease by inhibiting the "healthy" innate defense status is idea is presented to the dental students as an example of how the highly organized, highly evolved dental plaque community evolved to live with the human host.

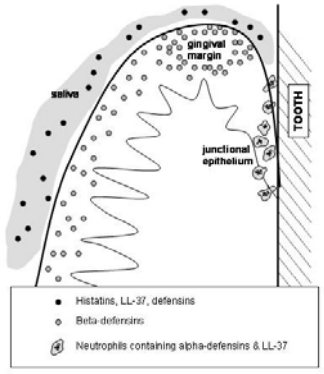


Diagram showing the localization of anti-microbial peptides that are being investigated in by Drs. Dale and Chung. These natural antibiotics include the α- and β-defensins, LL-37 and histatins that are part of the host innate immune responses. They are expressed in gingival epithelium in response to both non-pathogenic and pathogenic bacteria, and are present in saliva and in the neutrophils that migrate through junctional epithelium adjacent to the tooth surface and into the gingival sulcus. These peptides are critical to oral health helping to maintain the balance of oral flora in this complex environment.

Awards: Dr. Frank Roberts was a Univ. of Washington Presidential Fellow, 1999-2000. Dr. Dale-Crunk received the IADR Research in Oral Biology award in 1999. She is also the past recipient of an NIH Merit Award.

- Physiology of oral cells and salivary gland signaling.

The study of salivary gland physiology and function has been a traditional strength of this department. Drs. Watson, Izutsu, and Fatherazi are involved in cell signaling and physiology studies relating to salivary gland cells and other oral epithelial cells. Two major areas of research have defined the expertise of Dr. Watson's laboratory. The first area of research has been on-going for the past 25 years, and has been aimed at determining the molecular events associated with the cross-talk that occurs between signaling pathways in salivary cells. These pathways include Ca^{2+}, cAMP, as well as MAP kinase pathways. It is now clear that the latter pathway can be regulated by G-protein coupled receptors (GPCRs) to control short-term as well as long-term signaling of cell proliferation, growth, differentiation, and secretion. The role of several intracellular mediators/messengers, i.e. Ca^{2+}, arachidonic acid, nitric oxide and cAMP, also are involved in salivary function. Dr. Watson was the first to identify and characterize intracellular Ca^{2+} store ryanodine receptors in non-excitable cells. In addition, her laboratory was the first to identify and characterize adenylyl cylcase type 8 in non-excitable cells and to show that it plays the major role in the regulation of cAMP by Ca^{2+}. Recent work focuses on serine/threonine phosphatases in regulating the signaling pathways. A second area of research has focused on the role of GTP-binding proteins in exocytosis. For this work Dr. Watson received a Merit award from the National Institute of Health. Both heterotrimeric and monomeric GTP-binding proteins were found to be associated with secretory granules, and the heterotrimeric GTP-binding protein,

G_s was reported to affect exocytosis in an in-vitro model. This is a unique finding since G_s is primarily associated with receptors on the cell surface. Dr. Watson also found that a monomeric GTP-binding protein, Rap1, located on the secretory granule membrane was causally related to secretion via regulation of Ca^{2+} signaling.

Taken together the work of the Watson lab has made important contribution to unraveling the mechanisms involved in salivary secretion. Dr. Watson's ability to dissect complicated events in native cells has been her forte, and consequently, she has made a major impact on cellular signaling in salivary cells, which has direct application to other cell types. Dr. Watson's expertise has resulted in her being a member of two editorial boards, one of which is devoted to cellular signaling.

Regulation of intracellular Ca^{2+} is also critical for growth and differentiation of mucosa epithelial cells. This is the current primary area of investigation of Dr. Izutsu and Fatherazi. Using a combination of physiological (patch clamp), fura-2 calcium ion imaging measurements, and cell and molecular biological approaches, they have correlated electrophysiological channel properties with Ca^{2+} channel identity at a molecular level. They described the first I_{CRAC}-like current in keratinocytes, provided the first evidence that calcium-induced differentiation of human keratinocytes may involve TRPC channels, the presence of a calcium sensing receptor in oral keratinocytes, and the first demonstration that activation of the calcium sensing receptor activates the I_{CRAC} and a secondary current. They also provided the first imaging of *P. gingivalis* invasion of oral keratinocytes, which allowed measurement of the rate of invasion, localization of the bacteria in the cell, and detection of the intracellular calcium oscillations associated with the bacterial invasion process. The intracellular calcium oscillations are of interest because such changes are known to effect gene expression changes, which they demonstrated using microarray analyses. This work has implications for normal growth and differentiation, changes in dysplasia, and signaling from G-protein coupled receptors including protease-activated receptors that may be future therapeutic targets in periodontal disease.

- Molecular mechanisms of epithelial differentiation

Dr. Presland's research focuses on the structure and function of the epithelial barrier that is an integral part of all epithelial tissues, including the oral cavity and skin. Depending on location, these epithelial structures function to protect animals from physical, chemical, and microbial attack, and desiccation. They are essential for survival. During barrier formation, many genes are expressed that comprise either structural components of the barrier or function as enzymes that participate in its formation. This laboratory focuses on two groups of proteins involved in barrier formation: the S100 Ca^{2+}-binding proteins (including profilaggrin) and certain proteases, primarily caspase-14, using a variety of molecular and cell biology approaches to understand the function of these proteins in the process of barrier formation. Major recent findings include the following; 1) profilaggrin, traditionally thought of as functioning as a structural protein (in the form of the keratin-binding protein filaggrin), may have a regulatory function, e.g. as a transcription factor or DNA remodeling factor, 2) profilaggrin functions as a bona fide S100 Ca^{2+}-binding protein, that is, it forms homodimers and interacts with other proteins, potentially regulating multiple pathways in differentiating keratinocytes, 3) caspase-14 is an epithelial-specific caspase and has a substrate specificity similar to the inflammation-associated caspases, such as caspase-1 (ICE).

In terms of teaching, Dr. Presland is course director of two graduate courses in Oral Biology, ORALB 578 (Introduction to Recombinant DNA Techniques) and ORALB 579 (Molecular Biology and Oral Health Applications). His background in molecular biology and epithelial biology allowed development of these courses. In ORALB 579, he uses a number of examples from his own research, and from other research in Oral Biology, to illustrate concepts. Examples include techniques used to express genes in cells and how SNPs (single nucleotide polymorphisms) are being used to study disease risk in human populations.

- Functional anatomy of the craniofacial complex

The craniofacial biology group (Drs. Herring, Popowics, Cunningham, King) has focused its efforts on (1) collection of biomechanical data relating to oral function, including the measurement of *in vivo* forces and strains as well as *ex vivo* mechanical properties, and (2) study of the mechanisms and rates of hard and soft tissue growth. It is our eventual goal to understand how mechanical events influence cranial growth. This broad goal has specific relevance to the practice of orthodontics and maxillofacial surgery, but also is fundamental to the interpretation of cranial anatomy in all vertebrates, especially mammals. Three projects are described as examples.

Temporomandibular joint (TMJ) mechanics and growth. The TMJ (jaw joint) is vulnerable to several debilitating disorders that affect millions of Americans. In addition, its lower member, the condyle of the mandible, is the major growth site of the lower jaw. Both the disorders and the growth are thought to be affected by biomechanical loading. Using an animal model, we have verified that the neck of the condyle is compressed during chewing, and that these loads were inversely related to growth rate. In addition, we have produced the first measurements of soft tissue loading, which indicate that the joint capsule and intra-articular disc are maximally stretched at the end of the chewing stroke on the side opposite the food. These findings are being used to establish design parameters for TMJ prostheses and engineered replacements.

Cranial suture form and function. The sutures are the fibrous joints that join the bones of the skull together. They are the primary sites of growth for the young cranium, and their premature fusion causes abnormal skull shape and sometimes neurological impairment. We have shown that the sutures are hot spots for mechanical deformation as well as for growth. Furthermore, some sutures are typically compressed during function while others are tensed. The compressed sutures have a distinctive structure of interdigitating bony fingers joined by oblique collagen fibers, whereas the tensed sutures have a simpler shape. These findings explain how the skull is adapted to its mechanical environment and will also allow a functional interpretation of abnormal sutural development. Additional work of this group focuses on genetic defects that alter the time of fusion of sutures and result in various human syndromes, including craniosynostosis, that affect the shape of the head and entire craniofacial complex. These clinical syndromes require surgical correction for normal function.

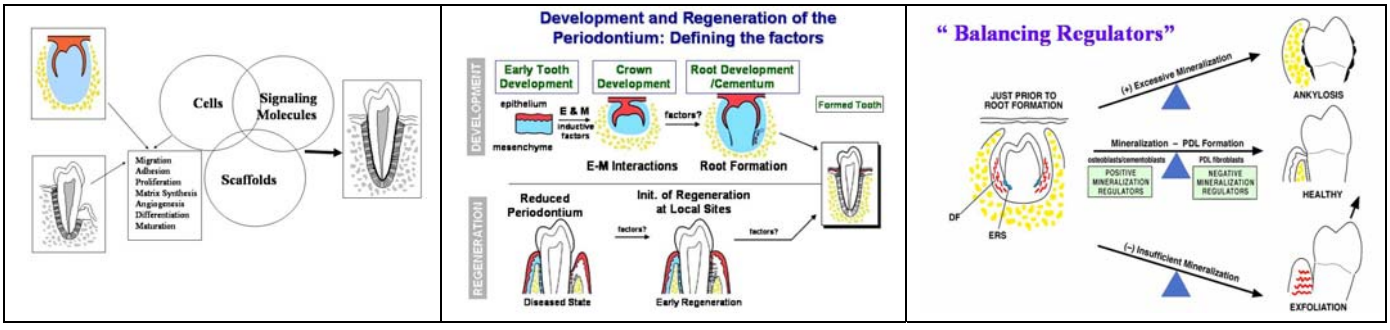
Fixation of mandibular osteotomies. Surgery is often performed on the mandible to lengthen it by distraction osteogenesis, which is a gradual pulling apart via tensile forces. This technology is very exciting in its ability to grow new bone, but the procedure is difficult to control. Speculating that these difficulties arise from mechanical instability, we have devised methods to measure

movement within the fixed osteotomy site, again using an animal model. Using ultrasound and other techniques, we have demonstrated that these sites do deform extensively during function. These findings will be useful in redesigning the fixation hardware.

Undergraduate, dental, and graduate students have participated in all these projects. The research is incorporated into classes taught to dental students (ORALB 510 and ORTHO 520) and to students in the graduate programs of the School of Dentistry (ORALB/ORTHO 591-2-3).
Dr. Herring received the IADR research award in craniofacial biology in 1999 and has been continuously funded by NIH since 1980.

- Molecular mechanisms of bone remodeling and bioengineering collaborations

The goal of researchers in this field at the School is to define the factors required for regenerating oral/craniofacial tissues and to apply this knowledge to design therapies for restoring tissues lost to disease. Our School has partnered with UWEB members (University of Washington Engineered Biomaterials) toward this goal. The group includes Drs. Somerman and Rutherford (Dentigenix) as well as Bioengineering and Materials Science faculty (Mehmet Sarikaya; Pat Stayton; Ceci Giachelli). The Somerman website is http://staff.washington.edu/blfoster/Somerman/index.htm. Dr. Somerman's research focuses on understanding the mechanisms/factors controlling cell behavior during development and regeneration of soft and hard tissues, with a specific focus on cells of the periodontium using both in vitro and in vivo models. There is general agreement that during development and repair of tissues the extracellular environment plays a critical role in controlling cell differentiation; however the exact factors responsible for promoting cell differentiation remain to be elucidated. Furthermore, the role for specific cell types both during development and regeneration of periodontal tissues has yet to be defined. Thus the major areas of concentration for the laboratory have been on identifying and characterizing the specific cells and associated factors required for formation of periodontal tissues. Using this approach we have identified several attractive candidate molecules and have collaborative efforts with UWEB researchers to construct scaffolds for delivery of genes, proteins and cells to periodontal defects and calvaria defects in rodents (see Models illustrated in the figure below).



Educational impact: This research area is very attractive for students since it spans from the basic to the clinic (e.g. implants). The basic concepts related to this area of research are presented to our undergraduate students at UW as part of a course of introduction to dentistry. This is also a topic for our graduate periodontics students, for our training grant, 'Cross Disciplinary Dental Science Research' and for CE courses and international presentations. The research is funded by NIDCR/NIH; industry and UWEB (NSF grant). Dr. Somerman received the William J. Gies

Award in Periodontology, 2003; she is a fellow of the American Association for the Advancement of Science, and served as President of the American Association for Dental Research in 2001-02.

4. In what ways have advances in your discipline, changing paradigms, funding patterns, technologies, or other changes influenced research and scholarship in your unit?

Advances in technologies and changing paradigms: Major advances in molecular approaches, gene array technology, and imaging methods have resulted in changes throughout biomedical research including Oral Biology. In addition, education of dental students and graduate students in advanced clinical training programs has changed to reflect these advances and their impact on clinical applications. New approaches include the use of (1) small inhibitory RNA to temporarily block gene expression to establish functional importance of specific cell components (utilized by Dr. Chung who has helped investigators in Dr. Izutsu and Dr. Watson's labs with this technology); (2) Yeast 2-hybrid approach to investigate protein interactions (used by Dr. Presland's group); (3) Gene microarray work to establish global patterns of gene expression in response to specific stimuli (utilized by Dr. Dale and Dr. Darveau); (4) Imaging via subtractive radiography (Dr. Somerman) and live cell imaging to establish responses of individual cells (Dr. Fatherazi and Izutsu).

Changes in thinking about major dental problems have also influenced our research. Tooth decay is now considered an infectious, communicable disease and periodontal disease is considered an abnormal response to a mixture of microorganisms. Thus, innate immune factors are important for health and their role may be critical in these disease processes. Research of Drs. Dale, Darveau, and Chung now emphasizes innate immunity and the balance of innate immune components, such as antimicrobial peptides, in health and disease. The bone loss that occurs in severe periodontal disease is influenced by growth factors whose activity may be controlled and regulated to promote healing, a topic that is emphasized by Dr. Somerman's laboratory. This represents a significant change from research 10 years ago.

Funding patterns: Most Oral Biology full time faculty research is funded by individual investigator-initiated (R01) NIH grants. The major funding agency for our department is the National Institute of Dental and Craniofacial Research (NIDCR) (Izutsu, Watson, Herring, Dale), and the National Institute of Arthritis, Musculoskeletal, and Skin (NIAMS)(Presland, Dale). The NIDCR also has excellent career development mechanisms of support (K awards) that have been utilized by our junior faculty (Chung, Popowics, Roberts).

In the mid-1990s NIDCR used a Center mechanism that supported a comprehensive approach to a topic. Our School of Dentistry in cooperation with Health Sciences was successful in its application for the "Comprehensive Center for Oral Health Research" which utilized basic and clinical studies, as well as technology transfer and outreach to address the theme "The Basis of Oral and Craniofacial Health and Susceptibility to Disease: a focus on the child as a key to lifelong oral health." Dr. Timothy DeRouen served as Center Director and Dr. Dale-Crunk was the Scientific Director of the CCOHR. Both she and Dr. Herring were involved in individual projects and in establishing the Basic Science Core laboratories. Matching funds from the School of Dentistry and the University helped in renovation of space for a new cell culture facility and a

histology and imaging facility that were part of this Center. Although NIDCR support for this type of Center was terminated in 2004, these facilities remain for our use.

Drs. Darveau and Dale as well as Dr. Herring and Cunningham were instrumental in two applications for more focused basic research centers that were designed to replace the "Comprehensive" center mechanism. These multidisciplinary centers involved people from several departments. The first was focused on innate immunity in the oral cavity (Oral Biology, Immunology, Microbiology, and the UW Center for Expression Array Analysis) and the second on craniofacial function (Oral Biology, Orthodontics, Pediatrics, Bioengineering). The process of developing these Center proposals has led to increased interdepartmental activities and collaborations. Unfortunately, neither of these proposals was funded and the investigators are currently looking for other mechanisms to continue the interesting collaborations that have been established.

Finally, a significant change in the NIDCR training grant program led to consolidation of three training programs within the School of Dentistry. The previous Salivary Secretions Training Program, the Chronic Inflammation and Periodontal Disease Training Program, and the Short Term Training Program were all combined into the new Cross Disciplinary Training Program in Dental Research under the direction of Dr. Izutsu. Dr. Dale-Crunk, Darveau, and Giachelli also serve on the Advisory committee for the Training grant. This program features predoctoral, postdoctoral, and short term training positions. It emphasizes interdisciplinary training in Oral Biology, inflammation and infectious disease, craniofacial sciences, and bioengineering.

Technologies: The convenience and speed of web based information has altered our communication and education. Several of the departmental courses have websites for students with the syllabus, lectures, references, extra information, etc. Within the next year, all Oral Biology courses will have websites with this information. The molecular biology course utilizes the web for training for use of online data bases as well as PubMed, OMIN, and other databases of the National Center for Biotechnology Information. This provides up-to-date training for our graduate students. In addition, most of our students take the Pathobiology (Pabio 536) Bioinformatics and sequence analysis which provides training in use of the web.

5. What variations exist among your faculty in terms of methodologies, paradigms, subfield specializations? Where are faculty offices located? What strengths and weaknesses for the unit are generated by differences among its faculty? Are there obstacles to communication? What strategies have been developed to promote communication, and are these successful?

Faculty scholarly interests are in several major areas of research which emphasize different paradigms, methodologies, and subfield specialization: 1) biochemical studies of protein secretion, expression and function; 2) pharmacological investigation of molecular mechanisms in signaling; 3) physiological studies of ion fluxes and their role in secretion and differentiation; 4) molecular aspects of bacterial interactions with oral cells; 5) pathology; 6) functional anatomy of oral tissues and their development; 7) immunological, emphasizing innate immune responses of oral cells to commensal and pathogenic bacteria present in the oral cavity; and 8) molecular genetics of craniofacial disorders. Our faculty offices and laboratories are located on B1 (Izutsu, Popowics, Fatherazi, Dale, Chung, Presland, Watson, and Somerman). Faculty who have joint

appointments are located in D2 (Darveau) and B5 (Herring). Adjunct faculty, are located throughout the Health Sciences.

A strength of this diversity of research interests and approaches is that it makes an important contribution to the School of Dentistry and to the profession allowing mentorship of students with a wide range of scientific and clinical interests. The regular and joint faculty meet regularly for department meetings and for occasional departmental retreats. Nevertheless, we have not had good enough communication with our adjunct faculty. As a way to overcome this problem, the regular, joint, and adjunct faculty all participated in our Research Retreat in early October. This retreat was specifically designed to promote communication among our diverse faculty and students. Communication in our department between faculty and students is also aided by the regular get-togethers (always with food) that accompany the School of Dentistry Research Day, departmental seminars and each PhD defense, and several holidays throughout the year. Communication is also promoted through our ongoing seminar series. This series has recently been in conjunction with Bioengineering. The schedule for the 2002-3 and 2003-4 seminars series are included in **Appendix G.2.**

Faculty and student communication was the main reason for development of the Oral Biology Research Day retreat in addition to the School of Dentistry Research Day. The latter is limited in terms of oral presentations and in terms of participation of our adjunct faculty since it is specifically designed to reach out to clinically oriented School of Dentistry faculty. The first Oral Biology Research Day was held on October 5, 2004 at the Waterfront Activities Center. Eighteen faculty participated by giving short talks on their research area and interacting in a relaxed and informal setting with faculty, students, and staff. The retreat was organized by Dr. Richard Presland and the program is included in **Appendix G.3.** The day was a great success with participation from regular, joint, and adjunct faculty, postdoctoral fellows and graduate students. Individuals stayed throughout the day; discussion was active and opened up possible new avenues of collaboration.

Oral Biology Research Day. October 6, 2004. Faculty, staff, postdocs, and students participated in our research day held at the Waterfront Activities Bldg.

6. What impediments to faculty productivity exist, how can they be reduced?

Major impediments fall primarily under the headings of graduate financial support and the need for improved facilities. A major impediment to faculty productivity is the limited support that is currently available for graduate students and qualified postdoctoral fellows making it difficult to recruit highly qualified trainees. Many of our students and potential postdocs are foreign and thus do not qualify for the NIH funded T32 Training Grant. Yet these students have made significant contributions and have become faculty in this country and internationally. Their support must come from research grants (RA positions for graduate students or Senior Fellow appointments for postdocs) which is a problem for faculty who have limited support or whose grant funds must cover technical personnel. The Oral Biology department has helped meet this need by offering limited support on a stipend basis for foreign PhD graduate students. This reduces their financial burden by allowing resident tuition instead of non-resident tuition. A second way the department has helped is by providing each faculty member with a $5000 budget for research support during the July 2004-June 2005 fiscal year. This fund has allowed student and faculty supplies, travel, pilot studies, and even student support. This fund has come from indirect costs and salary recapture and therefore will be highly variable from year to year depending on the success of the faculty with extramural grant applications.

A second impediment is the lack of support for graduate teaching assistants. Several of our faculty have multiple courses for dental students and graduate students (Darveau, Herring, Popowics) or courses that require laboratory assistants for setup and experimental support (Presland, Molecular Biology lab course). Each of these faculty is highly regarded by students and each has excellent teaching evaluations. Yet they have departmental staff support that is essentially limited to copying class handouts. The department would benefit greatly from several teaching assistantships per year. This would help faculty productivity and would help to solve the problem of support for graduate students. In addition, it would allow the department to provide a teaching experience for graduate students which would benefit their graduate education (helping with preparation of class notes, putting materials on the web, running review sessions, grading exams, giving an occasional lecture, etc.). At the present time, the School of Dentistry has no Graduate Teaching Assistantships. This problem can be addressed by awarding such positions to the Department of Oral Biology.

A final impediment is the lack of major research equipment. One example is the need for a facility that permits confocal microscopy and live cell imaging of human cells and tissues. This approach is currently being used by Dr. Izutsu's group via an arrangement with the imaging facility at the Fred Hutchinson Cancer Research Center. The approach would be valuable to many faculty, but use of the FHCRC facility is extremely limited. Live cell imaging via other Health Sciences facilities does not permit imaging of human cells due to biohazards. We have developed a request for a new state-of-the-art Imaging facility that will be part of the School of Dentistry funding raising targeted goals, and an alternate plan that calls for a major upgrading of the present Imaging facility that could be funded in stages as departmental funds permit. Such a facility would be useful to essentially all of the lab groups within the department. Our department has been fortunate to have common equipment including preparative centrifuges, an ultracentrifuge, a UV-visible spectrophotometer, a scintillation counter, a small cell culture room, dark room, and cold room. However, much of the equipment is old and in need of repair or

replacement with newer models that can interface with the departmental server for computer assisted analysis of data. Imaging via phosphoimaging is also needed for quantification of several types of common research approaches and findings.

7. What steps has your unit taken to encourage and preserve productivity of staff? How are staff recognized and rewarded? What programs support professional development of staff?

The Department of Oral Biology has an excellent staff that has had very low turnover. Eileen Kakida, Administrator, has been on the staff since 1984. Eileen arrived here with considerable knowledge regarding dental school administration, having worked as an Administrative Specialist at Marquette University, School of Dentistry from 1981-84. She was hired into the position of Secretary Senior, reclassified to Program Coordinator 2 in 1985, and, in 1997, was promoted to the position of Administrator of the department. During her 20-year tenure, Eileen has enrolled in many Training and Development courses, computer classes, and the 3-day university sponsored supervisory workshop. She has also attended all of the training sessions offered by the University, as new administrative processes evolved on campus. The department enthusiastically supported her in these endeavors. She also benefited from the mentoring of the former, long-time-Administrator, Colleen McKay.

Rosale Meriales, Fiscal Specialist 2, has been on the staff since 1994. Rosale started in the department as a Secretary Sr., was promoted to Fiscal Specialist 1 in 1997, and then promoted to Fiscal Specialist 2 in July 1999. Rosale was awarded one of the School of Dentistry's Distinguished Staff Awards for the year 2003.

Jennifer Kohn, Program Support Supervisor 1, was hired in the position of Program Coordinator in 1997. In 1999, Eileen Kakida submitted a reorganization plan for the departmental administrative staff that recommended Jennifer be promoted to Program Support Supervisor 1 (her current position).

Along with periodic promotions, Rosale and Jennifer have received merit step increases (funded by departmental funds), as well as generous release time to enroll in training and development classes of their choosing. In addition, they are both strongly encouraged to attend other campus training sessions that are offered periodically during the academic year. Rosale has completed the University of Washington Fiscal Management series that is offered through UW Training and Development, as well as numerous other courses and workshops. Jennifer has attended several computer classes, a 2-day supervisory workshop, and a supervisory class offered through Training and Development. She has also attended the yearly Graduate Program Coordinator's Workshops. The department is also paying for yearly memberships for Eileen, Jennifer, and Rosale to participate in the UW e-learning series. All training and development has been paid for by the department.

Several of the research staff have also been long-term employees of the department. Janet Kimball, Research Technologist Supervisor, has been working with Dr. Dale-Crunk since 1982; and has been associated with the Department of Oral Biology since 1988. Janet has been supported by the Department of Oral Biology for coursework toward a Supervisory Skills Certificate which is offered by the UW Training and Development Office. Thus far, she has

taken 11 courses over a 3-year period. Janet also participated in the Molecular Biology course offered through the department during Summer quarter. Over the years, Janet has also attended many research conferences, along with Dr. Dale-Crunk.

Dennis DiJulio, Research Technologist 3, has worked in the department since 1988. Over the years, Dennis has attended numerous conferences, and also the Molecular Biology course offered during summer quarter through Oral Biology.

And finally, Kerry Jacobson, Research Technologist 3, has worked for Dr. Eileen Watson for more than 30 years. Kerry retired in June 2000, but has returned on a part-time basis in the laboratory. Kerry attended numerous research conferences, along with Dr. Watson, over the years. Kerry has participated in the Molecular Biology class offered during Summer quarter, under the directorship of Dr. Richard Presland.

Although the administrative staff has received promotions, and merit increases, it has been extremely frustrating, and demoralizing for them not to be included in the annual increases (funded by the legislature or the University) that the faculty and professional staff have received. Over the past 20 years, there have been many biennia, that staff was overlooked in the cost-of living increases. The department has been very fortunate to have had such low turnover.

SECTION D. RELATIONSHIP WITH OTHER UNITS

1. Collaborations with other units.

The department encourages and seeks research and educational collaborations on both the individual and departmental levels. Individual collaborations are driven by the research and teaching interests of the faculty and include a number of long standing collaborations. These collaborations are discussed later in this section. In addition, the department as a whole has sought to increase collaborations with several departments that can aid us to attain educational and research goals.

Educational collaborations. A good example of this type of collaboration is illustrated by our molecular biology teaching collaboration with the Department of Microbiology in the School of Medicine. As explained in Section B, the department found it necessary to have a readily accessible molecular biology course for our graduate students, some of whom were practicing dentists returning because of their interest in an academic career. These students needed modern molecular biology with both didactic and laboratory components. The Department of Microbiology was willing to help us set up and run these courses, because their own course was often over-subscribed, and we agreed to take their excess students into our course. We shared the laboratory instructor and teaching assistant with the Microbiology course, the two courses were given in adjoining class rooms, and reagents for the two courses were prepared together. Moreover, our course was given in a Microbiology laboratory classroom and the reagents and TA costs were shared. This arrangement allowed us to give a course that was immediately successful and effective because we benefited from the years of experience Microbiology had with their course.

Another example is the cooperation between Oral Biology, Orthodontics, and Biological Structure in curriculum design and teaching of gross anatomy, head/neck anatomy, histology, and development. Courses covering this subject matter are an important core portion of the dental curriculum for first year dental students. The faculty involved confer frequently to insure that the students are getting quality instruction and that there is minimal overlap.

Finally, Our PhD program requires students to take several of the conjoint courses that are given by multiple basic science departments through the interdisciplinary Molecular and Cellular Biology Graduate Program. Thus, our students interact with students in programs throughout the Health Sciences.

Research and training collaborations with Bioengineering. The best example of departmental level collaborations in research and training is our interaction with the Department of Bioengineering. The Department of Oral Biology and the Department of Bioengineering share a training grant that provides $582,879 per year in direct research training funds. Our two departments aim to develop research collaborations that will yield clinically useful procedures that will give new healing tools to practicing dentists. Procedures are currently being investigated in implant integration, wound healing in soft and hard tissues, and maintenance and recovery of the periodontal pocket from infections and disease. We began this interaction with Bioengineering in 1999 by having one quarter (Spring) of our Oral Biology seminar series be

devoted to Bioengineering faculty speakers. This series led to a collaborative effort to have a Bioengineering component in the School of Dentistry's Research Training Grant application. This application was entitled "Cross-Disciplinary Dental Science Research Training" and was submitted in response to an NIDCR request for comprehensive research training proposals. The School of Dentistry proposal incorporated two existing research training grants (the Salivary Research Training Grant and the Periodontics Research Training Grant), as well as adding new components in Oral Biology and Bioengineering. Hence, the resulting grant was multidisciplinary, and cross-disciplinary in that trainees were expected to receive training in a number of disciplines per NIDCR instructions. All trainees take coursework in molecular and cell biology, bioinformatics, biomaterials and an introduction to bioengineering approaches. Trainees can take the majority of their training in Molecular and Cell biology or in Bioengineering and Biomaterials. The training grant was submitted in 2001 and funded to support 6 predoctoral, 5 postdoctoral, and 6 short term trainees. Dr. Izutsu serves as the Principal Coordinator of the grant which has three additional co-directors (Dr. Beverly Dale-Crunk, Oral Biology; Dr. Richard Darveau, Oral Biology and Periodontics; Dr. Cecilia Giachelli, Bioengineering). The grant is administered in Oral Biology.

In order to have increased communication with Bioengineering faculty and trainees, the Departments of Oral Biology and Bioengineering hold their research seminars at the same time, in the same room, on alternating Mondays. Consequently, trainees and faculty hear speakers from the two programs (School of Dentistry or Bioengineering) on alternating weeks in order to learn about the research interests and approaches of the two disciplines. These interactions have led to a number of research collaborations, and to several collaborative research proposals. School of Dentistry (Oral Biology) and Bioengineering faculty submitted research applications in response to an NIDCR RFA (Request for Applications) for Specialized Center project grant applications in Craniofacial biology. While the P50 concerned with the craniofacial skeleton was not funded, the collaboration has resulted in two RO1 applications that are being submitted for an October 1 deadline. In one, Dr. Sandra Bordin is collaborating with Drs. Greg King and Sue Herring on a proposal that developed from an initial proposal that dealt with effect of mechanical strain on cell cycles of the periodontal ligament, which involved a collaboration with Dr. Pat Stayton of Bioengineering. The other involves a collaboration between Drs. Michael Cunningham and Joan Sanders, of Bioengineering.

A number of collaborations are currently underway between School of Dentistry and Bioengineering faculty. For example, Drs. Martha Somerman and Mehmet Sarikaya of Material Science and Engineering have support from the training grant for postdoctoral fellow Hanson Fong who will study physical properties of regenerated tooth components. Dr. Somerman is also collaborating with Dr. Ceci Giachelli of Bioengineering on a project involving molecular mechanisms of calcification. Dr. Sue Herring is currently collaborating with Dr. Pat Stayton on a project involving Jennifer Patterson, a Bioengineering graduate student. Dr. Dale-Crunk is starting a collaboration with Dr. Paul Yager for rapid assay of salivary antimicrobial peptides.

While the interdepartmental collaborations have yielded some publications, and some grant support, we expect the major impact from these collaborations to come in several years time. The projects should yield specific clinical strategies for increasing wound recovery in both soft and hard tissues, and new procedures for increasing oral tissue resistance to infections;

specifically to periodontal disease. Other studies should increase our understanding of disease and normal tissue development, especially with regard to the oral soft and hard tissues.

Adjunct Faculty in Oral Biology. Our Adjunct Faculty represents a major collaboration with other units in the Schools of Dentistry and Medicine. These faculty were chosen for appointment because of their expertise on specific research and/or teaching topics. From the School of Dentistry, Norma Wells (Dental Public Health Sciences) was chosen for her experience in educating Dental Hygienists, Dr. Douglass Jackson for expertise on anesthetics and neurophysiology, Dr. Gregory King (Orthodontics) and Dr. Douglas Ramsay (Pediatric Dentistry/Dental Public Health Sciences) for expertise on teeth and bone, Drs. Martha Somerman and Sandra Bordin (Periodontics) for expertise on teeth and bone and/or on the biological basis for periodontal disease, and Dr. Werner Geurtsen (Restorative Dentistry) for expertise on biological effects of dental materials. From the School of Medicine, Dr. Margie Byers (Anesthesiology) was chosen for expertise on the dental pulp, Dr. David Eyre (Orthopedics) for expertise on bone biology, Drs. Tim Rose and Gerard Cangelosi (Pathobiology) for expertise on bioinformatics and microbiology, Drs. Peter Byers and Sampath Narayanan (Pathology) for expertise on the genetic basis of disease and expertise on teeth biology, respectively, and Dr. Michael Cunningham (Pediatrics) for expertise on cranial-facial development. These faculty members are available to serve as research/teaching mentors for students interested in their specific topic areas, and as such, they make a very significant contribution towards supporting the graduate program in Oral Biology.

In addition, several other faculty members were recently considered for appointment to the Adjunct Faculty; these appointments were approved by the department in October 2004. These include Dr. Frank Roberts (Periodontics) for teaching and research expertise in molecular and cell biology of periodontal disease, and several Bioengineering faculty members (Dr. Ceci Giachelli, Albert Folch, Xingde Li, Patrick Stayton, Paolo Vicini and Dr. Paul Yager) who are actively engaged in mentoring trainees on the Cross-Disciplinary Dental Research Training grant. It is envisioned that having these individuals serve on the Oral Biology faculty will allow them to serve as research mentors for dentists and other students with biology backgrounds, who wish to apply bioengineering approaches to study dentally relevant research questions. These individuals generally do not have the engineering background needed to matriculate in the Bioengineering graduate program, but the proposed pathway should allow them to obtain their desired training through the Oral Biology graduate program.

Individual faculty collaborations. Departmental faculty are encouraged to develop new approaches and collaborative ties to further their research efforts. Several faculty have fairly extensive collaborative efforts. The following paragraphs list most of the collaborations undertaken by the Oral Biology faculty.

Dr. Richard Presland collaborations with:

1. Peter Elias and Ken Feingold of the VA Medical Center, UCSF; studying barrier function in filaggrin transgenic mice. One paper has just been published (Presland RB, Coulombe PA, Eckert RL, Mao-Qiang M, Feingold KR, Elias PM. Barrier function in transgenic mice overexpressing K16, involucrin, and filaggrin in the suprabasal epidermis. J Invest Dermatol. 123(3):603-6. 2004.)

2. Catherine Thompson of the Kennedy Krieger Research Institute, Johns Hopkins University, Baltimore; provided promoter plasmids for transfection studies. No publications have resulted yet

3. Charles Craik and Youngchool Choe, Department of Pharmaceutical Chemistry, UCSF; provided recombinant caspase-14 protein for substrate profiling experiments. A publication is likely to result from this work.

4. Ken Izutsu and Sahba Fatherazi, Department of Oral Biology, UW; a project studying expression and function of TRPC channels in oral keratinocytes. Two papers based on this work have been submitted.

5. Irwin McLean,. University of Dundee, UK; to determine the genetic mutation in the flaky tail mutant mouse 4. No publications yet.

6. Isidro Sanchez-Garcia, MD, PhD at the Instituto de Biologia Molecular y Celular del Cancer (IBMCC), Centro de Investigacion del Cancer, Campus Unamuno, Salamanca, Spain; provided promoter plasmids for transfection studies. No publications yet.

7. Page Fredericks and Beverly Dale-Crunk, Department of Oral Biology, UW; to study significance of SNP in the human hBD1 gene 4. Manuscript in preparation.

Dr. Beverly Dale-Crunk collaborations with:

1. Richard Presland / Page Fredericks: Oral Biology, UW; see above.

2. Whasun O. Chung: Oral Biology, UW; regulation of defensin expression in response to commensal and pathologic oral bacteria. Several publications.

3. Edward Clark: Microbiology & Immunology, UW; interaction of epithelial cells and dendritic cells in innate immunity in the oral cavity. Collaborator on R01 competing renewal (submitted July 1 2004). Manuscript in preparation.

4. Richard Darveau: Periodontics and Oral Biology, UW; oral epithelial innate immune responses to commensal and pathologic oral bacteria.

5. Edward Clark, Microbiology and Immunology, UW; interactions between oral epithelial cells and dendritic cells. Manuscript in preparation. Collaborator on submitted NIH grant.

6. Roger Bumgarner: Microbiology, UW; protease activated receptors in oral health. Collaborator on R21 grant funded 4/1/04-3/31/06. Collaboration for DNA microarray studies

7. Robert Coombs: Laboratory Medicine, UW; role of defensins in HIV infection in an oral mucosal model (with graduate student).

8. Margaret Byers, Anesthesiology, UW; studies of innate immune responses in dental pulp (with graduate student). Grant submitted: formal collaboration on a Royalty Research Fund grant and in the competing renewal for an NIH R01 grant (submitted July 1, 2004).

9. Dr. Ove Back, Dept. of Dermatology, University of Lund, Lund, Sweden; studies on genetic variation (SNP) in the DEFB1 gene in atopic dermatitis patients. This collaboration also involves Page Fredericks, Oral Biology, UW and Robert Livingston, Genome Sciences, UW.

10. The following collaborations are related to Harlequin ichthyosis (a severe genetic skin disorder).
Dr. Karen Stephens, Lab. Medicine/Medical Genetics, UW.
Dr. Philip Fleckman, Medicine/Dermatology, UW.
Dr. Thomas Bugge, National Institute of Dental and Craniofacial Research, NIH, Bethesda, MD.
Dr. David Kelsell, Centre for Cutaneous Research, Barts and London School of Medicine

and Dentistry, Queen Mary, University of London, London, England.
Dr. Patrick Zeeuwen, Dept. of Dermatology, University Medical Center Nijmegen, The Netherlands, has resulted in a publication.
Dr. Daniel Hohl, Dept. of Dermatology, CHUV, Lausanne, Switzerland.

Dr. Sahba Fatherazi

1. Dr. Kenneth Izutsu, Department of Oral Biology, UW: calcium regulation of keratinocyte differentiation and responses to pathogenic bacteria. Numerous publications and a funded R01 and a recently submitted NIH grant application (with the two as Co-PIs).
2. Dr. Richard Presland, Department of Oral Biology, UW; molecular biology approaches to testing the role of TRPC4 in the calcium-induced differentiation response of keratinocytes.
3. Dr. Neal Futran, Department of Otolaryngology, UW; role of calcium signaling in oral cancer.
4. Dr. Sandra Bordin, Department of Periodontics, UW; measurement of cytokine responses in oral cancer cells.
5. Dr. Martha Somerman, Department of Periodontics, UW; promoter activation in mineralized tissues.

Dr. Tracy Popowics

1. Sue Herring, Dept. of Orthodontics; on the biomechanics of craniofacial tissues. Two publications (Popowics, T. E., Zhu, Z. and S. W. Herring. 2002. Mechanical properties of the periosteum in the pig, Sus scrofa. Arch. Oral Biol. 47: 733-741; Popowics, T. E., Rensberger, J. M. and S. W. Herring. 2004. The relationship of enamel microstructure to cusp strain and fracture in human and pig molars. Arch. Oral Biol. 49: 595-605) and an NIH grant (PI, Dr. S.W. Herring).
2. Ann-Marie Bollen, Dept. of Orthodontics; on the biomechanical properties of femur bones from calcium deprived rats. No publications to date.

Dr. Kenneth Izutsu

1. Dr. Sahba Fatherazi, Department of Oral Biology, UW; calcium regulation of keratinocyte differentiation and responses to pathogenic bacteria. Numerous publications and a funded RO1 and a recently submitted NIH grant application (with the two as Co-PIs) have resulted from this collaboration.
2. Mr. Paul Goodwin, Applied Precision, Incorporated, Issaquah, WA; use of deconvolution microscopy to measured intracellular calcium ion concentration changes. Numerous publications and a funded RO1 and a recently submitted NIH grant application with Mr. Goodwin as a consultant have resulted from this collaboration.
3. Dr. Bruce Rutherford, Acting Professor, Department of Oral Biology, UW; use of DNA microarray analysis to detect genes activated by calcium receptor activation. This collaboration has yielded one publication, also Dr. Rutherford has served as consultant on a recently submitted NIH grant application.
4. Dr. Edmond Truelove, Department of Oral Medicine; Dr. Frank Roberts, Department of Periodontics; a new collaboration seeking salivary markers for oral diseases. Two patient populations have bee identified, and a collaborative study involving two clinics is being organized.
5. Dr. Bertil Hille, Department of Physiology and Biophysics; a long mentorship that allowed Dr. Izutsu to learn patch clamping procedures, and resulted in patch clamp studies

of salivary gland acinar cells and keratinocytes.

Dr. Sue Herring

1. Drs. Greg King, James Bork (Medical College of Georgia), Zi-jun Liu, Department of Orthodontics and Patrick Stayton, Department of Bioengineering; a study of inhibition of osteogenesis in the craniofacial skeleton. Has resulted in submission of an R01 application.

Adjunct faculty collaborations. The Adjunct faculty members also are working to establish collaborative research projects with faculty in Bioengineering. As an example, a P50 application was recently submitted to NIDCR, and the following collaborations were included. Dr. Greg King submitted a proposal with Sue Herring and Patrick Stayton; Michael Cunningham submitted a proposal with Joan Sanders of Bioengineering; and Sandra Bordin submitted a proposal with Dr. Inez Vincent of Pathology. Also, Dr. Martha Somerman has collaborations with Drs. Ceci Giachelli of Bioengineering and Mehmet Sarikaya of Material Science and Engineering.

The collaborations of the Adjunct faculty are too numerous to list. Hopefully the examples given above will show that the Training faculty of the Oral Biology Graduate Program actively seek collaborations to increase their research and teaching capabilities.

Interactions with other departments yield opportunities to recruit new faculty and graduate students. Interactions with Bioengineering have resulted in several training grant appointments of both predoctoral and postdoctoral fellows. Certain of these individuals have a strong interest in developing research programs in the dental sciences. One in particular, Dr. Hanson Fong, has done work with dental researchers at the University of Southern California as well as the University of Washington. He is currently working with Dr. Somerman to study engineered hard tissues of the teeth to determine whether current engineering methods for building components of teeth yield products that are mechanically suited to withstand chewing forces. If so, then the procedures will be investigated for clinical adaptability. There is a high likelihood that Dr. Fong will remain in dental research, and there is a distinct possibility that he will be offered a faculty position with the School of Dentistry. Other Oral Biology faculty members have obtained faculty positions after being postdoctoral fellows in the department. Hence, Drs. Presland and Dr. Chung did postdoctoral training with Dr. Dale-Crunk, and Dr. Sahba Fatherazi did a postdoc with Dr. Izutsu.

Interactions with other departments improve our graduate and undergraduate education. Our molecular biology course was developed and still benefits from our collaboration with the Department of Microbiology. This was discussed above (Section B and Section D). Interactions with Dr. Frank Roberts, Department of Periodontics, have further strengthened the molecular biology course.

Student participation in the joint seminar series with Bioengineering has broadened the knowledge base of our students. More generally our students benefit greatly from the interdisciplinary Conjoint courses. Hence, the School of Dentistry and the Department of Oral

Biology share a training grant with faculty from the Department of Bioengineering that provides $582,879 per year in direct research training funds.

2. Participation in faculty governance.

Faculty members in Oral Biology participate in faculty governance by service on various School of Dentistry Committees, the Faculty Council, a faculty governance organization of the School of Dentistry, and the University Faculty Senate. Some of these are elected positions, others are appointed. Faculty in their early years at the School tend to serve on committees that are directly relevant to their careers, or on committees that require relatively little time commitment so as not to endanger their chances for promotion to Associate Professor. After attaining the rank of Associate Professor, faculty of the department are expected to serve in any manner requested of them, including School committees recognized for requiring greater time commitments. For example, research faculty tend to serve on the School's Research Advisory Committee. Drs. Presland and Fatherazi currently serve on this committee, while Drs. Dale-Crunk and Izutsu have served on this committee in recent times. Dr. Izutsu served on the APT committee for the last several years, and previously on the Curriculum committee. Dr. Tom Morton recently served on the Curriculum committee. Dr. Darveau recently served on the Curriculum committee, currently serves on the Student Progress Committee, and was just elected to the Faculty Council. Dr. Popowics is on the Student Affairs committee. Dr. Watson is currently on the Faculty Council and recently served on the Research Advisory committee. Drs. Dale-Crunk, Robinovitch and Izutsu have also served on the University's Faculty Senate. Drs. Dale-Crunk and Robinovitch also served on the Search Committee for the School of Dentistry Dean. Dr. Herring has recently served on the School of Dentistry Admissions Committee, the Accreditation Leadership Committee, the Search Committee for a Restorative Dentistry faculty member, and the Search Committee for Chair of Periodontics. Drs. Izutsu, Dale-Crunk, Presland, and Herring served on the Oral Biology Graduate Steering Committee.

SECTION E. DIVERSITY

1. Describe the inclusion of underrepresented groups for students, faculty and staff.

The Department of Oral Biology is an ethnically mixed department with an excellent representation of women.

Ethnicity of students. Of the 13 students currently in the Oral Biology Graduate program, 1 is Hispanic, 8 are Asian, and the rest are White. 7 of the students are males, and 6 are females. We have one Hispanic male student who is currently on leave from the PhD program. Our students are from the US, Puerto Rico, Thailand, Saudi Arabia, India, Taiwan, China, and Japan.

Ethnicity of faculty. There are eleven full time faculty in Oral Biology (including three Research faculty and three who have joint-appointments). Of the seven Professors in the department, one is Asian, the remainder white. Three Professors are female, and four are males. The one Associate Professor (Research) is a white male. The three Assistant Professors (two Research) consist of one Asian female, and two white females.

The department has one Acting Professor who is a white male.

There are currently fourteen Adjunct Faculty appointed in the department. These include four white females, one African-American male Associate Professor and one Asian-American male Professor, and eight white males.

The department has five Affiliate faculty who are all white males.

The one emeritus faculty member is a white female.

Ethnicity of staff. The department currently has three full time office staff, and five full time research staff. Two of the office staff are white females, and one is an Asian female. Two of the research staff are white males, and three are white females. The department also has three student assistants on the staff: one is an Asian male, one is a white male, and the other is a white female.

2. Underrepresented minority faculty work load.

We have no underrepresented minority faculty on the regular Oral Biology faculty.

3. Outreach and other minority recruitment efforts.

The School of Dentistry stresses recruitment of minority faculty, students, staff and patients in its Mission statement, which is quoted in part here.

> "…The service mission [of the School] is to improve the health and well-being of the people of the community and the region through outreach programs that are especially attentive to minority and underserved populations. The School values diversity in its students, staff, faculty, and patient populations. It seeks to foster

an environment of mutual respect where objectivity, imaginative inquiry, and the free exchange of ideas can flourish to facilitate personal development, professionalism, and a strong sense of self-worth."

The department participates in the School of Dentistry minority recruitment efforts, and has its own minority recruitment effort plans as well. These are described below.

School of Dentistry RISE grant recruitment effort. The School of Dentistry encourages its faculty to work to increase minority applications and enrollment in the School. One important initiative is the MBRS (Minority Biomedical Research Support) Research Initiative for Scientific Enhancement (RISE) Grant awarded on May 1, 2003 to a team of researchers and administrators from Heritage College and faculty of the School of Dentistry. Heritage College is located on tribal lands of the Yakama Indian Nation in Toppenish, Washington and serves Native American, Hispanic/Latino and other populations that have been educationally isolated. The Key Personnel for this grant includes Dr. James Falco, Dean of Arts and Sciences at Heritage College, the P.I. of the grant, and Drs. Susan Coldwell, Peter Milgrom and Norma Wells (an Oral Biology Adjunct Faculty member), all School of Dentistry faculty, who play important roles in coordinating research training experiences at our School. The immediate goal of this grant is to enhance the research environment at Heritage College. The ultimate objective of the grant is to increase the interests, skills and competitiveness of students and faculty at Heritage College in the pursuit of biomedical research or professional careers. The grant has 3 specific aims. One is to increase opportunities for learning about biomedical research careers on the Heritage campus. The second is to increase student opportunities for hands-on research experiences in the biomedical sciences at the University of Washington and other sites. The third is to increase opportunities for Heritage faculty to develop and enhance research skills in the biomedical sciences and to participate in on-going research at the University of Washington and other sites. The Department of Oral biology is one of the University of Washington sites available for minority student or faculty training.

Faculty of the Department of Oral Biology have worked with several underrepresented minority trainees from Heritage College in hopes of interesting them in careers in biomedical research or in clinical dentistry. Mr. Israel Fuentes, a Latino, worked with Dr. Susan Herring from June 16 through August 22 of 2003 and from his work became a co-author on an abstract presented at the 2004 meeting of the International Association of Dental Research. Mr. Fuentes returned to the University of Washington in Summer, 2004 continuing his research training on bone and on orthodontic tooth movement with Dr. Herring and with Dr. Greg King (an Oral Biology Adjunct Faculty member). Nancy Chino, a Latina, worked with Dr. Beverly Dale-Crunk in the Summer of 2002. She was particularly interested in Medicine and in research. Erik Van Doren, another Latino, worked with Dr. Dale-Crunk in the Summer of 2004. He is interested in a career in the health professions.

This is evidence that the faculty of the department are active in the recruitment of underrepresented minority students into the health professions by providing research training opportunities for these students in their laboratories. It is expected that these experiences will acquaint them with the health sciences as a career option, and that some of these students will be recruited into the School of Dentistry if they seek health professional careers, or into the department if they seek careers in biomedical research. While the effects of this effort are long-

range, the effort has a good chance of success because the RISE grant has given long term structure and financial support to this undertaking.

The ConneX program. Another component in the School's minority recruitment effort is through the University of Washington Northwest/Alaska Center to Reduce Oral Health Disparities (NCROHD), which is based in the School of Dentistry, and which sponsored a visit to the UW campus by high school students involved in the Yakima Valley ConneX program. This program encourages Yakima Valley students to seek Health Career opportunities. ConneX has 55 economically-disadvantaged and minority student members from 10 high schools in the Yakima Valley. Their UW visit was organized by Dr. Susan Coldwell and Dr. Douglass Jackson (Oral Biology Adjunct Faculty), and included an evening of bowling and pizza in the UW Husky Union Building, and participation in a Dental Camp run by Dr. Jackson and sponsored by the Washington Dental Service Foundation. ConneX students also performed basic training activities preparing them for careers in dentistry, dental hygiene, dental assisting and dental laboratory arts. Followup faculty (including Drs. Jackson and Dale-Crunk) visits with ConneX students in Toppenish are aimed at keeping students interested in seeking careers in the health sciences in general, and in dentistry in particular.

Hopefully, these activities of Oral Biology faculty will contribute to the recruitment of more underrepresented minorities into the health professions and possibly into the Oral Biology Graduate program as career options.

Departmental recruiting efforts for underrepresented minorities. The department receives very few applications from underrepresented minority students. However, we have made several serious attempts to recruit underrepresented minorities into the Oral Biology graduate program when their applications were received. In 1990, we attempted to recruit Yvonne L. Hernandez, who graduated from the University of California San Francisco School of Dentistry. Dr. Hernandez had done research while in the Dental School, and had published one paper and presented an abstract at the International Association of Dental Research, so we felt she was an exceptional candidate for our program. Dr. Hernandez had contacted us about her interest in applying to the graduate program in Periodontics and the PhD program in Oral Biology. Dr. Izutsu was the Graduate Program Coordinator at that time, so he wrote to the Graduate School for special dispensation to use the 1-year recruitment funds from two fiscal periods ($17500/year) as a financial enticement to recruit Dr. Hernandez. The department also used Graduate School recruitment funds to sponsor a visit by Dr. Hernandez to the graduate programs in Periodontics and Oral Biology. The visit was quite successful, but the graduate programs at the UCSF School of Dentistry heard of our offer to Dr. Hernandez and offered her financial support to do her graduate work at their School. In the end, Dr. Hernandez chose to remain at the UCSF to be close to her family. However, we were able to make a competitive offer at that time (albeit unsuccessful) thanks to the financial support of the Graduate School.

We also attempted to recruit Dr. Jerry W. Dillon, an African-American, to our PhD program in 1990. Dr. Dillon received his DDS from Meharry School of Dentistry in 1989 and a MS in MicroImmunology from Tuskegee University in 1989. He was also the Research Coordinator for the School of Dentistry at Meharry University. He applied to the graduate programs in Periodontics and Oral Biology at our University. We again asked for and received approval from

the Graduate School to use the funds refused by Dr. Hernandez in our effort to recruit Dr. Dillon. We communicated his acceptance into the PhD program and our financial aid offer of $17,500/year for two years by letter to Dr. Dillon. Because the Department of Periodontics had already accepted their entering class for that year, they indicated they would not consider Dr. Dillon's application until the following year. We then communicated with Dr. Dillon by phone, and he said that Harvard had offered him over twice as much financial aid as we had offered. We could not compete with Harvard's offer, so Dr. Dillon enrolled in their program. This was an example of a case where we could not compete on financial grounds with a more financially endowed University.

In 1995 we successfully recruited Dr. Ernesto Valiente into our Oral Biology graduate program. At the time of application, Dr. Valiente had received both a DMD degree (1991) and Oral and Maxillofacial Surgery graduate training from the University of Puerto Rico. Both programs are recognized as accredited programs in the US. We were Dr. Valiente's first choice for a PhD program, and he was also interested in practicing Oral and Maxillofacial Surgery here so he could qualify to take the boards in this specialty. We were able to recruit Dr. Valiente because of our financial resources at that time. We first offered Dr. Valiente a position on our Salivary Research Training grant that had a stipend of $25,600. Dr. Valiente accepted this position, but indicated that he would like to be considered for a position on the Dentist-Scientist Institutional Award (DSA) Program from the NIDCR at our School, which had a stipend of $40,000 per year. The NIDCR later ruled that Dr. Valiente didn't qualify for the DSA program because he already had completed specialty training. However, they recommended that he apply for a K08 (Mentored Clinical Scientist Development) award instead. (K08 awards were initiated by the NIH to encourage dentists to seek careers doing clinical research.) Hence, Dr. Valiente applied for and received one of the first K08 awards given by the NIDCR, and his financial stipend went to $68,172 per year during the last two of years of his training. This salary figure was difficult for many of our faculty to accept because it was higher than many faculty salaries in the department. However, the figure was approved by the School because it was the NIH recommended figure (which indicated how badly UW faculty salaries trailed national figures). The NIH had previously determined that high trainee stipends were necessary if dentists were to be recruited into academia versus private practice. Dr. Valiente completed his General Examination and data collection for his thesis before going on leave in 2000 so he could obtain further Oral and Maxillofacial Surgery experience in Ohio. He has not returned to the program from this position and is still on leave.

An example of a recent recruitment effort was the 2002 application from Ms. Vida de Arce, an African-American student who completed a MS in Oral Biology at UCLA and was interested in obtaining the PhD in Oral Biology. When we became aware that Ms de Arce was an underrepresented minority with very strong letters of recommendation from her Masters program instructors, we made a concerted effort to recruit her. We waived her Graduate School application fee, and we contacted the GO-MAP office in an attempt to obtain financial aid as part of a recruitment package. Ms Arce did not submit a final application to our program and chose to go to Harvard instead. It is probably fair to say that without competitive resources it will continue to be difficult to compete with the program at Harvard in recruiting underrepresented minority students.

One of our faculty was indirectly involved in recruiting an underrepresented minority student as a dental student. Dr. Sue Herring is a nationally recognized researcher in oral bone and muscle research. Through common research interests, Dr. Herring met a student, Elicia Thompson, a Masters student at Ohio University. Their acquaintance influenced Ms. Thompson to matriculate in our School of Dentistry, and Elicia did a SURF project with Dr. Herring and presented the findings at an international research conference last July. Through Dr. Herring's efforts there is a possibility that Ms. Thompson may consider a career in dental academics.

The department is also actively involved with the evolving School of Dentistry combined DDS/PhD program. A major attribute of this program is that students in this program receive considerable financial aid. Currently, the University covers tuition costs and provides a small stipend. Hence, students in this pathway should be able to complete their DDS/PhD training while accruing relatively little educational debt. It is hoped that this program will attract minority students interested in careers in dental education or in dental research to our School and graduate programs.

Financial inducements and recruitment of minority students. As seen in the above case studies, financial inducements play a major role in recruiting underrepresented minorities to different graduate programs. One financial factor that played a major role in recruiting students in general into the Oral Biology graduate program was the Dentist Scientist Institutional Award (DSA) program. This program paid substantial stipends (>$40K) to dentists to obtain training in a dental specialty and research training at the PhD level so they could seek careers in dental education and research. Many US trained dentists matriculated in these programs nationwide but few actually pursued careers in academia following completion of their training. Most chose to enter private practice utilizing their dental specialty training. Consequently, the DSA program was discontinued by the NIDCR, and enrollment of US trained dentists in PhD programs dropped dramatically. We are still in the post-DSA climate, and there are relatively few applications from US trained dentists to our PhD program because dentists can earn extremely high salaries in private practice. Hence, while we do have a Cross-Disciplinary Dental Research Training grant, we do not receive many applications from US trained dentists with the qualifications for graduate work in molecular biology. Moreover, very few underrepresented minorities apply to, enter and complete Dental School, and even fewer minorities who earn dental degrees seek careers as dental academicians. Dr. Douglass Jackson (Oral Biology Adjunct Faculty) is a rare example of a minority dental graduate who has chosen an academic career and we are fortunate to have his contributions to programs directed to recruitment of minorities. We believe that if we are to be competitive in recruiting such individuals to our graduate program, we would have to make them extremely attractive offers of financial assistance. At present this is highly unlikely because we do not have the financial resources to make such offers. Once a minority student is enrolled in our program, we could apply for an NIH supported minority supplement to continue support.

Increased Diversity in association with Bioengineering. In addition to the School of Dentistry strategies described above, the Department of Oral Biology is working to increase diversity among faculty and students by working with the Department of Bioengineering. Although the major motivation for this collaboration is to provide a pathway by which students with biology backgrounds can receive training in bioengineering-related approaches to dentally relevant

problems, a side benefit of this interaction is that our department will interact with underrepresented minority faculty in the Bioengineering department, and we may be able to recruit underrepresented minority students into School of Dentistry programs. For example, the Bioengineering faculty members who will serve as the initial faculty for the Bioengineering-related pathway in the Oral Biology PhD program include Albert Folch, Ceci Giachelli, Xingde Li, Patrick Stayton, Paolo Vicini and Paul Yager. These individuals were chosen because of their prominent roles in the collaborative research training grant between Bioengineering and School of Dentistry faculty. This pathway involves one underrepresented minorities faculty member (Dr. Folch). In addition, underrepresented minority students have accounted for 8.4 percent of the full-time Bioengineering student body over the past 5 years. It is hoped that our association with Bioengineering will result in some of these underrepresented Bioengineering minority students becoming interested in School of Dentistry programs.

Factors that impede recruitment. Our efforts to recruit underrepresented minority student candidates have generally been unsuccessful. As noted above, the main reason is because such students are generally also recruited by other Schools with larger endowments that can make offers of financial support that we cannot come close to matching. The lack of financial aid is the major factor that impedes our efforts to recruit and retain members of underrepresented racial groups.

University assistance with recruitment. The University can assist all departments and graduate programs with minority recruitment by establishing a pool of financial aid grants available on an as-needed basis as prospective candidates are identified. By not allocating the funds directly to departments/graduate programs, the money will not go unused when targeted underrepresented applicants are unavailable, but will be immediately available to those departments/graduate programs who receive enquiries from targeted minority applicants. By combining resources in this way, a relatively small amount of money could serve to aid in recruiting underrepresented minorities to many departments and graduate programs.

4. Impact of diversity on curriculum.

As described above, we have only one underrepresented minority student in our program, so there has been little impact on our program. However, we have been altering our program by seeking new degree pathways (e.g., the Bioengineering-related pathway, combined DDS/PhD) and associations (e.g., the research training of underrepresented minority students from Heritage College) in an effort to increase the numbers of these minority students in our graduate programs.

Importance and impact of foreign students on program goals. Our program does have a large number of foreign students, and this appears to be because people from other cultures are more likely to seeking careers in academic health professions and dentistry. Students from Asian countries especially seek careers as dental educators and researchers. While all of our foreign students have been academically competitive here, some require more time to develop their skills in written and spoken scientific English. Hence, our courses require many oral and written reports, so these students can become proficient in these areas. This requires a little effort on the part of our faculty, but there is a significant pay off for the program since foreign-trained dentists

constitute a major resource from which future dental educators in our country may be drawn (see Section A.1). As examples, three foreign-trained dentists to date have graduated from our program and are either teaching or doing research in a US Dental School (Drs. D'Silva and Hua) or a Dental Hygienist training institution (Dr. Bharat). At least two of our current foreign-trained dentist students (Drs. Cai and Sun) are also interested in seeking careers teaching in dental schools in this country. Both students are taking dental clinical specialty training in addition to PhD level research training in order to prepare for such careers. One of these students is receiving financial aid from our School in recognition of his potential as a future dental educator.

SECTION F. DEGREE PROGRAMS

1. Doctoral program

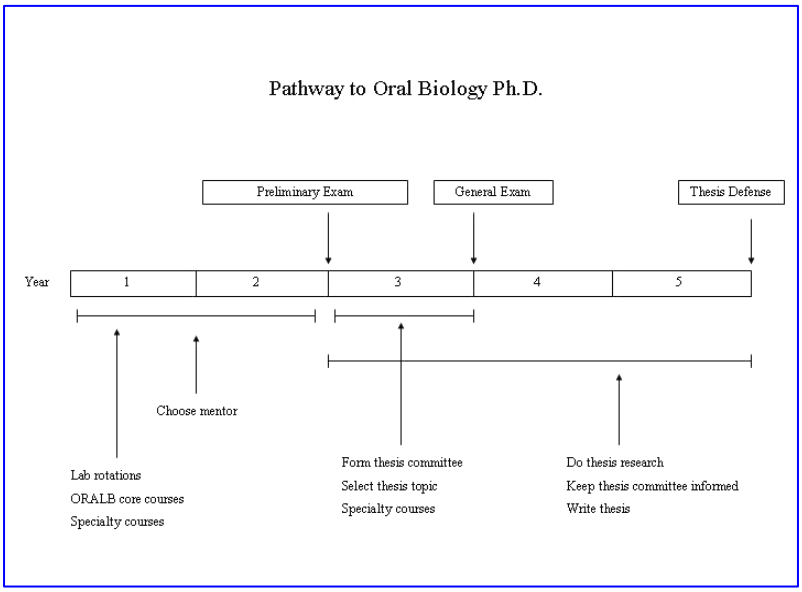
a. Describe objectives in terms of student learning and other outcomes, as well as benefits for the academic unit, the university, and region. Compare your objectives with those for programs at peer institutions.

Our mission statement is repeated here due to its relevance to our graduate programs.

> "The primary mission of the Department of Oral Biology is to bridge between the Basic Sciences and the clinical practice of Dentistry through excellence in teaching, in research and in the education of dental scientists for academic and research positions of leadership. Recent advances in basic sciences, the human genome project, and the new recognition of multidisciplinary contributions to the understanding of oral health and disease processes and treatment, place the Department of Oral Biology in an excellent position to contribute to the national effort to establish the genomics and proteomics of oral and craniofacial health and disease, relate these findings to overall health, and translate these advances into improved dental care and oral health."

The Department of Oral Biology PhD, DDS/PhD, and Masters' programs are directed by the Graduate Steering Committee which is composed of the Graduate Program Director, Dr. Beverly Dale-Crunk, and Drs. Izutsu, Herring, and Presland. The Graduate Steering Committee makes decisions concerning the policies and procedures, acceptance of applicants, and tracks student progress. All major policy decisions are discussed with the entire faculty. Within the past several years this included important topics such as the new DDS/PhD program, and its goals, organization, and options for support of students.

PhD Program. The Department of Oral Biology offers the PhD program for the School of Dentistry. We are committed to the education of dentists as well as non-dentists, who seek advanced research training and careers in dental academia and research. Our program offers benefits to the School, University, and country by serving the need for academically oriented professionals that can be the faculty members of the future. Schools of Dentistry across the country are desperately short of qualified faculty. A recent report from the American Association of Dental Schools showed nearly 300 vacant budgeted faculty positions in a total of 55 dental schools in the US. The average number of unfilled faculty positions was 6.4 and only a single school had no vacant positions (Haden et al., 2002). Further, the high average age of the current dental school faculty suggests that the need for qualified dental academics will increase in the future as current faculty face retirement. Finally, if dental schools are to continue to contribute to the research mission of their parent universities, then PhD and DDS/ PhD students



are essential. There are some very specific contributions to be made by dental research that is best performed in basic science departments within dental schools. For example, research on craniofacial problems, salivary secretory mechanisms, bone metabolism, and innate immunity are clearly relevant to clinical problems of oral health as well as overall systemic health. The Department of Oral Biology PhD program is designed for students desiring extensive research training as well as in-depth course work in oral biology. Students in the PhD program are expected to gain proficiency in oral and craniofacial sciences with an emphasis in modern investigative methods. These are the faculty members of the future. A list of pathways, degrees, etc. is found in Appendix C.

Comparison with Peer Institutions. Our goals are quite consistent with those of our peer institutions. For example, the UCSF Oral and Craniofacial Sciences Program "offers academic programs at the leading edge of basic and translational biomedical sciences related to craniofacial development, oral health, and disease processes and treatments. …. Our ultimate goal is to provide outstanding training for future academic, professional and research leaders." The Harvard Department of Oral and Developmental Biology PhD program "graduates are prepared to become leaders and independent investigators in dental and medical schools as well as industry." The University of Michigan Oral Health Sciences trains "candidates who can contribute, through their research, teaching, and/or service, to the diversity and excellence of the academic community." These are just three examples, but indicate the recognition by oral biology programs at major educational institutions of the need for training academic leaders of the future.

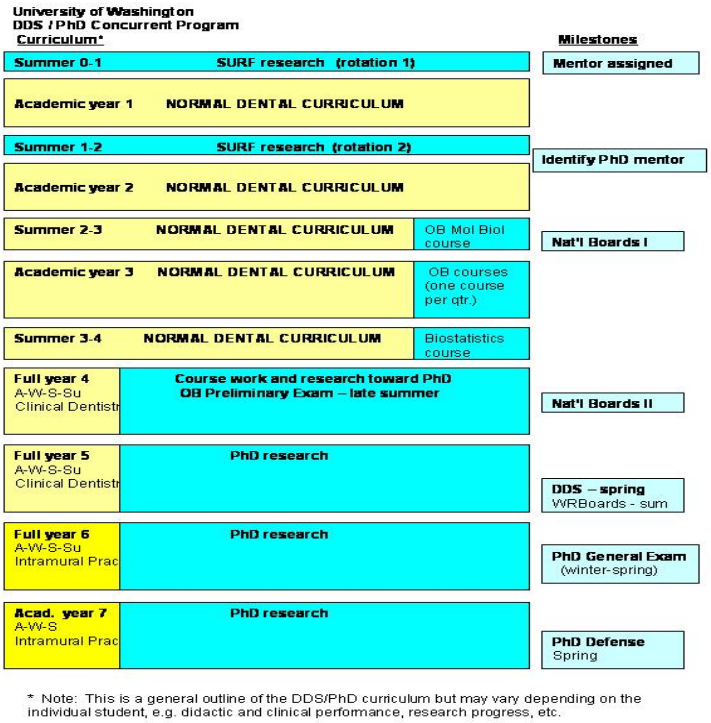
The Oral Biology PhD program usually requires five years. Students are expected to devote the full twelve-month year to their graduate work (allowing time for vacation and holidays). Some of our graduate students will have the opportunity to assist in the teaching program of the department as a practical means of gaining experience in the presentation of lectures and laboratory work. A list of current graduate students and their research interests is in Appendix C.2.

DDS/PhD program. Our department also offers a DDS/PhD program. The objective is to educate committed individuals for future academic positions in a manner that provides the best possible dual training and minimizes the debt load that typically occurs with dental education. Students have an opportunity to continue clinical practice so there is no break in use of clinical skills while completing the PhD research portion of the program. This program, combined with clinical specialty training and/or postdoctoral experience, will prepare individuals for faculty positions and give an excellent opportunity to connect their research training and clinical experience. The program is designed to recruit future dental educators early in their professional development before they have acquired a significant educational loan debt. Such debts constitute a major deterrent for dentists considering careers in dental education.

The DDS/PhD program keeps the normal dental curriculum intact for years 1-3 while taking advantage of our already existing Summer Research Fellowship (SURF) program for research rotations as an entering DDS student and between the first and second years. Additional basic science course work will be taken in summers and year 3 in place of normal electives, but will be the focus of the 4th year, while the DDS clinical experience will be spread over years 4-6. We

anticipate that the DDS could be conferred in year 5 or 6 while the entire combined program will take 7-8 years.

The first student, Jeremy Horst, entered this program in summer 2004. He is a very committed and mature student who has a Master's from the University of California San Diego in Chemistry and Biochemistry. Because one of the goals of the program is to minimize student debt load, financial support is essential. We have been fortunate that the University of Washington has granted tuition waivers for the first two years for students in this program. In addition, the Washington State Dental Association is providing a stipend. Both sources of support are willing to provide for two students each year. We anticipate that once the student has selected his/her preceptor for research, the student will apply for an individual NIH DDS/PhD traineeship, which will free the WSDA funds for use recruiting other trainees. The overall outline of the DDS/PhD program is shown in the Figure.



The diagram indicates the relative time devoted to clinical dental curriculum (light areas) and to the PhD program courses and research (dark areas). Milestones for the program are shown on the right.

PhD Course Requirements.
The curriculum description is included in Appendix C.1. The information summarized here is condensed from our website and from the description in Appendix C.1. Through their coursework, students are expected to gain proficiency in oral and craniofacial sciences and in one or more basic biologic sciences and in modern experimental laboratory approaches. 90 credits are required of which at least 15 credit hours must come from science courses in departments other than Oral Biology and at least 27 are thesis credits. Courses generally include those offered through the Molecular and Cell Biology Program, basic sciences departments, and Bioengineering. Students attend and participate in departmental seminars (ORALB 575).

<u>Year 1:</u> Initial Course Work. All new students meet with the Graduate Program Coordinator before the start of classes in the Autumn Quarter to consider the student's course work. The selection of courses will depend on the student's background, research goals, and interests. Each student is expected to take 2-3 rotations in different laboratories and select a research mentor by the end of the 1st year.

Year 2: **Continued course work and research.** Students complete courses including the remainder of the core courses in Oral Biology and other disciplines relevant to the student's dissertation research. Students are also encouraged to take elective courses offered through the Medical Education program and the Graduate School which will help them in their future teaching careers. By early in the second year of study, the student is expected to choose a thesis adviser and to begin to develop a research project for his/her dissertation problem.

The Preliminary Examination is given at the end of the year 2. The purposes of the exam are (1) to allow the student an opportunity to reflect on the breadth of topics encompassed by Oral Biology and to demonstrate both a mastery of the topics and recognition that these topics constitute a discipline, (2) to determine that the student is sufficiently knowledgeable in the area of oral and craniofacial sciences to proceed in this discipline, and (3) to determine that the student is capable of documenting existing knowledge concerning important research questions in the field.

The Supervisory Committee is selected and officially appointed in year two or by the third year at the latest. This committee will consist of at least two members of the Oral Biology graduate faculty most familiar with the student's area of research, as well as representatives from other appropriate departments. This will include a Graduate Faculty Representative chosen by the Graduate School. In accordance with Graduate School regulations, the Supervisory Committee will meet regularly and be responsible for advising and directing the student through the PhD program.

Year 3: The student is expected to take **the General Examination** by the end of the third year. This examination is in the format of a written research grant proposal that is presented to the PhD Supervisory Committee. All required coursework must be completed at this time. The purposes of this examination are (1) to determine whether the student is capable of recognizing an important research question in oral and craniofacial sciences, (2) to determine whether the student is able to develop this question into a comprehensive proposal complete with preliminary findings and suggested methods of procedure, and to orally defend the proposal, and (3) to provide the student an opportunity to receive feedback from the Supervisory Committee on the proposed research project. The research project for the PhD dissertation will be chosen by the candidate and adviser and be approved by the candidate's Supervisory Committee via the General Exam. **The research must represent a worthy and fundamental contribution showing originality in concept and implementation.**

Years 3 to Completion: Research is continued with at least several meetings of the PhD Supervisory Committee per year culminating in **the Dissertation and the Dissertation Examination.**

When the candidate has completed the research project, written the dissertation, and had it approved by the reading committee, the mentor will obtain approval from the Graduate School and set a date for the Final Examination which is conducted as an open seminar followed by examination by the Supervisory Committee.

b. Describe the standards by which you measure your success in achieving your objectives. Assess the degree to which the program meets these objectives. Indicate any factors that have impeded ability to meet objectives and plans to overcoming these impediments.

Measures of success during training include competitive grades in courses taken with graduate students in other health sciences programs, such as the Conjoint courses and success in the departmental Preliminary Exam and the General Exam. Overall measures of success of our program and its students include attainment of suitable postdoctoral and faculty positions, publication in peer-reviewed journals, obtaining NIH and other extramural research funding, awards, and continuing involvement in dental sciences. All of our PhD students are expected to publish their findings in quality peer-reviewed journals. Typically students publish 2-4 manuscripts dealing with their PhD work although some may not be published until after the degree is completed. We also look at Graduate School Exit Survey results to see if our Program is fulfilling the needs and expectations of our graduates. It is clear from these surveys that student satisfaction with the program has increased from below the mean for the University as a whole (1993-1997) to above the mean for the University (1997-2004), suggesting that our program has improved and is indeed meeting the needs of our students. The Exit surveys are important in terms of documenting the overall improvements made in the curriculum during the years since our last review.

During the past 10 years (since our last review) we have had a total of 9 PhD graduate students complete the program. Five currently hold full time faculty positions at academic and research institutions and 3 are part-time faculty. Two additional students are expected to finish and defend their PhDs Fall quarter 2004 and both of these individuals will be going to faculty positions. Five of these graduates have current or pending grant support, and one has pursued a clinical training program. **Appendix E** lists the current positions of all graduates. For example, from our PhD program, Dr. Nisha D'Silva is an Assistant Professor in the Dept of Oral Medicine, Pathology, and Oncology, University of Michigan School of Dentistry. She has NIH supported research funding and is involved in both clinical oral pathology and basic research. A second example from the PhD program is Dr. Suttichai Krisanaprakornkit. After completing his PhD he returned to Chiang Mai University in Thailand where he has clinical and basic science teaching responsibilities, but has also been successful in setting up a research program, establishing collaborations with others at his school and in Japan, and obtaining research support from the Thai government for his studies.

The success of our program is also indicated by awards both at the University and the national level. Five out of the nine PhD students who have completed our PhD program were Magnuson Scholar Awardees for the School of Dentistry (Kautsky, D'Silva, Krisanaprakornkit, Yilmaz, and Jurevic), as well as one past MS student (Rody), and one current PhD student (Sun). Dr. Krisanaprakornkit won the international Hatton Award competition of the International Association of Dental Research. Dr. Kautsky was supported by an independent NIH Dentist Scientist Award. Drs. Van der Ven, Boegart, and Jurevic were supported by the institutional Dentist Scientist Award Program (funded by NIH). Drs. Yilmaz and Xie each were successful in obtaining NIH career development awards prior to finishing their PhD training.

In summary, our PhD program has been steadily producing the type of well trained individuals for academic dentistry consistent with our goals. The great majority of these graduates are contributing to dental education and research both in this country and internationally.

c. How do you stay informed of career options, inform students of and prepare them for the breadth of opportunities and career alternatives available, including industry, as well as academic careers in non-research-intensive universities?

Students are encouraged to attend and present their research at the American Association for Dental Research meeting held in the spring of each year. This is the primary meeting for networking among dental academics and has listings of positions available. In addition, the University of Washington Career Center offers a number of seminars and informal get-togethers for people in the job market in biotech and other arenas. These notices are provided to graduate students and postdoctoral fellows as appropriate. Our training program helps students prepare for future opportunities by (1) encouraging their grant-writing skills via the General Exam format and by participating in grant writing seminars, (2) by participation in seminars and giving presentations to their own lab groups and at the departmental level, and (3) encouraging our students to take one or more courses in educational methods as a way to help them be prepared for future lecturing and preparation of teaching materials, although during the past few years we have not had sufficient opportunity for students to be involved in teaching. We hope to correct this problem by being able to offer Teaching Assistantships in the future. This would help support students and give them a hands-on teaching experience both in the classroom and with preparation of teaching materials, review sessions, and tutoring. This year we will encourage our students to attend the first annual Career Development Symposium in December 2004 co-sponsored by the Graduate School and the Center for Career Services. We also inform our students about other opportunities provided by the Graduate School to help them develop professionally toward their post-academic career.

2. Masters degrees – MS in Oral Biology

a. Show the relationship of master's degree programs to the doctoral program. Describe objectives of the MS program in terms of student learning, professional skills, skills for lifelong learning, and other relevant outcomes, as well as its benefits for the academic unit, university, and region. Compare your objectives with those for programs at peer institutions.

The curriculum description for the MS in Oral Biology is included in Appendix C.1. Our Master's program typically requires two full years and has a required thesis. Applicants to our program are encouraged to pursue a PhD if it is clear that they have sufficient background and commitment. However, we have a number of foreign candidates who have completed a Bachelors of Dental Science in their home country (India, Brazil, Iran, and Turkey) and wish to continue their education toward teaching and/or clinical practice. Since they typically do not have a background in modern molecular biology, a Master's program can be the better choice. In some cases, the terminal Master's is most suited to individuals interested in the PhD program, but unable to continue due to lack of financial resources (example, Dr. Rody). A terminal Master's was also the choice for an applicant who strongly desired a part time teaching career and obtained a position with the Lake Washington Technical College Dental Hygiene program

(Bharath). Those who wish to continue in a clinical program have generally entered the Oral Medicine program once they have updated their basic science background, and demonstrated their academic ability (Rao, Faghih-Nakhjiri).

Master's students do at least two research rotations during their first year and then decide on a laboratory for their Master's thesis research. They interact with the PhD students and have contributed to the "critical mass" and camaraderie of graduate students in the program. Their research also contributed to the overall research programs of faculty although at a different level than that expected of PhD students. These students participate in seminars, learn to read and evaluate the scientific literature and participate actively in course discussions.

Our Master's program contributes to the University and the region by producing trained professionals for a variety of positions. These include public health dentistry (Faghih-Nakhjiri), teaching both here (Bharath) and abroad (Rody), as well as teaching and clinical affiliation at the University of Washington (Kanter, Grace). In addition, participation in our Master's program has led to further training for a PhD (Cai).

b. Describe standards for success, assess success, indicate factors that impede success.

Standards for success include professional job attainment, publication of Master's research, and contributions to the profession. The current positions of our Master's students for the past 10 years are shown in Appendix E. Some examples of the success of this program are mentioned above (Section F.2.b.). One of our MS students (Rody) was a Magnuson Scholar Awardee. Master's students typically have one publication based on their research.

c. Career options

Students generally enter the program with a fairly good idea of their desired career path toward clinical teaching or a position which combines clinical teaching with research. However, Master's students often come to our program with unrealistic expectations about their competitiveness for teaching/clinical positions at this institution. Nevertheless, we work actively with other departments (Oral Medicine, Periodontics, Orthodontics) depending on student interest, to help students toward their goals and to direct them appropriately.

3. Master's degrees – MS for Dental Hygiene Educators

a. Show the relationship of master's degree programs to the doctoral program. Describe objectives of the MSDHE program in terms of student learning, professional skills, skills for lifelong learning, and other relevant outcomes, as well as its benefits for the academic unit, university, and region. Compare your objectives with those for programs at peer institutions.

The curriculum description for the MS for Dental Hygiene Educators is also included in Appendix C.1. The MS for Dental Hygiene Educators program has served quite a different group of students. The goal of this program is to provide academically motivated dental hygienists with an opportunity to increase their basic science skills for competitive positions in Dental Hygiene programs throughout the country. Applicants are typically dental hygienists who

have been in private practice for some years and now desire to shift to a teaching career. The students are mature and goal oriented. This is a 2 year (typically 7 quarters) non-thesis program. Students typically take microbiology, immunology, and pathology courses. They also have uniformly taken courses to develop and improve teaching skills. In addition, students in this program have an opportunity to learn research methods that may apply to community based programs, laboratory and clinical research. This program offers several benefits to the University community and region. Students have actively participated in the oral educational programs in rural Washington State in association with the Yakima Valley Farmworkers' Clinics, and Yakima Valley Community College. The teaching skills and educational background that our students gain from the program have given them confidence to continue in education and to improve their profession. Dental hygiene programs are expanding. The program at Lake Washington Technical College is less than 10 years old and a new program will be started within the next 2-3 years at Seattle Central Community College. Thus, there is a need for individuals who can organize, establish curriculum and teach. Our students fill this need for the community.

b. Describe standards for success, assess success, indicate factors that impede success.

Success is measured by attainment of suitable teaching positions that offer opportunity for advancement and service to the profession of Dental Hygiene. The present career positions of past students in this program are shown in Appendix E. Some recent examples are Kimberly Mathieu Coulton, now an Assistant Professor at Armstrong State University in Savannah Georgia where she has an opportunity to work toward a PhD at the University of Georgia. Beth Davis, another recent graduate, was very active in developing a teaching internship opportunity at Lake Washington Technical College. This led to a permanent teaching position for her and opened the opportunity for Hema Bharath as well.

Impediments. This program has had only limited student enrollment, although our graduates are quite successful. The program is most effective for the students when there is overlap of students to offer continuity in the learning experience, so that a second year student can assist the first year student. This has not always been the case. The primary reason for the small size of this program is that it is full time for seven quarters. Most dental hygienists cannot take this period of time to be full time students. In addition, we have only a single dental hygienist (Norma Wells) working to recruit applicants to the program. To address this problem we have (1) advertised the program through the American Dental Hygiene Association (ADHA) journal, (2) considered the possibility of an additional affiliate faculty member who could be especially helpful in establishing a regular dental hygiene teaching internship, and (3) considered a clinical research track for interested students by utilizing the skills of individuals in the Regional Clinical Dental Research Center. However, it is clear that the program would have more applicants if it could be made available on a part-time basis. The department will be considering this change. Nevertheless, the small number of applicants does not preclude the need for the program because our graduates are playing a vital role in dental hygiene education both locally and nationally.

c. Career options

This program is clearly oriented to academic teaching in Dental Hygiene programs. Students also learn of clinical research opportunities such as in the Regional Clinical Dental Research

Center and community based opportunities such as those in the Yakima Valley. Our students have an opportunity to have clinical rotations in the Dental Fears Clinic and in the Dentistry for the Disabled (DECOD) Clinic to give them experience in a clinical situation that is unique. We receive frequent information on job opportunities for students in the program from the national organization. These are made available to our students and alumni.

4. Bachelors Programs

The Department of Oral Biology offers undergraduate research (OBIOL 449) as an undergraduate elective. In addition, student helpers in the laboratories are actively involved in learning research techniques and getting research experience. Most of the undergraduate students participating in our program are interested in applying to Dental School or to other science or health related programs. Their interaction with our department is often their first 'hands-on' experience.

Our departmental faculty have also been very active in serving as mentors for the Summer Research Fellowship (SURF) Program that is open to entering and current students in the School of Dentistry. This program gives dental students an opportunity to get involved with a research project at all stages, including writing a proposal that is critically evaluated, bench work collecting data, analysis, preparing an abstract, and presentation of a poster at the School of Dentistry Research Day in the fall, and preparation of a written report. Posters and written reports are used as the basis of awarding funding to attend the American Association of Dental Research (AADR) meeting in the spring, the American Dental Association Student Research Meeting and the Hinman Student Research meeting. A new national competition for student research abstracts was started at Harvard in 2003. One of our students (Stephen Hanson, working with Drs. Chung and Dale) won this award in its first year. This SURF program typically attracts the top students in the first and second year School of Dentistry classes. These students are a candidate pool for our DDS/PhD program. We have had informal interest group sessions with these students to be sure that they know about the program and will consider it as an option to the purely clinical DDS program.

A list of DDS students who have conducted SURF project with Oral Biology departmental mentors within the past several years is shown below.

Year	Student	Mentor
1996	Jennifer Marshall	Susan Herring
1997	Jeff Berg	Murray Robinovitch
	Eve Erickson	Peter Byers
	Steve Lemery	Gregory King
	Christopher Perez	Beverly Dale-Crunk
	Dale Woodnutt	Margaret Byers
	Bill Wong	Susan Herring
1998	Jason Bourne	Gregory King
	Michelle Kobayashi	Douglass Jackson
	Ramesh Rao	Leigh Anderson
	Dale Woodnutt	Margaret Byers
1999	Stan Edwards	Susan Herring
	Ramesh Rao	Leigh Anderson
	Seng Yea	Kenneth Izutsu

2000	Ronald Hsu	Susan Herring
	Jeff Lingenbrink	Gregory King
	Marjorie Tsutsui *	Beverly Dale-Crunk *
	Dorcha Wojtkowski	Gregory King
	Dale Woodnutt	Margaret Byers
2001	Christopher Herzog	Douglas Ramsay
	Ronald Hsu	Susan Herring
	Fleur Jones	Richard Darveau
	Jeff Lingenbrink	Gregory King
	Scott Starley	Margaret Byers
	Douglas Whitfield	Sandra Bordin
2002	Donald Chi	Richard Darveau
	Rachel Evans	Richard Darveau
	Eric Hanson	Sue Herring
	Jeff Kochevar	Margaret Byers
	Peter Pellegrini	Richard Lamont
	Matt Rafie	Peter Byers
	Niharika Singh	Douglass Jackson
	Doug Whitfield	Sandra Bordin
2003	Emily Baird	Susan Herring
	Theron Baker	Douglas Ramsay
	Rebecca Bockow	Martha Somerman
	Kevin Brown	Sampath Narayanan
	Jason Gile	Margaret Byers
	Stephen Hansen	Whasun Oh Chung
	Ryan Kidman	Sampath Narayanan
	Michael Layton	Peter Byers
	Matt Rafie	Margaret Byers
	Elicia Thompson	Susan Herring
	Doug Whitfield	Sandra Bordin
2004	Remy Choi	Beverly Dale-Crunk
	Stephen Hansen	Whasun Oh Chung
	Michael Lemme	Susan Herring
	Bradley Sainsbury	Richard Presland
	Annie Singleton	Peter Byers
	Vuong Vo	Richard Darveau
	Kyle Winter	Werner Geurtsen

* Continued research 2002-03 via Student Research Fellowship from the American Association for Dental Research .

Haden, N. K., Weaver, R. G., and Valachovic, R. W. (2002). Meeting the demand for future dental school faculty: trends, challenges, and responses. J Dent Educ 66, 1102-1113.

SECTION G. GRADUATE STUDENTS

1. Recruitment and Retention

a. Describe recruitment / outreach programs to attract graduate students. Describe the measures you use to assess the success of your efforts. How successful have they been?

Our department recruits by various means. (1) At the annual American Association of Dental Research meeting via a brochure at the University of Washington booth. Major dental schools each have a booth with various programs. This is a major way that our School provides information about its programs – both clinical and graduate programs – to the dental community. (2) Our Website has complete information about our graduate programs. (3) NIH websites were previously a very useful link to our departmental website during the time that the NIDCR supported the Dentist Scientist Award program. (4) Currently training grant positions are advertised both on the web and in national publications as needed. (5) Information about the DDS/PhD program is given to each group of SURF students; these dental students are the ones that are most likely to be interested in this combined program. Success of these efforts has led to a small but steady number of inquiries and matriculating students. Nevertheless, recruitment remains a difficult problem for our PhD program. In particular, we would like to have more US applicants, and especially those who are dentists or who are clearly interested in dental research and academics. We would like to be in a position to accept 2-3 qualified students per year into our PhD programs. We typically have 1-2 students accepted each year.

b. What are your retention rates for master's and doctoral programs? To what do you attribute attrition? What steps are taken to minimize attrition?

Attrition has not been a problem for our graduate programs. The only PhD students who have left the program in the last ten years are one student who got a terminal Master's due to lack of adequate financial support (Rody), a second who decided she preferred clinical practice (Yoon), and a third who is on leave (he joined an Oral Surgery clinical practice), but we anticipate that he will complete his degree. One Master's student dropped the program to concentrate her efforts on clinical studies in Oral Medicine (Sahasrahbude).

Financial efforts to minimize attrition. The department tries hard to provide support for students within the limited resources available. This support can include training grant support, encouraging mentors to provide research assistantships, encouraging our students to apply for the Magnuson award, Graduate School Top Scholar award (we have only one quarter support of this type), and Oral Biology departmental funds that are minimal (typically $500/mo) but allow waiver of non-resident tuition and therefore are highly beneficial to students. Currently we also have one PhD student supported by an International AIDS Traineeship (Nittayananta) and a Master's student who has a stipend through the Oral Medicine clinical program and their association with the Seattle Cancer Care Alliance (Rao).

Efforts to minimize attrition and gain student input. The opinions of our graduate students are important in minimizing attrition and helping to improve our graduate programs. In early 2004, the graduate students were surveyed about their concerns using a survey designed by Drs. Dale-Crunk and Morton that contained both numerical ratings and open ended questions. The survey results were collated and reviewed by Dr. Dale-Crunk, Graduate Program Director,

Dr. Morton, and Jennifer Kohn. Dr. Morton met with the Graduate students to discuss their concerns. He was especially appropriate for this role due to his past experience as Associate Dean of Student Services and the fact that he is not presently a mentor for a graduate student and was viewed as a neutral party. At our Spring 2004 department retreat Dr. Morton led a discussion with faculty and with faculty and students together about their concerns. The topics covered curriculum, opportunity for research, mentoring, exams, financial support, and general comments about the program. In general students were pleased with the program, its curriculum and viewed the program to be in line with their personal career goals. Several very useful suggestions came out of this survey and the discussions that followed. One suggestion was to have an assigned faculty mentor and a senior student mentor for each incoming student to help them in their initial year. Students requested greater opportunity to have a teaching experience. They were appreciative of the help from the department in obtaining financial support. As expected, there were some criticisms, including the view that research rotations were a waste of time (from a student who had previously identified his mentor), better review of the literature course (for the MS for Dental Hygiene Educators), greater choice of mentors who can take graduate students (i.e. have RA support), and more flexibility in their choice of courses. Students were evenly divided about whether the Preliminary Exam should be an open- or closed-book exam (the exam was closed book until 2003 when it was changed to open book). A summary of the Oral Biology Graduate Student Survey is attached to this section. Students were also enthusiastic in their support for the faculty suggestion of a research retreat for the department. This retreat was held in October 2004 and gave the graduate students an opportunity to learn what is happening in the department including activities of adjunct faculty who are spread throughout the Health Sciences.

2. Advising, Mentoring and Professional Development

a. In what ways do you communicate academic program expectations to students? Such information should include: timelines, phases and benchmarks of the degree program; procedures for committee formation; coursework, exam and presentation requirements; and standards of scholarly integrity.

Program expectations and projected timeline are included on the website and in handouts to each student. For example, information on the Preliminary Exam, General Exam, and Final thesis defense are clearly reviewed (document attached). The Timeline for PhD progress is also clearly indicated (see Section F.1.a.) with milestones and expected timing for Preliminary Exam, formation of the Supervisory Committee, etc. Coursework and standards for gradepoint average are also indicated and in accordance with University policies.

Each student identifies a mentor by the end of the first year, with the Graduate Program Director acting as the mentor during the first year. In addition, following discussion and suggestions of our students our future incoming students will have both an assigned faculty mentor during the first year and a senior student mentor. Each student meets with the Graduate Program Director at the beginning of each quarter (less frequently for more advanced students) and progress is reviewed as needed. The Graduate Program Director tries hard to guide students to research rotations that fit their overall interests and seeks feedback from both students and faculty about the learning experience gained via the research rotations. She also emphasizes the need to meet

the milestones of choice of research mentor, the Preliminary Exam, formation of Supervisory Committee, etc. in a timely manner. In addition, our department has an excellent Graduate Program Assistant, Jennifer Kohn, who helps students understand the courses, exams, and other demands that students face when they come to Seattle, especially students from overseas. She has developed excellent rapport with students, a quality that is often useful when they seek advice from a non-faculty person. She has excellent understanding of the guidelines of the Graduate School and the use of MyGrad program for communication with the Graduate School.

b. In what ways do you inform students of your unit's graduation and placement record? Such information should include time to degree; average completion rates (Master's and PhD); and employment of graduates two and five years after degree completion.

This information was reviewed with our present graduate students at our departmental Retreat (May 2004). Our department is small enough that students are generally aware of the position taken by graduates immediately after completion of their degree; however, the position 2 or 5 years post-completion was not reviewed with our students prior to the retreat. This information was well received and will be added to our website.

Both students and faculty realize that the average time of completion of the PhD degree (7 years) was longer than expected when these data were presented at our retreat. The main reason is that many of our students elect to also enroll in a graduate clinical specialty program concurrently with their PhD studies. Our students have taken clinical training in Oral Medicine, Periodontics, and Endodontics. Since these specialty programs require 2-3 years training, the overall time for completion of graduate work is greatly lengthened. Another reason for the length of time to complete the PhD is that many of our students are foreign and/or lack adequate basic science background and therefore must spend some curriculum time gaining this background or improving their English so they can be competitive with other basic science students (for example in the Conjoint courses). Nevertheless, we feel that our students should be able to complete the PhD more quickly whenever possible.

c. Attach an example of your departmental mentoring/advising plan. Such information should include evidence that each student's work and progress are being evaluated on at least an annual basis and that the results of the evaluation are communicated to the student

The importance of mentoring at several stages of a student's career is clearly recognized and the Graduate Program Director and individual faculty actively mentor their students. The mentoring/advising plan is reviewed each quarter by the Graduate Program Director (attached). In addition, progress of each student in research is reviewed quarterly or annually (reports from each research rotation for first year students, and annually for each student during the progress of their research). The Graduate Program Director maintains an open door policy to be available to students and maintains a positive and encouraging attitude in discussions with students. Mentoring by the Graduate Program Director is especially important in initial stages of the program, as well as in the transition from coursework to research. Individual faculty actively mentor their students with respect to gaining experience in presenting their work at seminars and national meetings, and encourage publication. They also offer support and advice in post-PhD placement, resume writing, and interviewing skills on an informal basis. Moreover, the PhD

Supervisory Committee is used to mentor the student and monitor progress as well. The department encourages these committees to meet quarterly and requires that they meet annually. The Graduate Program Director also advises students to seek advice from their committee members on a one-to-one basis as needed, since these individuals are most familiar with the research area.

d. Attach a copy of your professional development plan. Such a plan should address questions such as: "What are the career opportunities for a master's or PhD graduate in your field?" "What skills/experiences contribute to success in the various academic and non-academic career paths listed?"

We do not currently have a professional development plan. Our PhD students are generally focused on academic positions in dental schools. Many of the foreign students already have faculty positions in their home country when they come for their PhD and plan to return to those positions. Our most recent US PhD (Dr. Jurevic) was offered an academic position prior to completion of his degree and took the position upon finishing his PhD. Advertisements for academic positions or postdoctoral positions in dental school are posted or passed on to our students.

3. Inclusion in governance and decisions

a. In what ways do you include graduate students in the governance of your department?

For a number of years we had a graduate student representative attend our faculty meetings for the purpose of student input in governance and communication. Mikael Kautsky served this role, but the practice was not maintained after he completed his degree. An important goal of our recent retreat was to involve graduate students in development of departmental goals and in departmental governance. We re-instituted the policy of having a student representative to the faculty as one of the outcomes of our departmental Retreat in May 2004. Currently, Zongyang Sun is the graduate student representative. We are involving students in the design of a new student handbook, and for their input in the department website.

b. Describe your grievance process and characterize the nature of any grievances that have been lodged over the past 3 years.

Graduate students are encouraged to discuss problems with the Graduate Program Director, and/or the department Chairman. Further resolution of problems is via School and University policies. Policies on acceptable grades and grievance procedures are provided to students (attached at the end of this Section).

A complaint was filed against Dr. Izutsu by one of our previous graduate students. Dr. Izutsu asked that the School request an investigation of the complaint by the University Complaint Investigation and Resolution Office; and the findings were in favor of Dr. Izutsu and the department. Details of this complaint and its resolution should be available from the Provost's office.

4. For graduate student service appointees, please describe:

a. – c. Appointment process; average duration of appointment; mix of funding (teaching, research, staff, fellowships, traineeships)

Graduate student funding comes from the Cross Disciplinary training grant (US or permanent residents only), research assistantships (RA) via individual faculty research grants, other fellowships, Graduate School Top Scholar award (one quarter for one entering student), support from the military, and small departmental stipends that permit tuition waiver for non-resident students. Our graduate students are not guaranteed support, however, at the present time all of our graduate students have some type of support as shown in the Table below.

The appointment process is slightly different for each funding source. Training grant positions are filled on a competitive basis when a position becomes available. Applications, which include project description, CV, transcripts, and three letters of recommendation, are evaluated by the Cross Disciplinary Training Grant Steering Committee. Appointments are made in July whenever possible, but can be delayed until September. The stipend level is set by NIH policies. Duration of appointment is 3-5 years. The appointment of Research Assistants is at the discretion of the mentor and depends on availability of funding from faculty research grants. Appointments are in accordance with University policies and the new GSEAC contract. The Graduate School provides a Top Scholar award (one quarter RA position) that is awarded to the best incoming candidate and is used for recruitment purposes. In addition, several Oral Biology graduate students have received the Magnuson Award which has helped to cover their expenses. Student applications for this award are reviewed by the School of Dentistry Research Advisory Committee based on description of project, recommendation of the mentor, and letters of recommendation. Finally, Oral Biology departmental stipends are awarded based on financial need with the highest priority for funding for students in the PhD program in good standing. These awards are requested by the student with justification of need, and decisions are made by the Oral Biology Graduate Steering Committee with input from the department administrator regarding availability of funds and possible special circumstances due to family situations. These awards are reviewed annually. The funds come from indirect cost recapture when available, from the Oral Biology Research and Training fund derived from a portion of the Oral Pathology service, and from Oral Biology faculty and public donations. Additional Research and Teaching Assistantships would greatly help the department to reduce disparities in funding levels for graduate students, help recruitment, and help the faculty have better opportunities to support graduate students.

d. What criteria are used for promotion and salary increases?

Graduate student RA position salary levels are on the basis of a variable departmental rate which is slightly above the standard rate. RAs receive a raise in pay when they have passed their general exam and advance to PhD candidacy. Salaries for training grant positions and other fellowship awards are based on policies of the funding agency. Oral Biology departmental stipends have been limited to $500-800/month.

Summary of Graduate Student Support

Students	Mentor	Source of Support
Present students:		
Montaser Al-Qutub	Darveau	Home government; Darveau grant
Brian Bainbridge	Darveau	Training Grant
Takahiro Chino	Clark, Micro/Immun	RA, previously Oral Biol. dept. stipend
Douglas Dixon	Darveau	Military; Perio dept. stipend; Magnuson
Wipawee Nittayananta	Dale/Coombs	Int'l AIDS Fellowship
Pannee Ochareon	Herring	Home government, Herring grant
Chootima Ratisoontorn	Cunningham	RA, previously by Home government
Divya Rao	Dale	Oral Medicine, SCCA stipend
Zongyang Sun	Herring	RA, previously by Oral Biol. dept. stipend; Magnuson
Ernesto Valiente	P. Byers	K08/23 award; Training grant
Orapin Veerayutthwilai	Dale	Oral Biol. dept. stipend, previously by RA.Anticipate future RA
Ching-Yi Wu	Watson	RA, previously Top Scholar (UW Grad Sch), Oral Biol. dept. stipend
Recent past students:		
Hema Bharath	Roberts	Training Grant; Oral Biol. dept. stipend
Shiwei Cai	Izutsu	Oral Biol. dept. stipend; Izutsu grant; private practice
Beth Davis		Oral Biol. dept. stipend; personal funding
Richard Jurevic	Dale	DSA; Dale research grants; Magnuson
Faghih-Nakhjiri, Simin	Lamont	Training grant

e. In what way are graduate student service appointees supervised?

Supervision is up to the discretion of the mentor. Mentors and students have been informed about the new GSEAC contract and the entitlements regarding vacation, sick leave, total work hours, etc.

f. What training do graduate student service appointees receive to prepare them for their specific role?

Starting in Autumn 2004, training for RA positions is available through a Graduate Research Assistant Workshop. Emily Wu attended this workshop and found it to be useful. We will require all of our RAs to attend this workshop in the future. In the past, training was up to the mentor. All students are expected to take annual Bloodborne Pathogen training, chemical safety training, training in the use of radionuclides, etc. as needed and appropriate for their specific laboratory work.

Appendix to Section G.

ORAL BIOLOGY GRADUATE STUDENT SURVEY
March 2004

Our department is preparing for retreat for faculty and students (scheduled for May 21), that will focus on the graduate program. Because student opinions are important to us in our continuing efforts to improve the program, your opinions and suggestions are important. Please complete the survey below (you don't need to identify yourself). Dr. Morton will schedule a time to discuss the survey to determine the major issues that need a more complete discussion at the departmental retreat. **Return the surveys to Jennifer by March 19**. Thank you for your input.

	Topic	**Question**	**Scoring**				
A.	**Curriculum**		No (1)	(2)	(3)	(4)	Yes (5)
1		Are there too many required courses?	9	1	3		
2		Do the courses cover a sufficient range of material?	1	2	3	4	4
3		Do you have the flexibility you need to design a program that suits your needs?	2	1	2	5	4
4		Would you like to have a teaching experience?	1		2	2	8
4a		a. if you were supported by a TA during the quarter in which you participated in teaching?	1	1	2	2	5
4b		b. If you received credit?			4	2	4
5		Specific suggestions for courses? 1. We need a better review of the literature course something that is a lot more structured for the DHY students 2. Conjoint courses are not so relevant! There should be more flexibility in choosing other relevant courses other than conjoint courses! 3. It's better to have classes that discuss oral pathogens & pathogenesis of oral tumor. 4. Computer application for science, English writing for science, computer skills for science.					
B.	**Opportunity for research**		No (1)	(2)	(3)	(4)	Yes (5)
6		Do you (did you) have sufficient opportunity to identify an area of interest?	1	1	2	3	7
7		Do you (did you) have enough opportunity to learn a diverse range of techniques for modern research applications?	2	1	4	4	3

		Comments? 1. I just would like to suggest if graduate student can attend lab-meetings of different labs in addition to lab rotation so she/he will be able to get better idea what different labs are doing which will help her/him in identify an area of interest! 2. Great.					
C.	**Mentoring**		No (1)	(2)	(3)	(4)	Yes (5)
8		Do you (did you) have a wide enough choice of mentors?	1	3	2	4	3
9		Do you have enough access to your mentor?		1	3	3	6
10		Was the timing for selecting a mentor (after 2-3 rotations) OK for you?		1	3	4	3
		Comments 1. Rotations just waste time.					
D.	**Exams**		No (1)	(2)	(3)	(4)	Yes (5)
11		Was the Preliminary examination a fair test of the subject matter of oral biology?	1		4	3	5
12		Were the topics appropriate?			6	2	4
13		Do you think the exam should be open book or closed book?	Open 6				Closed 5
		Comments? 1. Either one is fine for me 2. For question 11: Not all of it was a fair test of the subject matter of OB. For question 12: Topics were ok 3. Give me a break/ If you are getting an advanced degree in Oral Bio, why should the exam be open book?					
E.	**Financial Support**		No (1)	(2)	(3)	(4)	Yes (5)
14		Do you have financial support for your studies?	3		1		10
15		Did you need help from the department to obtain financial support?	1		2	1	10
15a		If so, was the department helpful?		1	4		8
16		Has your mentor helped with financial support?	3		3	3	5
		Comments? 1. It's better to support students (especially PhD students) until he/she get financial support form the mentor.					

F.	**The Program in General**						
17		Do the coursework and research opportunities provide the education you were seeking when you applied to the Oral Biology Graduate program?			1	7	6
18		What suggestions do you have to improve the OB grad program? (use more pages if needed) 1. Better instructor and classes for review of literature. Instructor was unorganized and there was not enough structure in the class. I felt it was a waste of my time. I have struggled in that area. 2. Needs more mentors who really want to take students and care about students. Each new student should be assigned to a senior student as a kind of student mentor. 3. Don't change the academic standards on a student per student basis. The same standards should apply to <u>all</u> students, no exceptions!					

What are your career goals?		Not important (1)	(2)	(3)	(4)	Very important (5)
	Teaching	1		1	5	7
	Research	1		2	2	9
	Clinical teaching	2	2	1	2	7
	Other (specify) 1. *Clinical Practice* 2. *Private Sector*	1		2	1	

Thank you for your help.

Beverly A. Dale-Crunk
Graduate Program Director

DEPARTMENT OF ORAL BIOLOGY

GUIDELINES FOR ACCEPTABLE GRADES FOR GRADUATE CREDIT

The academic requirements adopted by the Department of Oral Biology are as follows:

1. Master's Degree:
   - A. The student must receive a minimum grade of 3.0 in all Oral Biology courses.
   - B. The following guidelines apply only to the 36 quarter credits required by the Graduate School for completion of the Master's Degree:
     - (1) Grades below 1.7 will not count towards satisfying residency, total credit count, nor grade and credit requirements. The Registrar will count any grades below 1.7 as 0.0.
     - (2) A minimum of 2.7 will be required in each course counted towards satisfying the 18 hours of coursework numbered 500 and above. The 2.7 figure was chosen since it corresponds to an "S" in courses graded S/NS.
     - (3) Grades between 1.7 and 2.7 may be used to satisfy the remaining 18 of the 36 hours required by the Graduate School for the Master's Degree. Please note that a minimum 3.0 cumulative grade-point average will still be required for graduation.

2. Doctoral Degree:
   - A. The student must receive a minimum grade of 3.0 in all Oral Biology courses.
   - B. A minimum of 2.7 in each course will be required for the half of the total program which must be taken in courses numbered 500 and above.
   - C. Grades between 1.7 and 2.7 may be received in the remaining half of the program with the caveat that the cumulative average must be 3.0 or above for graduation.
   - D. Grades below 1.7 will not count towards satisfying residency, total credit count, nor grade and credit requirements.

   Note that 300- and 400-level courses are exempted from the 2.7 requirement, since it only applies to courses numbered 500 and above.

REVIEW OF STUDENT PERFORMANCE

Student performance and progress will be reviewed at the end of each quarter. In cases where students fall below the expected performance levels, the graduate faculty will review the situation in detail and make recommendations as to the options available to the student. Students will be informed in writing about their status following the quarterly review.

The bases for deciding that a student's progress or performance is unsatisfactory are defined in Graduate School Memorandum 16 (revised 2/89). The same memorandum lists the various options the department may recommend to deal with unsatisfactory progress or performance.

ACADEMIC GRIEVANCE PROCEDURE

Students who feel they have been unfairly dealt with in academic areas or who believe they have been discriminated against on the basic of race, religion, color, sex, national origin, age, handicap or disability have a right to seek resolution of their complaints. These students are encouraged to first consult the graduate program coordinator, the alternate graduate program coordinator or the department chairman. In addition, students should refer to Graduate School Memorandum 33 (revised 11/90) for detailed information about grievance procedures.

INFORMATION STATION

Students are advised that an "Information Station" is available in the departmental office. Graduate School and departmental policy statements, guidelines and memoranda are maintained there for reference. Please see Jennifer Kohn to gain access to the information.

Appended here are Graduate School Memoranda Number 16 and 33 which deal with performance standards and academic grievance procedures.

Graduate School Memorandum No. 16 *(Revised February, 1989)*

Continuation or Termination of Students in the Graduate School

Admission to the Graduate School allows students to continue graduate study and research at the University of Washington only as long as they maintain satisfactory performance and progress toward completion of their graduate degree program. The definition of satisfactory performance and progress toward completion of the degree program may differ among degree offering units; therefore, **it is imperative that each graduate unit has these requirements in writing, and distributes them to each graduate student.** The following information should be included:

- General expectations for graduate student performance within the academic unit, including, but not limited to, required coursework and length of time allowed for completion of various phases of the program.
- The identification of persons in departments, colleges, schools, and groups who are responsible for both the evaluation of graduate student progress and for informing students about the fulfillment of these requirements, and when such evaluations are to be made.
- Criteria by which performance and progress are to be evaluated, including areas which may or may not be negotiated.
- Under what circumstances the graduate unit will recommend to the Dean of the Graduate School the alteration of a student's standing--i.e., conditions that warrant warn, probation, and final probation (see Suggested Guidelines for Change of Status Act ion), and length of time the academic unit will tolerate low scholarship or unsatisfactory performance and progress.
- Procedures for appealing evaluations recommended to the Graduate School by the graduate program.

Review Process for Low Scholarship and Unsatisfactory Progress

Review of students who maintain a 3.0 grade point average (GPA) is at the discretion of the graduate unit and is expected to be undertaken at least annually. Students whose cumulative or quarterly GPA falls below a 3.0 must be reviewed quarterly and be provided with an explanation of performance expectations and a timetable for correction of deficiencies. Doctoral program students are to be reviewed by their doctoral Supervisory Committee, or by a committee of graduate faculty in the unit appointed or elected for this purpose in consultation with the student's Supervisory Committee. Pre- and postmaster students are to be reviewed by supervisory committees, if such committees have been appointed, or by the graduate faculty members who have been designated to oversee such students' programs. See Graduate School Memorandum No. 13, Supervisory Committees for Graduate Students, for an explanation of the role and responsibilities of supervisory committees. In evaluating the student's performance and progress, all of the following should be reviewed:

- Grade reports: cumulative and quarterly GPA's computed on those courses taken while the student is enrolled in the University of Washington Graduate School. Computation is based only on courses numbered 400-599; courses graded I, S/NS, and CR/NC are excluded, as are the 600-800 series.
- Performance during informal coursework and seminars.
- Research capability, progress, and performance.
- Any other information relevant to graduate program academic requirements.

A determination of satisfactory performance and progress may be made upon review of the

factors indicated above and consideration of the student's progress relative to other students (part-time/full-time) in the program or to an individually negotiated schedule.

LOW SCHOLARSHIP

Low Grade Point Average

The Graduate School provides the Graduate Program Coordinator of each degree-offering unit with a quarterly Low Scholarship Report which lists the names of graduate students whose GPA's fall below 3.0 either cumulatively or for that quarter. Instructions and deadlines for completing the review and transmitting the recommendations are provided with the report.

Graduate Program Coordinator and the graduate faculty who supervise these students are expected to review the status of each student whose name appears on the low scholarship printout and to transmit to the Dean of the Graduate School a specific recommendation--i.e. no action, warn, probation, final probation, or drop--for each case. Final probation and drop recommendations must be accompanied by a statement which describes the student's academic problems and provides an explanation for the recommended action by the graduate faculty or supervisory committee involved.

Graduate programs deciding that either "no action" or "warn" is the appropriate action to be taken based on the student's performance, may initiate contact with the student without such action appearing on the student's permanent record. The Registrar will record only those actions recommending probation, final probation, and drop.

UNSATISFACTORY PROGRESS

Unsatisfactory Performance and Progress

To determine satisfactory performance or progress, the following criteria should be used:

- Performance in the fulfillment of degree program requirements.
- Performance during informal coursework and seminars.
- Research capability, progress, and achievements.

When review of a student's performance and progress result in a determination that it has been unsatisfactory, the name of the student and recommendation for action--i.e. warn, probation, final probation, or drop--should be transmitted by the Graduate Program Coordinator or the head of the graduate unit to the Dean of the Graduate School by the appropriate deadline dates. **All** recommendations of unsatisfactory performance and progress must be accompanied by a well-documented statement of the circumstances involved and evidence that the action requested is supported by the majority of the graduate faculty, delegated representatives, or supervisory committee involved. Students should receive written notification of this action which includes information regarding the necessary steps the student must take to maintain their graduate student status in good standing.

SUGGESTED GUIDELINES FOR CHANGE OF STATUS ACTION

Suggested guidelines for determining the action to be recommended for low grade point average or unsatisfactory performance and progress are given below:

No Action

May be recommended for those students whose cumulative GPA is above 3.0 but whose **most recent quarter's work** is below 3.0, if the review has determined that this condition is not cause for immediate concern.

Warn

- May be recommended for those students whose cumulative GPA has dropped slightly below 3.0--i.e. 2.99-2.95
- May be recommended for those students who have failed to meet expectations for performance and progress as determined by the graduate program.

ACTION TAKEN AS INDICATED ABOVE WILL BE INITIATED BY THE GRADUATE PROGRAM, AND REPORTED TO THE GRADUATE SCHOOL, BUT WILL NOT APPEAR ON THE STUDENT'S PERMANENT RECORD. THE DEPARTMENT IS EXPECTED TO NOTIFY EACH STUDENT IN WRITING.

Probation

- May be recommended for those students who have not corrected the deficiency which caused the warn action within the time limit specified by the graduate program.
- May be recommended for those students who depart suddenly and substantially from scholarly achievement as defined by the graduate program. (A previous warn recommendation is not necessary).
- Programs may determine the length of probationary status. (The Graduate School recommends no less than one quarter and no more that three quarters of probationary status). Students should be informed of the current program policy regarding the length of the probationary period.

Final Probation

- May be recommended for those students who have not corrected the condition(s) that caused the probation recommendation within the time limit specified by the graduate program.
- May be recommended for those students who fail to progress toward completion of the graduate program. A student will be carried on final probation status for one quarter before being changed to drop, probation, or some other status.

Drop

Final action to be recommended. A drop recommendation means immediate drop from the University of Washington. Therefore, this recommendation must be received in the Graduate School soon after the beginning of the quarter following the quarter on which the decision is based.

Recommendations for action on low grade point average or unsatisfactory performance and progress will be reviewed by the Dean of the Graduate School, and students will be informed of a change in status by letter from the Dean.

Appeals

Students may appeal change of status, as explained above, directly to the Chairperson of the graduate degree granting unit. Appeals beyond this point should follow the process outlined in

Graduate School Memorandum No. 33, Academic Grievance Procedure.

Please note: Action is taken for 1 quarter only. No action will appear on the transcript for any subsequent quarter unless a recommendation is made to the Dean.

Graduate School Memorandum No. 33 *(Revised November 2000)*
Academic Grievance Procedure

Application

With the noted exceptions, graduate students who believe they have been subjected to unfair treatment in the administration of academic policies may seek resolution of their complaints as described below. Graduate School Memorandum No. 33 applies to, but is not limited to, the application of departmental, college or Graduate School policies, deviations from stated grading practices (but not individual grade challenges), unfair treatment, and related issues.

Exceptions:

1.	Students contesting individual grades or academic evaluations should refer to the Change of Grade Procedure contained in the University Handbook, Vol. IV-22, Sec. 2 (1999).
2.	Students who believe they have been discriminated against on the basis of race, religion, color, creed, national origin, sex, sexual orientation, age, marital status, disability, or status as a disabled veteran or Vietnam-era veteran should refer to the Resolution of Complaints Against University Employees Procedure contained in the University of Washington *Operations Manual,* D 46.3.
3.	Student disciplinary proceedings for misconduct, including plagiarism and cheating, fall under the provisions of the Student Conduct Code contained in the University Handbook, Vol. III-14 (1996) and Chapter 478-120 WAC.

Timing: Students seeking resolution of their complaints under this policy must initiate either an informal conciliation or file a formal complaint within 3 months of the complained of incident.

Informal Conciliation

The student is encouraged, but not required, to first attempt to resolve a grievance with the faculty or staff member(s) most directly concerned. If the student attempts informal conciliation, the student must initiate this process within 3 months of the complained of incident by requesting one of the following persons to conciliate the grievance: director or chair of the unit, or the appropriate college dean.

If discussion with the faculty or staff member(s) concerned, facilitated by the director

or chair of the unit or the appropriate college dean, does not resolve the grievance, the student may request the Graduate School to assist in an informal resolution. In such a case, the Dean of the Graduate School shall designate an Associate Dean as the informal conciliator for the Graduate School. The Associate Dean may either facilitate conciliation directly or involve the Ombudsman. If the Associate Dean attempts informal conciliation directly, he or she may not be involved in a subsequent formal complaint.

If the student is dissatisfied with the informal conciliation, he or she may file a formal complaint with the Dean of the Graduate School within 10 days[1] of the conclusion of the attempted informal process.

Formal Complaint

Filing: Within 3 months of the complained of incident or, if informal conciliation was attempted, within 10 days of the conclusion of the attempted informal process, a student may file a formal complaint with the Dean of the Graduate School.

Chair of the Academic Grievance Committee: The Dean of the Graduate School shall designate an Associate Dean of the Graduate School as Chair of the Graduate School Academic Grievance Committee ("Committee"). If the Associate Dean attempted to facilitate informal conciliation directly in a particular case, then the Dean of the Graduate School shall appoint another Associate Dean or a Graduate Faculty member as Chair of the Committee in that case.

Graduate School Academic Grievance Committee Panel Pool: Prior to the first day of the Autumn Quarter, the Dean of the Graduate School shall appoint to the Panel Pool twenty (20) members of the Graduate Faculty. At the time the formal complaint is filed, all registered graduate students shall constitute a pool from which twenty (20) full-time graduate students who are in good academic standing shall be randomly selected by computer at the direction of the Committee Chair and appointed to the Panel Pool. From this 40-member Panel Pool, the Committee Chair will appoint a Hearing Panel to provide a fair and impartial hearing on the formal complaint filed with the Dean of the Graduate School.

Hearing Panel: A formal grievance will be referred to the Committee Chair who shall within five (5) days of its receipt designate two (2) faculty and two (2) student members from the Panel Pool to serve as Hearing Panel members. The Committee Chair or his or her designee shall act as Hearing Panel Chair. The student and the faculty or staff concerned shall each have the right to exercise one preemptory challenge against the Hearing Panel members, other than the Hearing Panel Chair, within five days after notification of the names of the members. If a challenge is made, the Committee Chair shall designate another faculty or student member to replace the member challenged. All members of the Hearing Panel shall be present for the hearing and shall have the right to vote upon any matter that may come before the Hearing Panel. No member of the Hearing Panel shall be from the department of any of the

parties to the grievance. There shall be no ex parte communications between any of the parties and any member of the Hearing Panel.

Hearing Preparation: The Hearing Panel Chair shall distribute a copy of the formal complaint to the member(s) of the faculty and staff concerned, the dean of the college or school, the chair of the department and the Graduate Program Coordinator of the department, and members of the Hearing Panel. The Hearing Panel Chair shall establish a time and place for a hearing to be held no later than fifteen (**15)** days from the date of final determination of the Hearing Panel membership, unless for good reason stated in writing to the complainant and other concerned parties the Hearing Panel Chair schedules the hearing for a later specified date. The Hearing Panel Chair shall announce the time and place of the hearing to the student, the member(s) of the faculty and staff concerned, the dean of the college or school, the Chair of the department, the Graduate Program Coordinator of the department and include a list of persons so notified, who shall comprise the "mailing list."

At least seven (7) days before the hearing, the parties must submit to the Hearing Panel Chair any documentary or any other physical evidence that will be presented at the hearing and any witnesses to be called.

Hearing: Hearings will be conducted, with the Hearing Panel Chair presiding, in closed session except when and to the extent mutually agreed upon by the student and faculty or staff concerned. All parties may present evidence and testimony. Only evidence timely submitted to the Hearing Panel Chair will be considered in determining the validity of the complaint. Hearings will be conducted with reasonable dispatch and terminated as soon as fairness to all parties involved permits.

An attorney is neither necessary nor recommended. The Graduate School Academic Grievance Committee Panel described herein operates as part of an academic hearing, not a judicial proceeding. However, if the student elects to have counsel present, the University's attorney must also be afforded an opportunity to attend. Accordingly, the student must notify the Graduate School, in writing, at least seven (7) days prior to the hearing if he/she intends to have an attorney present. The attorney(ies) presence at the hearing does not change the proceeding. The attorney(ies) will not be able to examine witnesses, ask questions or otherwise take part in the proceedings, except in an unobtrusive manner, in an advisory capacity to their clients.

Within fifteen (15) days after the hearing adjourns, the Hearing Panel shall present to the Dean of the Graduate School its report, including findings, conclusions, and recommendations for action. The report will be simultaneously transmitted to the student and to the faculty and staff member(s) concerned. A written summary of the proceedings will be kept for at least one year and shall include a tape recording of testimony.

The Dean of the Graduate School, within ten (10) days after receipt of the Hearing Panel report, shall issue his or her decision as to the action to be taken on the grievance.

The Dean's decision shall include an evaluation of the validity of the grievance and a statement of the action to be taken. Copies of the decision shall be transmitted to the student, the faculty and staff member(s) involved, the dean of the college or school, the chair of the department, and the Graduate Program Coordinator of the department.

The decision of the Dean shall become final at the close of the seventh day after issuance, unless the student or any other party directly involved files a written request for consideration of the findings by the Provost, whose review will be limited to the hearing record.

[1] Specified time limitations within this Memorandum 33 refer to the academic year September through June and prevent the running of time in regard to the actions required of a student during the summer months or of a committee whose membership is composed of individuals who would not normally be at the University during the summer months. Thus, if a student presents a grievance in June or the complained of incident allegedly occurred during the summer months, the time stops running at the end of the academic year and begins running at the commencement of the following academic year in September. In addition, time limitations are suspended for official University holidays or other closures during the regular academic year. The term "days" refers to days when the University is open for business.

THE PH.D. EXAMINATIONS IN THE DEPARTMENT OF ORAL BIOLOGY

I. The Ph.D. Preliminary Examination

A. Purpose of Ph.D. Preliminary Examination

1. To allow the student an opportunity to reflect on the breadth of topics encompassed by Oral Biology and to demonstrate both a mastery of the topics and recognition that these topics constitute a discipline.
2. To determine that the student is sufficiently knowledgeable in the area of Oral Biology to qualify as a Ph.D. candidate in this discipline.
3. To determine that the student is capable of documenting and applying existing knowledge concerning important research questions in Oral Biology.

B. Format

The Ph.D. Preliminary Examination in Oral Biology is a written examination administered by the Oral Biology faculty.

1. Approximately five months prior to the written examination, students will be provided with:
   a. A list of sample questions from each area to be examined.
   b. A sample bibliography covering the various topic areas.
2. The examination will take place in Summer quarter following the second year, unless alternate scheduling is arranged by the mentor and the Graduate Program Coordinator.
3. The examination will be held on two consecutive days from 8:30 a.m. to 4:30 p.m. Topics covered on day 1 must be answered and submitted by the end of day 1; additional topics/questions will not be available until day 2.
4. You will usually have a choice of questions within specific areas. You will need to answer questions in each of the major topic areas included in the study guide. There will be short answers on techniques, etc. Questions on the exam will not be identical to those in the study guide (but they may be similar). No exam questions will be available in advance. Some questions will emphasize factual knowledge. Others will emphasize ability to think about major findings or techniques, their implications, and their use of this knowledge to design experimental studies.
5. You are expected to identify sources or references for your answers. You must express your answers in your own words. Copying from references is not acceptable. The only exception is for quotes of less than 50 words which are put in quotation marks and referenced. Longer quotes in which you change a few words are also not acceptable. This is similar to what is required in writing for a scientific publication.
6. The examination will be an open book examination. The student may bring all references from the Study Guide as well as 3 - 5 textbooks.
7. In order to pass this section the student will have to provide acceptable answers to all essay questions as evaluated by the graduate faculty: the primary evaluator for each question will be the person who constructed the question. The grading will be pass-fail. Acceptable answers will also be required for the short answer questions.
8. In cases where the student fails the examination the following procedures will apply:
   a. If no more than two questions were answered unsatisfactorily, then the Graduate Program Steering Committee will decide whether to require the student retake the failed portion of the exam in writing, or whether to quiz the student orally in the areas of weakness.
   b. If three or more questions were answered unsatisfactorily, then the graduate faculty will have the option of demanding that the student retake any part or the entire exam the following year, or that the student be dropped from the Ph.D. program.

II. The Ph.D. General Examination

A. Purpose of Ph.D. General Examination

1. To determine if the student is capable of recognizing important questions appropriate for research projects.
2. To determine if the student is able to develop these questions into research proposals complete with suggested methods of procedure, and to orally defend the proposals.
3. To provide the student an opportunity to receive feedback from the Supervisory Committee on the proposed research project.

B. Format

1. Approximately one year following the Preliminary Examination (by the end of Summer quarter of the third year at the latest) the student will take the General Examination. This examination will be administered by the Supervisory Committee and will consist of an oral presentation and defense of a written Ph.D. thesis project proposal.
2. The Ph.D. thesis research proposal will be chosen with the approval of the preceptor and members of the Supervisory Committee.
3. The written proposal will consist of the background material, specific aims, and specific experiments to be performed for the Ph.D. thesis project, and will follow the general format of a NIH research grant application. The "research plan" section will be limited to current NIH page limitations, but no budget or administrative pages will be required. Students will not be penalized for a lack of preliminary results supporting the proposal, but preliminary results supporting the feasibility of the approach are encouraged.
4. The student should plan to spend approximately six weeks preparing the written application. The student will distribute copies of the proposal to all the members of the Supervisory Committee and to the Graduate Program Coordinator at least 7 days prior to the presentation.
5. The examination will generally be 2-3 hours in duration and will comply with Graduate School regulations.
6. The student's performance on the oral exam will be evaluated by the thesis Supervisory Committee. If the student's performance should be less than satisfactory, then the Supervisory Committee will make appropriate recommendations to the Oral Biology graduate faculty.
7. The student is not obligated to use the approved research project as his/her Ph.D. thesis topic. However, any significant departures from a project approved in the General Examination must be scrutinized and approved by the Supervisory Committee.

III. The Ph.D. Final Examination

The Ph.D. Final Examination in Oral Biology consists of the preparation and oral defense of the student's Ph.D. thesis findings, interpretations and conclusions.

DEPARTMENT OF ORAL BIOLOGY

STUDENT SCHEDULE

Name: _____

Quarter/Year _____

Course	Number of Credits
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Total Credits _____

Mentor's Comments & Signature

_____

_____

Graduate Program Director's Comments & Signature

_____

_____

Students: Please list any publications you have completed or are working on:

_____

_____

REMEMBER: All students must register & attend Oral Biology 575 Seminar each quarter. **Exceptions**: Not offered Summer Quarter.

NOTE: Students are required to turn in a quarterly report of laboratory activities (if in ORALB 578) and an annual report (due prior to Autumn Quarter) of laboratory activities (if in ORALB 600, 700/800) prior to meeting with the Graduate Program Coordinator.

DEPARTMENT OF ORAL BIOLOGY

Graduate Student Laboratory Performance for Research Rotations
(ORALB 578)

Student Name _____

Faculty Name _____

Period in Laboratory _____

1. Was the student's performance satisfactory? Yes No

2. What were the major techniques the student observed or used?

   Other comments _____

   _____

3. Was the student's attendance satisfactory? Yes No

   Comments _____

   _____

4. Would you consider this student for thesis research in your laboratory?

   Yes No

5. If your laboratory was mutually agreed for the student's thesis research, would your grant funding allow for:
   a graduate Research Assistant position? Yes No
   adequate research expenses? Yes No

Use additional sheets as needed. Thank you for your assistance and feel free to contact Dr. Dale (bdale@u.washington.edu or 543-4393 if you have other concerns about the student rotation. Please return this form to Jennifer Kohn, Oral Biology, Box 357132. Phone 543-5477.

DEPARTMENT OF ORAL BIOLOGY

Annual Graduate Student Performance for Thesis Research
(ORAL BIOLOGY 600)

Student Name _____

Faculty Name _____

Period in Laboratory _____

Anticipated time for:

Preliminary exam _____

PhD Advisory committee formation _____

General exam _____

Completion of PhD _____

Research:

In your view, is the student making satisfactory progress toward developing and testing hypotheses appropriate for PhD research? Yes No

Publication:

Does the student have any publications? Yes No

or

Is the student making progress toward publishable results? Yes No

Funding issues:

Does your current / future grant funding allow for:

Graduate Research Assistant position? Yes No

Adequate research expenses? Yes No

Please use this opportunity to let the Graduate Program Director know of potential problems that either she or the department may need to address. We realize that each student in our department is individual and has a unique situation. Use additional sheets as needed (or email: bdale@u.washington.edu). Thank you for your assistance and feel free to contact Dr. Dale if you have other concerns about the student's progress. Please return this form to Dr. Beverly Dale-Crunk, Oral Biology, Box 357132, phone 543-4393.

Note: Students are expected to write a brief summary of their research annually. Most students will submit this prior to Autumn Quarter.

DEPARTMENT OF ORAL BIOLOGY

Annual Graduate Student Performance for Thesis Research (ORAL BIOLOGY 700)

Student Name _____

Faculty Name _____

Period in Laboratory _____

Anticipated time for:

Completion of M.S. _____

Research:

In your view, is the student making satisfactory progress toward developing and testing hypotheses appropriate for M.S. research? Yes No

Publication:

Does the student have any publications? Yes No

or

Is the student making progress toward publishable results? Yes No

Funding issues:

Does your current / future grant funding allow for:

Graduate Research Assistant position? Yes No

Adequate research expenses? Yes No

Please use this opportunity to let the Graduate Program Director know of potential problems that either she or the department may need to address. We realize that each student in our department is individual and has a unique situation. Use additional sheets as needed (or email: bdale@u.washington.edu). Thank you for your assistance and feel free to contact Dr. Dale if you have other concerns about the student's progress. Return this form to Dr. Beverly Dale-Crunk, Oral Biology, Box 357132, phone 543-4393.

Note: Students are expected to write a brief summary of their research annually. Most students will submit this prior to Autumn Quarter.

DEPARTMENT OF ORAL BIOLOGY

Annual Graduate Student Performance for Thesis Research (ORAL BIOLOGY 800)

Student Name _____

Faculty Name _____

Period in Laboratory _____

Anticipated time for:

Preliminary exam _____

PhD Advisory committee formation _____

General exam _____

Completion of PhD _____

Research:

In your view, is the student making satisfactory progress toward developing and testing hypotheses appropriate for M.S. research? Yes No

Publication:

Does the student have any publications? Yes No

or

Is the student making progress toward publishable results? Yes No

Funding issues:

Does your current / future grant funding allow for:

Graduate Research Assistant position? Yes No

Adequate research expenses? Yes No

Please use this opportunity to let the Graduate Program Director know of potential problems that either she or the department may need to address. We realize that each student in our department is individual and has a unique situation. Use additional sheets as needed (or email: bdale@u.washington.edu). Thank you for your assistance and feel free to contact Dr. Dale if you have other concerns about the student's progress. Please return this form to Dr. Beverly Dale-Crunk, Oral Biology, Box 357132, phone 543-4393.

Note: Students are expected to write a brief summary of their research annually. Most students will submit this prior to Autumn Quarter.

Report of Graduate Student Committee Meeting

Department of Oral Biology
School of Dentistry
University of Washington

Date:_____

Student name:_____

Committee members present:_____

Research Progress report submitted was:
_____ satisfactory
_____ unsatisfactory

Comments/Recommendations:

_____ Chairperson
_____ Member
_____ Member
_____ Member
_____ Member
_____ Member

I agree/do not agree that this report reflects the conclusions reached at the committee meeting.

_____
Student