



A HARVARD MEDICAL SCHOOL
TEACHING AFFILIATE



MASSACHUSETTS
GENERAL HOSPITAL

MGH Department of Oral and Maxillofacial Surgery

Ten Year Report 1994 – 2004





Contents

- 1 Chairman's Letter
- 2 Patient Care
- 7 OMFS Resident Education
- 10 Predoctoral Education
- 11 Continuing Medical Education
- 12 Research
- 19 Faculty & Faculty Highlights
- 24 Future Goals
- 26 Publications

Chairman's Greeting

It was a cold and dreary January day in 1994, when I reported for my first day of work as the new Walter C. Guralnick Professor and Chief of Oral and Maxillofacial Surgery at Massachusetts General Hospital (MGH) and Harvard. In fact, it was so cold that I wondered why I had returned to Massachusetts from the pleasant and easy environment of Northern

“...the working environment at MGH; the support of the hospital administration...and the faculty and residents of the Department have made the MGH and Harvard a wonderful place to work and to accomplish a set of goals for the future...”



California and the beautiful city of San Francisco. During the ensuing 10 years, I learned the answer: the working environment at MGH; the support of the hospital administration in the form of three Presidents, Sam Thier, then Jim Mongan, and now Peter Slavin; successive Massachusetts General Physicians Organization (MGPO) Presidents (Gerry Austen, Peter Slavin and David Torchiana); the Senior Vice President of MGH Ann Prestipino; the talented faculty, staff and residents of the institution and the faculty and residents of the Department

have made the MGH and Harvard a wonderful place to work and to accomplish a set of goals for the future of Oral and Maxillofacial Surgery (OMFS).

In the following pages, we tell the story of the Department of OMFS at the MGH during the last 10 years. This is a Department with a rich history at Harvard and at the MGH. Those of us working here in the present are the caretakers of this heritage and it is our duty to build on it and pass on an improved version to the next generation. This is our record.

Leonard B. Kaban

PATIENT CARE

ORAL AND MAXILLOFACIAL SURGERY

There have been significant changes in the volume and character of both inpatient and outpatient care during the past 10 years. In the specialty of OMFS, the performance of many procedures has moved progressively from the main operating room, to the surgical day care unit, and finally to the outpatient clinic (Figure 1). This movement has been driven by changes in the nature of the surgical procedures and by advances in anesthesia and sedation techniques. Third party payers and patients' desires have also had a significant effect. Much of our surgical day care volume of minor OMFS procedures is now done in the operating rooms in our Unit on the 2nd floor of the Wang Ambulatory Care Center (WACC). At the same time, inpatient volume has been maintained by growth of the number of referred complex cases (Figures 2, 3, 4).

During the past 10 years, the outpatient OMFS facility has grown as a result of the move of the expanded Dental Service to Charles River Plaza and 2 renovation projects. The Department now has a state of the art facility with seven examining/procedure rooms,

two modern operating rooms and a three-bed recovery room. The x-ray and photography systems are digital and images are visible in all rooms on monitors linked to the Partners/MGH information system. We use computer software to plan dental implant (Simplant) and orthognathic surgery (Dolphin Imaging) cases. In addition, software (Osteoplan and 3-D Slicer) developed in the Department, in collaboration with the Harvard Surgical Planning Laboratory at Brigham and Women's Hospital, allows us to do 3-dimensional planning for patients with complex craniofacial anomalies undergoing reconstructive procedures.

In 1994, there was only 1 operating room in the clinic, intravenous sedation was done during one clinic session per week and the resident service volume was progressively decreasing. Two of my major goals were to re-invigorate the clinical practice and to rejuvenate the resident service. With the help of David Perrott and then Thomas Dodson, as Resident Program Directors/Unit Chiefs and the rest of the faculty, we are well on the way to achieving these goals. We now do procedures using intravenous sedation 5 days per week on both the

FIGURE 1: OUTPATIENT VOLUME AT MGH 1998-2004

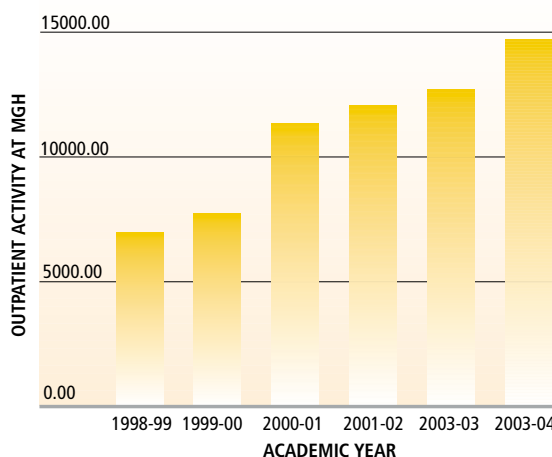
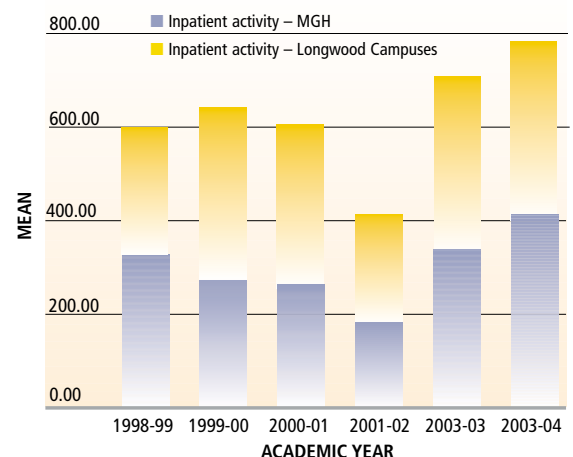


FIGURE 2: INPATIENT VOLUME AT THE MGH AND LONGWOOD CAMPUSES



private and ward services. The full-time and an active part-time faculty have worked with the residents, our head nurse and our ancillary staff to establish an active and viable outpatient ward service.

During the past 10 years we have developed a fully integrated faculty group practice, with a central appointment system, integrated on-call schedule, billing system and regular clinic hours for each faculty member. The faculty practice also includes surgeons at the Brigham and Women's Hospital (BWH), Children's Hospital (CH), Beth Israel Deaconess Medical Center (BIDMC) and Harvard School of Dental Medicine (HSDM), who all belong to the Massachusetts General Physicians Organization.

Faculty in the Department have been at the forefront of development of novel

technologies and new treatments in OMFS. Distraction osteogenesis, a form of tissue engineering, is a technique of bone lengthening that uses the body's healing potential to form new bone (Figure 5). The technique was popularized by Ilizarov, a Russian orthopedic surgeon working in Siberia. An osteotomy is made and tension created across the cut edges of bone by activating a device that slowly separates the segments. Bone forms spontaneously in the gap, without the need for a bone graft. Our distraction osteogenesis program consists of 4 projects which have implications for patient care: 1) Biology of distraction osteogenesis; 2)

Development of minimally invasive approaches to expose the craniomaxillofacial skeleton; 3) Development of totally buried miniature distraction devices capable of accurate 3-dimensional (3D) movements; and, 4) Three-dimensional imaging, based on CT data, for analysis, treatment

Figure 5: Drs. Kaban (seated) and Troulis (standing) with Kelly O'Laughlin, a child with severe micrognathia (small jaw) necessitating a permanent tracheostomy for breathing. She had mandibular lengthening by distraction osteogenesis and her tracheostomy was removed. This allowed her to begin developing normal speech and to participate in regular classes.

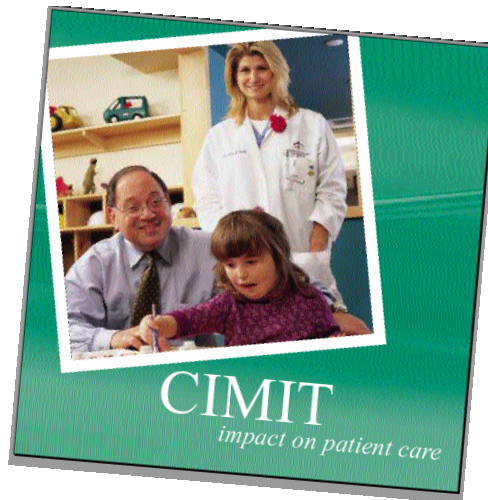


FIGURE 3: TOTAL OMFS PRODUCTION

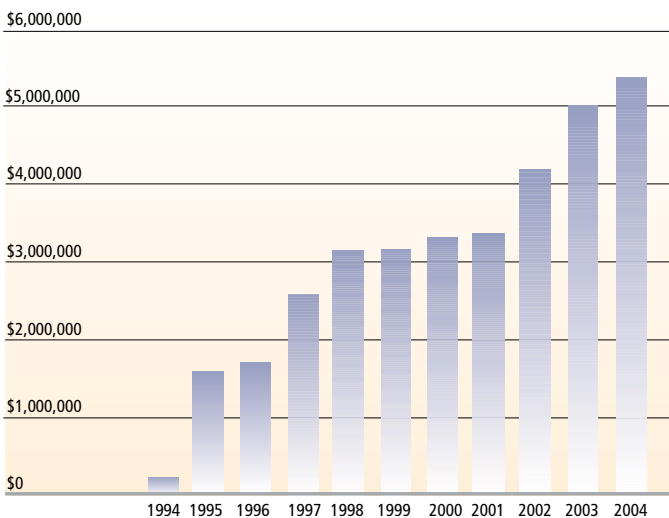
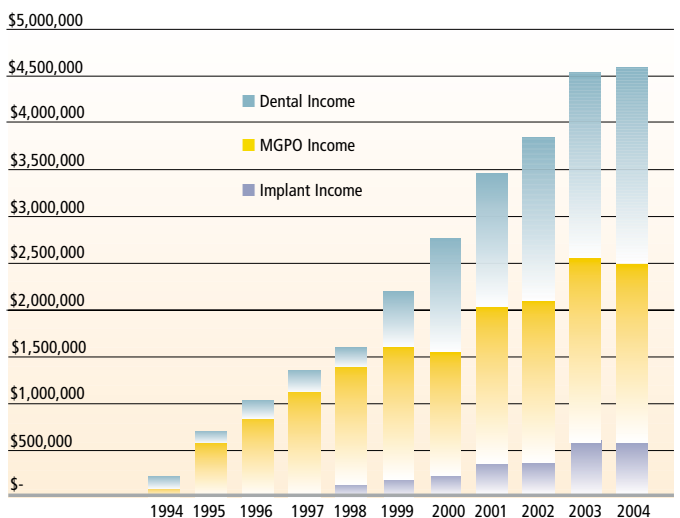


FIGURE 4: TOTAL SERVICES INCOME



planning, navigation and outcomes assessment.

The Department, under the leadership of Dr. Maria Troulis, has led the development of minimally invasive (endoscopic) approaches for maxillofacial surgery (Figure 6). As a result of a project begun in the Department laboratory and funded by CIMIT (Partners Center for Innovation and Minimally Invasive Technology in Medicine), we have brought to daily clinical use an endoscopic approach to the maxillofacial skeleton that has benefited our own patients enormously. We have spread this knowledge and technology to other surgeons by offering a yearly hands-on Minimally Invasive OMFS course at MGH sponsored by Harvard Medical School. Participants have included numerous department chairmen and program directors from around the United States and around the world. We have published the technique and the results and with industry support (Synthes, CMF Corporation, Paoli, PA; Storz, Culver City, CA), we have created an endoscopy research suite and a learning center for minimally invasive OMFS at MGH (Figures 7, 8).

The Department of OMFS at MGH and Harvard includes the OMFS Service, the

Pediatric OMFS Service (part of the Mass General Hospital for Children), the MGH Dental Group and the OMFS Research Division. It is one of the largest such Departments in the country. Our 20 full-time and 26 part-time faculty provide patient care and teaching for the Harvard system and conduct both laboratory and clinical research. In addition to our patient care and residency training activities at the core institutions: MGH, BWH, CH, BIDMC and HSDM, our full and part-time faculty provide patient care at the Cambridge Health Alliance, Family Health Center (Worcester) and Harvard Vanguard Medical Associates.

MGH DENTAL GROUP

In an effort to provide the comprehensive care necessary for patients of a tertiary care center, Dr. Bruce Donoff (Chief of OMFS, 1983-1992) recruited Dr. Agnes Lau to establish and develop the MGH Dental Group in 1990. There was shared administrative space and three operatories within the Oral and Maxillofacial Surgery clinical suite in WACC. Personnel consisted of Dr. Lau, one dental assistant, one dental

Figure 6: Drs. Kaban (left) and Troulis (right) with Mr. John Yeonopolous. Mr. Yeonopolous, through his foundation (Hanson Foundation, Weston, MA), has been a strong supporter of the Department's Program for Minimally Invasive Surgery. The Foundation has provided significant longitudinal grant support for our work for the past 8 years and is committed to additional support going forward.





Figure 8: Group photograph of participants in the first course, October 2001. Participants, many of whom are Professors, Department Chairs, Program Directors and senior clinicians, traveled from as far as Scandinavia, Europe, South Africa and from around the United States to participate.

hygienist and one administrative assistant. Initial efforts were focused on inpatient consultations, developing working relationships with Oncology, Radiation Medicine, Transplant and Cardiac Surgery services, and marketing outpatient dental services to the MGH community.

The summer of 1993 marked the beginning of MGH Dental Group's collaboration in the Brigham and Women's Hospital/Harvard-Wide General Practice Residency Program in Dentistry. Since then the MGH has trained 2

GPR residents per year (each for 6 months). In addition, 4 GPR residents each do a 1-month OMFS rotation at MGH. The program provides dental residents with advanced training in the treatment of medically compromised outpatients and inpatients, oral surgery, anesthesia, emergency medicine, and internal medicine.

With the addition of the resident service, we increased personnel by one dental assistant and one resident. No facility changes were necessary. Significant benefits to the MGH from the resident service included improved access to dental care for the indigent and enhancement of the MGH's educational mission by improving collaboration between the dental service and other medical/surgical services.

At the time of Dr. Leonard Kaban's arrival as the Chief of Oral and Maxillofacial Surgery, the start-up dental service had revenues of \$255, 000 per year. Dr. Kaban saw the potential of the dental service as a "full-service" dental group with the ability to reach a greater patient population.

With support from the hospital, Mass General Physicians Organization (MGPO) and

HARVARD MEDICAL SCHOOL
DEPARTMENT OF CONTINUING EDUCATION

MASSACHUSETTS GENERAL HOSPITAL
DEPARTMENT OF ORAL AND MAXILLOFACIAL SURGERY
presents
**ENDOSCOPY FOR MANDIBULAR
RECONSTRUCTION AND SALIVARY DISEASE**
October 5-7, 2001
at the
HOLIDAY INN - GOVERNMENT CENTER
BOSTON, MASSACHUSETTS
under the direction of
LEONARD B. KABAN, DMD, MD AND MARIA J. TROULIS, DDS, MSc

The objective of this course is to provide a hands-on workshop to train participants in the performance of endoscopic techniques. The course will familiarize the participants with the history, animal research and development, and clinical application of endoscopic techniques for mandibular reconstruction and salivary gland disease. This includes open reduction and fixation of condylar fractures, orthognathic surgery, condylectomy, costochondral reconstruction, placement of distraction devices, and sialendoscopy of the submaxillary and parotid glands. The faculty will train participants in the planning of endoscopic approaches and in the use of endoscopic equipment. Participants will then be able to practice endoscopic techniques using animal cadaver heads and mannequins during 12 hours of laboratory time.

Figure 7: The first MGH course brochure: Endoscopy for Mandibular Reconstruction and Salivary Disease, October 2001.

the Department leadership, the MGH Dental Group moved from its three-chair facility at WACC-230 to a ten-chair suite at Charles River Plaza in 1999. At that time, personnel included two attending general dentists, one resident, one hygienist, two dental assistants, and two administrative assistants.

In the ensuing years, we added more general dental attending staff, all with appointments at Harvard School of Dental Medicine. Specialists in almost all fields of dentistry were recruited to enhance resident education and patient care. Dental equipment for the operating room was acquired so that dental treatment could be provided for the very young or handicapped patient population who could not receive care in the typical outpatient office setting.

At present, the clinical providers of the MGH Dental Group include five general dentists, one resident, part time specialists in endodontics, orthodontics, pediatric dentistry, prosthodontics, and periodontics, and four dental hygienists. Patients receive comprehensive care incorporating the most current techniques and materials, including implantology and microscope-assisted endodontics.

MGH Dental Group staff have participated in community outreach programs, such as Partners' SeniorWise Program, Children's Health Week, MGH Head and Neck Cancer Support Group, oral cancer screening programs at neighborhood nursing homes, and CHIP child identification programs which include dental impressions and saliva sample collections.

In FY'04, there were 4,930 active patients, 11,434 outpatient visits, over 400 inpatient consults, and collections of \$2,180,000.

Benefits of the care provided at the MGH Dental Group to the MGH community include:

- Improved access to dental care for the indigent and handicapped population. The MGH Dental Group participates in the Massachusetts program, Dentistry For All. Resident services at reduced fees and OR dentistry have improved access as well.
- Improved outcomes by reducing and managing oral complications of therapy for a variety of diseases.
- Improvement of the education of medical, surgical, and dental residents.

Future goals for the MGH Dental Group:

- Improving overall patient care at the MGH by strengthening relations with other hospital services and continuing to pursue and develop advanced techniques in dental care.
- Incorporating digital radiography and paperless charting into dental service operations, hopefully integrating with hospital operating systems.
- Expanding child dental services to support the expansion of MassGeneral Hospital for Children. At present, orthodontic services are available one day a week and pediatric dentistry is provided a half day a week. There is tremendous potential to develop a more active pediatric dental service. Expansion of the MassGeneral Hospital for Children could include space for a dental facility. This would allow for greater access to children's dental services, the development of a postdoctoral training program for pediatric dentists, and a greater volume of OR cases.
- Developing clinical research activities.

OMFS Resident Education

The last ten years have been a time of vigorous growth and dynamic changes for the MGH/Harvard MD Oral and Maxillofacial Surgery Residency Program. During this period, the Program has had four Directors, Dr. John P. W. Kelly (1994-1995), Dr. David Perrott (1995-97), Dr. Bonnie Padwa (1997-98) and Dr. Thomas Dodson (1998-2004).

Thirty residents finished the program between 1994 and 2004: 27% were women and 6.2 % under-represented minorities. All but one of the graduates are actively involved in academic or private-practice of OMFS. Eleven (38%) are in full- or part-time academic positions or have assumed other leadership roles within the specialty. Fifteen of the graduates have achieved certification by the American Board of Oral and Maxillofacial Surgery and the remainder are in the candidate group (Figures 9, 10, 11).

There have been significant curriculum changes during the past ten years. The program, begun by Dr. Walter Guralnick in 1971, was the first such program in the United States. The sequence of training consisted of one year as OMFS Intern

FIGURE 9: GRADUATES OF RESIDENCY PROGRAM BY YEAR

1994
Jean L. Bruch, DMD, MD Bonnie Padwa, DMD, MD
1995
Bai-Zheng Song, DMD, DMSc
1996
Patrick C.W. Kline, DMD, MD David S. Kung, DDS, MD
1997
Alan P. Chun, DDS, MD Katherine A. Keeley, DDS, MD C. Randolph Todd, DMD, MD, DMSc
1998
Shawn J. Bailey, DDS, MD Robert S. Gilardetti, DMD, MD Anthony L. Ragonese, DDS
1999
Jonathan S. Bailey, DMD, MD Mary M. Collins, BDSc, FDSRCS Alf L. Nastro, MDSc, FDSRCS Mark D. Zajkowski, DMD, MD
2000
Bart F. Blaeser, DMD, MD Richard L. Elias, DMD, MD Janice S. Lee, DDS, MD Siobhan M. Stephen, DMD, MD
2001
Dexter Johnson, DDS, MD Angel Joseph Torio, DMD, MD Kenneth B. Whitworth, DDS, MD
2002
R. John Tannyhill, DDS, MD Brett C. Denhart, DMD, MD
2003
H. Daniel Clark, DMD, MD Jennifer N. Forshey, DMD, MD Melissa Lackey, DMD, MD
2004
Tuan G. Bui, DDS, MD Jeffrey A. Hammoudeh, DDS, MD Mark Nissenbaum, DMD

(PGY1), one year at HMS (HMS principal clinical year; PGY2), one year split between General Surgery and OMFS (PGY3), one full year of General Surgery (PGY4), one year OMFS Senior Resident (PGY5). The purpose was to expand the medical knowledge of oral and maxillofacial surgeons and to provide them with the opportunity to complete post-graduate General Surgery training. Currently 44 of 100 programs in the United States, with 50% of the residents in training, are modeled after the MGH/Harvard Program.

Initially, only graduates of Harvard School of Dental Medicine (HSDM) participated in the MD program. Non-HSDM graduates were eligible to enroll in a standard 4 year OMFS residency. In 1986, after approximately 15 years of experience, Dr. Bruce Donoff, Chief of OMFS, successfully proposed to Harvard Medical School to allow non-HSDM graduates to enroll in HMS as transfer students for OMFS. HSDM graduates continued in the five-year training program described above and non-HSDM graduates enrolled in a six-year program, spending two years at HMS (HMS II and III).



Figure 10: 1994 Residents-1st Row: Tania Haddad, Jean Bruch, Kia Movassaghi, 2nd Row: John Kelly, Leonard Kaban, 3rd Row: Walter Guralnick, Edward Seldin, Bruce Donoff, Meredith August, 4th Row: Tim Mitchell, David Kung, Steve Scrivani



Figure 11: 2004 Residents -1st Row: Matthew Jacobsen, Jose Ramirez, Basel Sharaf, Leonard Kaban, Tuan Bui, Mark Nissenbaum, Jeff Hammoudeh, 2nd Row: Brad Williams, Jeffrey Shaefer, Nanlin Chiang, An-Louise Johnson, Mailikai Abulikemu, Arnulf Baumann, 3rd Row: Walter Guralnick, Carol Lorente, Maria Troulis, Bruce Donoff, Meredith August, Thomas Dodson, 4th Row: Thomas Albert, Fardad Tayebaty, Leslie Halpern, Edward Seldin, Sung-Kiang Chuang

Over the ensuing years, it became apparent that the one-year HMS curriculum for HSDM students was not an ideal learning experience. They had to complete 13 months of clinical rotations and Parts I and II of the National Medical Boards or USMLE in 12

“We are very proud that 27% of the graduates of the residency program during the past 10 years have been women.”

months. In 1998, the HMS Faculty Council approved a curriculum change, proposed by Drs. Kaban and Perrott, requiring all OMFS residents to complete two years of HMS.

There was now a single six-year residency-training program for all students. In the new program, HSDM graduates matriculated as HMS III students and completed the final two years of medical school. There was no change in the curriculum for non-HSDM graduates.

The most recent change in the curriculum occurred in the fall of 2002. Dr. Dodson presented, and the HMS Faculty Council approved, a proposal to place all OMFS residents, HSDM and non-HSDM graduates, in medical school at the HMS III level. This has created an opportunity to enhance the educational experience for our residents. Six months of the HMS IV year is elective and is assigned as independent study in Oral and Maxillofacial Surgery. Residents can use the time available to participate in research-related activities and/or to explore other related clinical areas. Residents are now required to produce a scholarly work prior to graduation.

One aspect of the program that has been consistent during the last 10 years is the 16 months assigned for general surgery training. In an attempt to provide additional experience in relevant surgical specialties, we have instituted an otolaryngology, head and neck surgery rotation during the junior (split) year. The four months of general surgery during this year are now assigned to the Otolaryngology service at the Lahey Clinic in Burlington, MA.

All residency programs have dynamic resi-

dent personnel changes during a long training period. Having simultaneous five- and six-year programs and then transitioning to a uniform six-year track for all trainees created a number of vacancies. Filling these positions were some excellent clinical fellows including: Dr. Mary Collins (1994, 1995, Ireland), Dr. Amram Zagury (1996, Israel), Dr. Ali Iranmenash (1997, HSDM), Dr. Alf Nastri (1999, Royal Melbourne Hospital, Melbourne, Australia), and Dr. Leon Ardekian (2002, Rambam Medical Center, Haifa Israel).

The breadth and depth of the residents' clinical experience has always been the defining characteristic of the MGH OMFS Program. A major emphasis during the last decade has been to grow the resident service to provide trainees with more independent (though supervised) responsibility in patient management. During the 1994-95 academic year, the resident's recorded 2,200 outpatient visits. The ward service clinic currently has approximately 6,000 patient visits. Paralleling the increase in outpatient clinic volume, has been an increase in the number of procedures supplemented with office-based ambulatory anesthesia. There are no statistics for the years between 1994 and 1997, but with only 1 day per week devoted to sedation, the maximum number of cases possible would have been between 120 and 150 per year. During the 97-98 academic year, 270 cases were recorded, and from 2000 –2004 the resident clinic has done an average of 405 sedations per year. Despite the increase in office-based procedures, many of which would have been previously completed in the main operating room, the Service continues to increase its inpatient activity. During the 1994-95 academic year, there were 900 in-patient procedures of which 246 (27%) were dentoalveolar and 624 major operations. During the 2003-04 academic year, not counting dentoalveolar procedures, the service admitted 778 patients and recorded 857 major procedures.

LONGWOOD CAMPUS

The Longwood Campus (LC) is currently composed of three affiliated hospitals, the

Children's Hospital, Brigham and Women's Hospital, Beth Israel Deaconess Medical Center and Harvard School of Dental Medicine. In 1994, there were two full-time equivalent (FTE) resident positions assigned to cover these institutions. The Children's Hospital and Brigham and Women's Hospital each had 0.5 FTE and the Beth Israel 1 FTE. In 1995, a third resident was added to the Longwood campus so that the CH and BWH each had a full-time resident. In 1998-99, residents were scheduled to cover outpatient OMFS clinics at HSDM providing them the opportunity to teach predoctoral students and to see patients in their own clinic with faculty supervision. Dr. Bonnie Padwa is the residency director for the Longwood Area.

The inpatient volume on the Longwood Campus is rich in unusual adult reconstructive and pediatric, cleft/lip palate and craniofacial cases. Managing the residency program at the Longwood Campus has become especially challenging due to the diverse institutions involved and the lack of a central place considered "home" for our faculty and residents. Adding to the challenge was the closure of the Beth Israel Deaconess Medical Center's (BIDMC) oral and maxillofacial surgery clinic in 2000. Despite this, we have maintained a presence at BIDMC by providing urgent and emergency coverage with faculty and a resident.

RESIDENT APPLICATIONS

All good residency programs must recruit new interns each year. Over the last ten years there has been a continuously shrinking pool of applicants for OMFS training programs nation-wide. The MGH OMFS program is no exception to this trend. The pool of applicants to the program, while smaller, is still very competitive. Over 95% of the applicants are academically qualified to be considered for interviews. We limit the number of interviews to twenty applicants, making the selection process very difficult. With rare exceptions, we recruit and match our top applicant choices to the residency program.

In an attempt to meet the ever growing demand for academic oral and maxillofacial surgeons, the faculty has initiated a strategy of trying to recruit very high-quality predoctoral students from HSDM. Students with the interest and desire are identified during the first year of dental school and work with a faculty mentor on a research project. A select group of the students are invited to take a year off from dental school to participate in research or other related didactic activities in the Department. If the student performs well and maintains an interest in the specialty, he/she is accepted to the program outside of the match. The first student recruited into the program, Mr. W. Bradford Williams, is scheduled to matriculate in July 2005, followed by Srinivas Susarla in July 2007 and Fardad Tayebaty in July 2008.

FUTURE DIRECTIONS

The Department will be focusing significant resources on the training program at the Longwood Campus. We are working with the affiliated institutions to build a consortium OMFS outpatient unit outside the hospitals. This unit will be the home for clinical and academic activities for OMFS in the Longwood area. In addition, OMFS has been given divisional status at the Brigham and Women's Hospital, thus providing an opportunity for a high-level voice in the decision-making process. A new Chief will ultimately be recruited.

Introduction of the mandatory 80-hour work week by the American Council of Graduate Medical Education (ACGME) is a challenge for the training program. The Department has been monitoring current resident work hours (range 70-125 hours per week) and is considering the possibility of increasing the number of residents, hiring physician assistants to function as "resident extenders," and maintaining closer control of the volume in the resident outpatient clinics to comply with the new regulations. The challenge is how to maintain an outstanding surgical educational experience within constraints of limited work hours.

Predoctoral Education

In 1994, HSDM had a predoctoral class size of 15 students. The OMFS experience consisted of lectures and a rotation at the MGH during the senior year. The highlights of those years included a course at MGH, first initiated by Dr. Walter Guralnick and then run by Dr. Edward Seldin, during which case studies integrating basic science, general medicine, OMFS and dentistry broadened the horizons of these fledgling dentists. The course was meant to act as a bridge and integrate the basic sciences, clinical medicine and dentistry. The students' perception of OMFS developed in the context of major maxillofacial cases, including the treatment of patients with unusual congenital and developmental deformities and pathology referred from around the world. OMFS was, for these students, like a graduate level course. There were no numeric surgical procedure requirements for graduation and the only obligation was for the student to learn as much as he or she could, on as broad a range of topics as possible.

Early in the 1990's, however, a transition was beginning. The entire curriculum at HSDM began to change toward problem-based learning. In this new curriculum, dental students were expected to develop their skills in independently searching out and acquiring new information for the purpose of solving clinical problems and questions. Interesting cases, with gradually unfolding clinical details, were used to stimulate the student's curiosity. Experienced tutors served as coaches while the students developed their knowledge and skills.

During the 1990's the class size was increased to a maximum of 36 students. It became necessary to increase dramatically the amount of clinical material for this burgeoning student class. At the same time, the diversity of the predoctoral class expanded dramatically. Not only did the percentage of women increase to the current level of 60% in the 2004 freshman class, but also the diversity of interests and clinical goals has broadened considerably. Orthodontics and endodontics have

become much more popular choices for students. The time commitment and the perceived high professional demands upon the oral and maxillofacial surgeon, both of which may interfere with family life, have driven the decrease in OMFS applications nationally. Nonetheless, the number of HSDM predoctoral students choosing OMFS for their specialization has remained constant at 4 per class (11%).

During the past 10 years, the Department of OMFS has responded to these trends by devoting significantly increased resources to predoctoral education. Thomas R. Flynn, DMD was hired as the full-time Director of Predoctoral Education. He is the first OMFS faculty person to be completely based at HSDM. The increased presence of OMFS at HSDM has led to an increase in oral surgery clinic sessions for predoctoral students. Drs. Barry Agranat, Sung-Kiang Chuang and Thomas Flynn staff these clinic sessions.

Today's HSDM students experience an increasing depth and breadth of oral surgery activity at the School. The number of extractions performed by the students at HSDM has been increasing and the students get additional experience in nitrous oxide sedation and placement of dental implants. Before graduation, HSDM students must now pass clinical competency examinations in simple extractions, inhalation sedation, local anesthesia, prescription writing, and medical risk assessment.

The past ten years have been a period of change and growth for the predoctoral OMFS program. Competency based clinical education has become the organizing principle of all of our activities. In addition, we have significantly increased the research opportunities in OMFS for HSDM students. We now have more HSDM students working in our laboratory and doing clinical research than ever before.

Continuing Medical Education

MGH OMFS faculty members play a significant role in continuing education for dentistry, OMFS and other specialties by their participation in formal courses and by their service as guest lecturers and visiting professors.

During the past ten years the Department has focused its activity on three major courses: Microsurgery for Nerve Repair in OMFS, Minimally Invasive Oral and Maxillofacial Reconstructive Surgery and Combined Boston

OMFS Grand Rounds with Tufts and Boston University OMFS Programs.

The Microsurgery Course was given twice (1997 and 1998) and has been discontinued temporarily because of the significant cost, commitment of faculty time and resources

required to run it. In addition, the interest in such an intense course, with minimal opportunity for the participant to use the skills on a regular basis in private practice, has diminished.

We have focused our attention in recent years on a unique course in Minimally Invasive Oral and Maxillofacial Surgery. This is the first such course on this subject developed and carried out in an academic medical center. The philosophy and specific minimally invasive techniques developed at the MGH, are being taught in this exciting continuing education offering.

October 5-7, 2001 was a landmark in Continuing Medical Education for the MGH Department of OMFS. In collaboration with the Harvard Medical School Department of Continuing Education, we conducted the first course entitled: Endoscopy for Mandibular Reconstruction and Salivary Disease. This course was the result of five years of pioneering

work in minimally invasive surgery of the maxillofacial region. Starting with grants from CIMIT, the Hanson Foundation, the Department Education and Research Fund, and the NIH, we developed these innovative reconstructive endoscopic procedures in the laboratory and are now applying them to patient care. The 2001 course was the first international endoscopic workshop in the field of maxillofacial surgery to include endoscopic open reduction of fractures, orthognathic surgery and reconstructive bone grafting procedures for the jaw. Drs. Troulis and Kaban directed the course which also had a distinguished group of national and international faculty. This course has an annual course offering by the Department and Harvard and consistently receives excellent reviews (the last two ranked in the top 20 courses that HMS offers) from the participants (Figures 7, 8).

As a result of this activity, the AAOMS has appointed a national task force with Dr. Maria Troulis as chairperson, to make recommendations for the future and for the teaching of minimally invasive oral and maxillofacial surgery.

In 1994, although there were 3 accredited OMFS Programs in Boston, there was no formal interaction between the faculty and residents of these institutions. Dr. Kaban instituted a combined MGH/Tufts/BU Grand Rounds Program beginning in the fall of 1995. With the cooperation of H. Chris Doku and Donald Booth, the Chiefs of Tufts and BU respectively, the program was organized with the fall session at MGH, winter session at Tufts and spring session at Boston University. The Combined Grand Rounds offers a faculty lecture followed by a resident lecture and is opened to the OMFS public. Despite the difficulties of traveling in Boston, this has become a city-wide OMFS tradition during the past 10 years.

“October 2001 was a landmark in CME for the Department...we conducted the first university-based course in minimally invasive surgery for oral and maxillofacial surgeons. Despite the turmoil around 9/11, the course was completely subscribed and received the highest ratings from attendees.”

Research

SKELETAL BIOLOGY RESEARCH CENTER

- Faculty: Maria J. Troulis, Director; Leonard B. Kaban, Harutsugi Abukawa, Edward B. Seldin, Julie Glowacki (1994-2000)
- Laboratory Manager: Mailikai Abulikemu
- Fellows: Paul Tompach (1996-1997), Maria Troulis (1997-1999), Petra Thurmüller (1999-2001), Corinna Zimmermann (2001-2002), Krishna Yeshwant (2001-2003), W. Bradford Williams (2002-2003), Arnulf Baumann (2003-2004), Maria Papadaki (2004-2006).

DISTRACTION OSTEOGENESIS

Distraction osteogenesis (DO), i.e., gradual bone lengthening by placing tension forces across an osteotomy, remains a major effort in

“The distraction program has 4 components: Biology, minimally invasive access, distractor design, and image-based 3-D treatment planning.”

the Department. Our laboratory has developed a porcine model for DO. We have continued to publish results documenting the biology of bone wound healing in the distraction gap using clinical, radiographic (plain and computed tomography), ultrasound, biomechanical and molecular biology techniques. In addition, we have documented changes in the temporomandibular joint in response to DO for mandibular lengthening and have demonstrated that muscle overlying the distraction wound undergoes proliferation in response to the distraction forces. This is in contrast to the stretching of muscle that occurs with standard osteotomies and bone movement. Projects are ongoing to document the sequence of cellular response and the cells responsible for bone formation in a healing DO wound.

3 DIMENSIONAL TREATMENT PLANNING

Current surgical treatment planning systems attempt to predict three-dimensional (3D) sur-

gical corrections using two-dimensional (2D) data. Current methods are inadequate for complex movements. We have developed and published a 3D planning system based on computed tomographic (CT) data. Software that was developed in the Harvard Surgical Planning Laboratory was modified for the craniofacial skeleton. Three-dimensional visualization of the facial skeleton, selection of landmarks, measurement of angles and distances, simulation of osteotomies, repositioning of bones, detection of collisions and super-imposition of scans were accomplished. Future applications may include surgical navigation.

The Laboratory has developed a novel, semiburied, miniature distraction device capable of accurate 3-dimensional movements along a curvilinear path. When integrated with the 3-dimensional treatment planning system this will be a powerful tool for skeletal expansion in the craniomaxillofacial region in the future. Early clinical trials are currently in progress.

This work is funded by grants from the AO-ASIF Foundation, Davos Switzerland; CIMIT; Synthes Maxillofacial, Paoli, PA. Dr. Kaban has been the principal investigator of these grants.

TISSUE ENGINEERING

Tissue engineering of bone is a second major emphasis of our Skeletal Biology Program. Our group (under the leadership of Dr. Maria Troulis), in collaboration with the MGH Tissue Engineering and Organ Fabrication Laboratory, was successful in producing a tissue engineered mandibular condyle. A polymer scaffold was seeded with porcine mesenchymal stem cells in-vitro. This was the first example of a tissue-engineered bone utilizing autologous stem cells. The paper was published in the January 2003 issue of the Journal of Oral and Maxillofacial Surgery.

During this year, in vivo studies, in the minipig, were performed (and are ongoing) to determine the ideal time for construct implantation to maximize vascular in-growth and bone penetration of the scaffold. We also reported reconstruction of a mandibular defect, in a large animal model, using autologous bone marrow precursor cells seeded on a scaffold. These results were published in the *Journal of Oral Maxillofacial Surgery* and represent, to our knowledge, the first such reconstruction using tissue engineering principles and autogenous precursor cells. The project is leading up to the reconstruction of large continuity defects of the maxillofacial skeleton with tissue-engineered bone. In the long term, a 2nd goal is to tissue engineer a mandibular condyle growth center. The tissue engineering project has been funded by a grant from the Hanson Foundation (Boston, Massachusetts), the MGH Department of OMFS Education and Research Fund and by a grant from the Therics Corporation (Princeton, New Jersey). (Two R01 proposals have been submitted related to this work.)

The 2nd major tissue engineering project is in collaboration with investigators at HSDM and Forsyth Dental Research Institute. This involves the engineering of a composite jaw bone and teeth using tissue engineering techniques. We recently received an NIH grant for this project, detailed here:

JAW TUMORS

Our novel protocol for the management of giant cell tumors of bone, published in *Pediatrics* in 1999, continues to enroll patients in a prospective study. In this protocol, the tumor is enucleated and the patients receive postoperative antiangiogenic therapy with alpha interferon. The initial results of our case series was published in the *Journal of Oral and Maxillofacial Surgery* in 2003. We currently have 22 patients enrolled in this ongoing study. The recurrence rate for aggressive giant cell lesions has been zero (in the

current group of 22 patients). The historic recurrence rate for these tumors is 30-60%. This project has been a collaborative effort with the Division of Pediatric Hematology/Oncology, Departments of Orthopedics and Pathology, and Judah Folkman's laboratory at Children's Hospital. This is the first series of patients treated with interferon for a primary bone tumor.

We have also reported the exuberant bone formation demonstrated by these patients and hypothesize that interferon not only has an antiangiogenic effect on the tumor but also stimulates bone formation in the wound. We continue to study the effect of interferon on giant cell tumors, osteoblasts and osteoclasts to determine the exact mechanism of this effect.

In 2004, we published long-term results for the treatment of mesenchymal tumors of the jaws in children using a staged protocol of resection and reconstruction. This is part of a larger study in progress which includes both adults and children with jaw tumors. This strategy has resulted in significantly decreased morbidity and a significantly lower infection and bone graft failure rate than in previously published studies.

This work is funded by the Department of Oral and Maxillofacial Surgery Educational and Research Fund (ERF).

MINIMALLY INVASIVE SURGERY

Initially funded by a CIMIT grant, the minimally invasive surgery program in OMFS is currently directed by Dr. Maria Troulis. The minimally invasive approach to the mandibular ramus/condyle unit has been described and developed in the minipig model and then applied to multiple reconstructive procedures. In 2001, the first clinical series of patients who underwent endoscopic reconstruction of the mandible for a variety of developmental and acquired deformities was published and our first international workshop was held at the MGH. The workshop is now an annual event.

This year, two retrospective studies have

been completed and the results published. These are the first reported series of endoscopic mandibular osteotomies and endoscopic mandibular condylectomy and costochondral grafts. This technique, developed at MGH has the potential to revolutionize the techniques for mandibular reconstruction. The studies

“Minimally invasive surgery, in the broadest sense endoscopy, distraction osteogenesis, tissue engineering and other as yet undeveloped technologies, may revolutionize the practice of OMFS and MGH OMFS innovators are and will remain at the cutting edge of these developments.”

have been supported by CIMIT, the Department of OMFS Education and Research Fund and an NIH grant (K23 DE 14070-01, Maria Troulis, PI). An animal study to objectively demonstrate the reduction in edema with endoscopic recon-

struction was completed, presented at the annual meeting of the American Association of Oral and Maxillofacial Surgeons, and has been accepted for publication in the Journal of Oral and Maxillofacial Surgery.

A laboratory for OMFS Minimally Invasive Surgery Research has been completed and is devoted to this work. Furthermore, we have established the first learning center for this work (The OMFS Minimally Invasive Learning Center).

This work is funded by CIMIT, Hanson Foundation (Boston, MA), NIH K23 (Troulis, PI), and the Department of Oral and Maxillofacial Surgery Educational and Research Fund (ERF).

ORAL CANCER

From 1996-2002, this program, led by Dr. Randy Todd, focused on the mechanisms of oral cancer progression. Work on the DOC-1 (Deleted in Oral Cancer) gene was the major emphasis of the research. The DOC-1 gene encodes a 12kDa polypeptide that is reduced or absent in ~70% of oral cancers. Re-expression of DOC-1 in oral cancer cells restores many normal morphologic and functional characteristics. Functionally, DOC-1 appears to be a regulator of proliferation and apoptosis.

Dr. Todd's group studied how DOC-1 is de-regulated during oral cancer development (PHS Grant R29 DE 11983). In addition, they examined the de-regulation of DOC-1 effects cell cycle control (allowing oral cancer cells to grow faster) (PHS Grant P01 DE 12467). DOC-1 also may be a regulator of apoptosis that is inactivated during oral carcinogenesis, allowing oral cancer cells to survive longer. Dr. Todd's group has shown DOC-1 expression correlates with changes in epithelial proliferation during oral carcinogenesis, and they have evidence that DOC-1 may be a useful prognostic biomarker. Unfortunately, Dr. Todd left the Department for private practice in December 2002 and the work has not continued here.

PATIENT ORIENTED RESEARCH

To parallel and complement the laboratory research activities, we have initiated a Patient-oriented Research Division under the leadership of Dr. Thomas Dodson. Research projects completed and/or presented during the current year included:

- 1) Identification of risk factors for dental implant failure.
- 2) Head, neck and facial injuries as markers for intimate partner violence.
- 3) Variables affecting hospital length of stay in orthognathic surgery patients.
- 4) Mandibular third molars as a risk factor for fractures of the mandibular angle.
- 5) Panoramic radiographic findings and the risk for inferior alveolar nerve injury following third molar extractions.
- 6) Endoscopic vertical ramus osteotomy for mandibular orthognathic surgery: an outcomes assessment.
- 7) A protocol for the management and reconstruction of children with primary jaw tumors.
- 8) Patient satisfaction after trigeminal nerve repair.
- 9) Natural history of nerve injury in association with mandibular fractures.
- 10) A randomized, placebo controlled, double-blind clinical trial to determine if prophylactic administration of systemic antibiotics decreases the risk for localized alveolitis fol-

lowing the removal of impacted wisdom teeth is underway.

Perhaps the most important achievement toward the goal of a Patient Orient Research Division has been the development of the Oral & Maxillofacial Surgery Foundation Patient Oriented Research Fellowship Program. This is a two-year training program which includes matriculation for a Master's Degree in Public Health at the Harvard School of Public Health and patient oriented research and patient care in the Department of OMFS at MGH. A grant for this program was

awarded to the Department with Dr. Tom Dodson as the Principal Investigator. We have had 3 two-year grant cycles awarded. The first fellow was Dr. Leslie Halpern (2000-2002). She was followed by Dr. Sung-Kiang Chuang

(2002-2004). Both Drs. Halpern and Chuang have remained on the faculty and have active research programs. The current fellow is Srinivas Susarla. The Clinical Research Fellowship is the largest fellowship grant given out by the OMFS Foundation.

This program is funded by OMFS Foundation Clinical Research Fellowship, NIH K24 (Dodson, PI) and the Department of Oral and Maxillofacial Surgery Educational and Research Fund (ERF).

INDIVIDUAL FACULTY RESEARCH ACTIVITIES

MEREDITH AUGUST, DMD, MD

After completing my OMFS training and joining the faculty at the Harvard School of Dental Medicine, I have focused on both undergraduate teaching as well as conducting clinical outcome studies in areas of interest to me, particularly oral oncology and the use of dental implants in head and neck reconstruction.

My research interests have resulted in clinical outcome studies that have contributed significantly to the literature and aided in both diagnostic ability and treatment planning. My collaboration with Dr. William Faquin in the MGH Department of Pathology has enabled us to evaluate the use of fine needle biopsy techniques in the jaws and to determine both the feasibility of obtaining intrabony samples as well as determining their accuracy. Once the technique was improved, we began sampling the lining cells of various types of odontogenic cysts and were able to identify an immunocytochemical marker that distinguished odontogenic keratocysts from the more benign dentigerous cysts with a high degree of sensitivity. This minimally invasive and very rapid method of diagnosis has been extremely helpful for our patients and is widely used in the department. We are currently evaluating immunocytochemical markers to aid in the diagnosis of various salivary gland tumors.

I am currently evaluating the long-term success of endosseous implants in postmenopausal females. Working in conjunction with Dr. Julie Glowacki in the Department of Orthopedic Surgery at the Brigham and Women's Hospital, we have assessed the effects of osteopenia and osteoporosis on implant success and long-term stability in a retrospective study. We have completed a book chapter reviewing the effects of skeletal aging on the maxillofacial complex. Dr. Glowacki is a co-editor of this book. We are hoping to continue this work in prospective fashion and study the effect of hormone replacement therapy on the success of dental implants in this patient population.

An important part of my research activity has always included the mentoring and guidance of students at the Harvard School of Dental Medicine who have been an integral part of most of my research. Many of these projects have led to the presentation by students of oral abstracts at national meetings as well as the preparation and publication of manuscripts.

".....the most important achievement toward the goal of a Patient Oriented Research (POR) Division has been the OMFS Foundation supported Fellowship in POR. This is the only such program in the United States."

R. BRUCE DONOFF, DMD, MD

During the past ten years, while serving as Dean of the Harvard School of Dental Medicine, my research has focused primarily on continuing collaborative ventures. Basic research in oral cancer and outcome studies of microneural repair of inferior alveolar and lingual nerve injuries resulted in several publications. These were the result of collaborations with other members of the faculty. My long time interest in wound healing has led me back into research on bone healing in compromised healing situation, notably irradiated bone. We have developed a model of impaired rat calvarial bone healing with irradiation and in the future will use this to test various treatment strategies. We are also currently working on ultrasound imaging of the lingual nerve.

LESLIE HALPERN, DDS, MD, PHD

Since beginning my fellowship and faculty position in the Department of Oral and Maxillofacial Surgery, I have undertaken two research endeavors. First, I have worked to develop a protocol to diagnose intimate partner violence in the emergency room setting using head, neck and facial injuries and a

“The development of an integrated faculty group practice has allowed our faculty to organize their time so that they can practice successfully and maintain a viable research program.”

verbal questionnaire. I have received funding from Harvard Medical School’s Center of Excellence in Women’s Health. I am now reapplying for an RO3 to further fund the project. With my co-investigator and mentor Thomas Dodson, I am conducting a prospective study to evaluate the use of preoperative antibiotics to prevent postoperative complications after third molar surgery. We have designed a random double-blinded control trial to look at this using the patient pool at the outpatient OMFS clinic at Massachusetts General Hospital. We have a grant proposal that was funded by the Oral and Maxillofacial Surgery Foundation (OMSF) to begin March 1st 2004.

DAVID A. KEITH, DDS, FDSRCS

As an oral and maxillofacial surgeon, I perform a full range of specialty care with a special interest in temporomandibular disorders and orofacial pain. Together with Dr. Willie Stephens of our Department, I have started to investigate the use of Metallic Total Temporomandibular Joint Prosthesis in the multiply operated patient and the use of pain pumps for immediate postoperative pain control.

JEFFRY SHAEFER, DDS

My current research efforts involve a study investigating the effects of massage therapy for the treatment of myofascial pain compared to standard behavioral therapy, the study of the amount of nerve damage in patients with burning mouth syndrome by measuring the neural density in affected and unaffected tissue, and measuring the effect of predoctoral training in advanced local anesthesia techniques on the use of dental anesthesia in dental practices.

BONNIE PADWA, DMD, MD

My research interests fall within the field of pediatric oral and maxillofacial and craniofacial surgery. I have conducted retrospective studies to evaluate facial growth in children with a variety of craniofacial anomalies. Most of these entities are uncommon and the small numbers of patients makes emphasis on only one disorder impractical. My work has ranged from the rare disorders such as facial infiltrating lipomatosis and cervicofacial lymphatic malformation with associated skeletal overgrowth, to the two most common craniofacial anomalies, cleft lip/palate and hemifacial microsomia both characterized by deficient facial growth. The theme of my work is abnormal asymmetric facial growth. One such disorder, facial infiltrating lipomatosis, provides the opportunity to collaborate with basic scientists to study the possible etiopathogenesis of this rare condition. The goal is to find a pharmacologic treatment to minimize the regenerative overgrowth in this strange disease.

I have mentored many dental students in clinical research projects involving children with craniofacial anomalies. Several of these students obtained funding and have taken their projects to abstract presentation at national meetings and publication in peer-reviewed journals.

RESEARCH FUNDING

DEPARTMENT OF ORAL AND MAXILLOFACIAL SURGERY EDUCATION AND RESEARCH FUND (ERF)

Beginning in 2002, the faculty has been contributing a percentage of its clinical income to establish an Education and Research Fund (ERF). To date, we have contributed approximately 300,000 dollars and we are actively seeking philanthropic contributions to expand the fund and to eventually establish an Education and Research Endowment.

Beginning in 2003, the ERF offered small grants to Faculty, Residents, Fellows and Students. The purpose of these internal grants is to stimulate the development of research projects and programs within the Department. The grants are meant to be for 1 year with the possibility of renewal for a 2nd year. In addition, the ERF has provided educational grants for residents to participate in appropriate courses and travel grants for residents, students and fellows to present research results at meetings.

To date, the ERF has awarded 8 grants for a total of \$30,000 dollars. We expect this program to expand considerably as we get our residents more involved in research to meet a new graduation requirement for scholarly activity.

GRANTS FUNDED BY ERF:

Resident Education Grant (n=1):

Derek Steinbacher

Student Travel Grants (n=3): Srinivas (Seenu) Susarla, Mohammed Erakat, Michael Gentile
Pilot Studies approved for faculty with a resident or student mentee:

- I. Effect of distraction osteogenesis on inferior alveolar nerve
Resident: Matthew Jacobsen; Faculty: Maria Troulis
- II. Bone healing after radiation
Students: Matt Phillips, Jim Olsen (HSDM); Faculty: R. Bruce Donoff
- III. Immunohistochemical evaluation of giant cell tumors of the jaws
Student: Nathan Dewsnup; Faculty: Meredith August
- IV. Length of hospital stay and complications with early treatment of odontogenic infections.
Student: Rabie Shanti; Faculty: Thomas Flynn
- V. Alternatives to the standard IAN block in dental education
Student: Jeffrey Johnson; Faculty: Jeffrey Shaefer

EXTRAMURAL FUNDING

In 1994, there were no funded extramural grants in the Department. During the past 10 years, extramural research funding has increased dramatically based on the work of our dedicated faculty and research fellows. During the past 10 years, the Department has received a total of over 4 million dollars in research grants (Figure 12).

Figure 12: OMFS Research Fund List

Title	Dates	Sponsor	PI	Funding
Ryan White HIV/AIDS Dental Reimbursement Program	1999-present	Health Resources and Services Administration	Dodson	\$28,590
Patient Oriented Research:Oral & Maxillofacial Surgery	2000-2005	NIH-NIDCR	Dodson	\$620,096
Clinical Training Investion Fellowship Dr. Leslie Halpern	2000-2002	Oral and Maxillofacial Surgery Foundation	Dodson	\$200,000
Implant Survival Rates & Risk Factors Associated with Implant Failure	1999-2002	American Academy of Implant Dentistry	Dodson	\$2,500
OMSF Clinical Investigator Training Fellowship - Sung Chuang	2002-2004	Oral and Maxillofacial Surgery Foundation	Dodson	\$200,000
OMSF Student Training Award	1994-2006	Oral and Maxillofacial Surgery Foundation	Dodson	\$63,500
OMSF Clinical Investigator Training Fellowship - Seenu Susarla	2004-2006	Oral and Maxillofacial Surgery Foundation	Dodson	\$200,000
Molecular Techniques for Diagnosis of Odontogenic Infections	2000-2001	Oral and Maxillofacial Surgery Foundation	Flynn	\$54,770
Skeletal Biology Research Center-MGH Internal	1995-2000	MGH	Glowacki	\$50,000
Head, Neck and Facial Injuries as Markers for IPV	2001-2002	HMS Center of Excellence in Women's Health	Halpern	\$34,128
Antibiotic Efficacy in Third Molar Surgery	2004-2005	Oral and Maxillofacial Surgery Foundation	Halpern	\$55,000
Development of a Totally Buried Distraction Device	2003-2004	NIH-SBIR: Physical Sciences, Inc.	Kaban	\$120,000
Skeletal Biology Research Center-Synthes Fellowship	1996-Present	Synthes Maxillofacial	Kaban	\$320,480
Mechanims of Fetal and Postnatal Bone Repair Maxillofacial Surgeons	1995-1996	American Association of Oral and	Kaban	\$35,000
Distraction Program	1996-Present	AO/ASIF	Kaban	\$473,767
Distraction Osteogenesis and 3D Treatment Planning	2000-2001	CIMIT	Kaban	\$225,000
Endoscopy Learning Center	2004-Present	Synthes Maxillofacial	Kaban	\$60,000
1995 Fred A Henny Fellowship	1995	Oral and Maxillofacial Surgery Foundation	Padwa	\$23,000
Endoscopy for the Midface	2004-2006	CIMIT	Troulis	\$75,000
Minimally Invasive Surgery Program	2002-2007	Hanson Foundation	Troulis	\$420,000
Minimally Invasive Approaches for Craniofacial Surgery	2001-2006	NIH-NIDCR	Troulis	\$515,001
Nanohydroxyapatite	2004	Angstrom Corp	Vrahas/ Troulis	\$30,000
Tissue Engineering Bone	2001-2006	Therics Inc	Vacanti/ Troulis	\$250,000
Role of wnt Family Genes During Chondroblast Differentiation in Vitro	1999-2000	Aircast Foundation	Yates	\$50,000
Identification of Transcription Factors Regulating Chondroinduction by Demineralized Bone	1999-2000	Musculoskeletal Transplant Foundation	Yates	\$100,000
			TOTAL	\$4,205,832

Faculty

In Figure 13, we list the current faculty of the Department of OMFS. All faculty who have joined the Department since 1994 are indicated by an asterisk. Since 1994, many of our faculty members have received well-deserved academic promotions:

From Instructor to Assistant Professor:

Meredith August
 Sung-Kiang Chuang
 Thomas Flynn
 Leslie Halpern
 Bonnie Padwa
 Jeffrey Shaefer
 Randy Todd,
 Maria Troulis

From Assistant Professor to Associate Professor:

Meredith August
 Bonnie Padwa
 Maria Troulis

From Associate Professor to Professor:

David Keith,
 Julie Glowacki
 (secondary appointment with Orthopedic Surgery)

Figure 13: Faculty of the MGH Department of Oral and Maxillofacial Surgery

**Oral and Maxillofacial Surgery
 Full-Time**

Leonard B. Kaban, DMD, MD Chief*
 Meredith August, DMD, MD
 Sung-Kiang Chuang, DMD, MD*
 Thomas B. Dodson, DMD, MPH*
 R. Bruce Donoff, DMD, MD
 Thomas R. Flynn, DMD*
 Walter C. Guralnick, DMD
 Leslie Halpern, DDS, MD, PhD*
 David A. Keith, DMD, FDSRCS
 Mark Nissenbaum, DMD* Fellow
 Bonnie Padwa, DMD, MD
 Edward B. Seldin, DMD, MD
 Jeffrey Shaefer, DDS*
 Willie L. Stephens, DDS
 Maria Troulis, DDS, MSc*

**Oral and Maxillofacial Surgery
 Part-Time**

Barry Agranat, DMD
 John Buehler, DMD, MD*
 Richard Catrambone, DMD*
 George Gallagher, DMD, DMSc
 Matthew Jackson, DMD*
 Carol Lorente, DMD, PhD
 Daniel Nozik, DDS
 Zigmunt Pozatek, DMD
 Earle Rosenberg, DMD
 Jennifer Smith-Williams, DMD
 J. Henry Stempien, DMD
 Joseph Wilkes, DMD, MD
 Mark Zajkowski, DDS, MD*

OMFS Research

Harutsugi Abukawa, DDS, PhD*
 Maria Papadaki, DDS* Fellow
 Alexandre daSilva, DDS, DMSc* Fellow
 Julie Glowacki, PhD Affiliate

**MGH Dental Group
 Full-Time**

Agnes Lau, DMD Chief of Dental Unit
 Traci Portnoff, DMD*

Part-Time

Jason Burak, DMD*
 Lisa Campanella, DMD*
 Nicholas Dello Russo, DMD*
 Barry Dorfman, DMD*
 Alan Ko, DMD*
 Manish Lamichane, DMD*
 Yana Posemeynik, DMD*
 Mauro Stuparich, DMD*
 Deborah Tung, DMD*
 Miguel Vidal, DMD*
 Arnold Weiss, DDS
 Leslie Will, DMD*

North End Community Health Center

Georgina Chamberlain, DMD*
 Edward Fidrocki, DDS*
 Elizabeth Anne Starr, DMD*

* Joined Department since 1994

FACULTY HIGHLIGHTS



Haru Abukawa

- Award for Best Oral Abstract Scientific Presentation at AAOMS Annual Meeting, October 11, 2004. Title: "A Novel Fused Interconnected Scaffold for Bone Tissue Engineering"
- NIH Grant # 1 R21 DE016370-01, 2004-2006: Coordinated bioengineering of tooth and bone in the jaw (Co-investigator).



Meredith August

- Served a 6 year term on the examination committee of the American Board of Oral and Maxillofacial Surgery (1999-2005)
- Served as chairperson for 2 years of the Anesthesia and Medicine section of the American Board of Oral and Maxillofacial Surgery (2003-2005)
- Promotion to the academic rank of Associate Professor of Oral and Maxillofacial Surgery, Harvard School of Dental Medicine, Boston (2003)



Thomas B. Dodson

- Received NIH grant/K24 award: Midcareer Award in Patient-oriented Research (2000)
- Received the OMS Foundation Grant to support a Fellowship in Clinical Investigation (2002)
- Helped two former Fellows in Clinical Investigation receive academic promotions from Instructor to Assistant Professor (both in 2004)
- Appointed to the editorial committees of the International Journal of Oral and Maxillofacial Surgery (2003) and the Journal of Dental Research (2004)
- Serving on NIDCR Study Section (2003)



R. Bruce Donoff

- Member, Editorial Board, Journal of Oral and Maxillofacial Surgery (1993-present)
- Fellow, American Association for the Advancement of Science (1994-present)
- American Dental Education Association Center for Educational Policy and Research Advisory Committee (2003-2005)



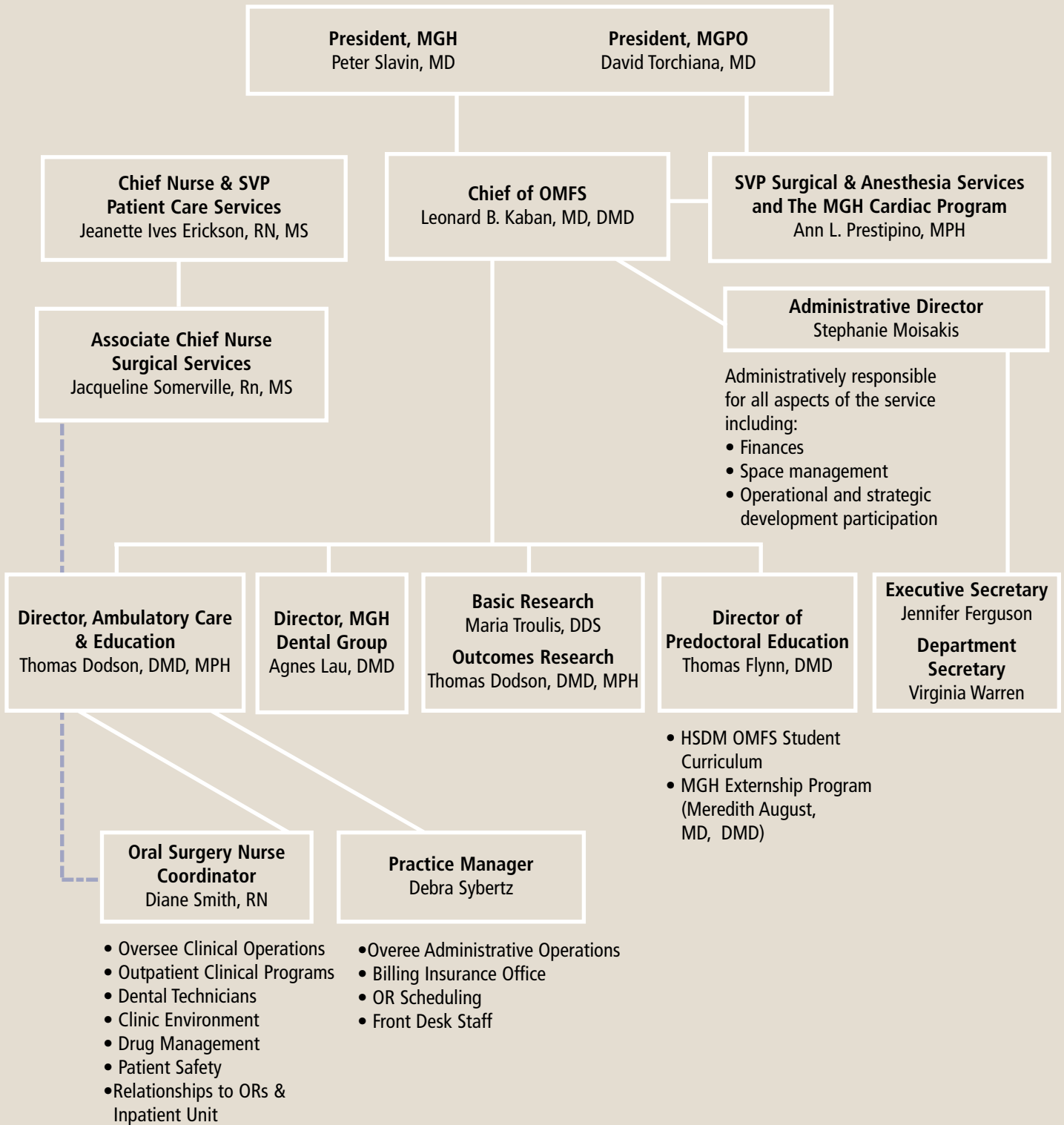
Walter Guralnick

- Humanitarian Award from the American College of Oral and Maxillofacial Surgery (2000)
- A. Clifford Berger Excellence in Mentoring Award at Harvard Medical School (2001)
- Senior Fellow of The Peabody Society of Harvard Medical School
- Member of the International Committee of the Office of Enrichment Programs for Harvard School of Dental Medicine and Harvard Medical School students.
- Elected Vice Chairman of the Board of Directors of The Medical Foundation, Boston, Massachusetts (2003)

Leslie Halpern

- Served as the first Fellow in the OMSF Clinical Investigator Fellowship Program in Clinical Outcomes Research (2000-2002)
- HMS Center for Excellence in Women's Health Research Grant: A Protocol to Diagnose Intimate Partner Violence (2001-2002)
- OMSF Research Investigator Award: Antibiotic Efficacy in Third Molar Surgery (2004)
- Promotion to the academic rank of Assistant Clinical Professor of Oral and Maxillofacial Surgery, Harvard School of Dental Medicine, Boston (2004)
- Award for Best Abstract at AAOMS/COMFS Annual Meeting in Orlando, Florida (2003) for the abstract: A protocol to diagnose intimate partner violence in the emergency room setting.

FIGURE 14: OMFS ORGANIZATIONAL STRUCTURE



**Leonard B. Kaban**

- Harvard University, School of Dental Medicine, Silver Anniversary Award (1994)
- Varatzad Kazanjian Lecturer, American Society of Maxillofacial Surgeons Annual Meeting, Montreal, Canada (1995)
- Presidential Lecturer, International Conference on Oral and Maxillofacial Surgery, Durban, South Africa. Lecture entitled: The Biomedical Technology Revolution: Opportunities and Challenges for Oral and Maxillofacial Surgeons. (2001)
- Harvard Medical School Dean's Award for Leadership in the Advancement of Women Faculty (2003)
- Donald B. Osbon Outstanding Educator Award, American Association of Oral and Maxillofacial Surgery Annual Meeting, San Francisco, CA (2004)
- Publication of Pediatric Oral and Maxillofacial Surgery (Kaban LB, Troulis MJ, eds) Philadelphia: Saunders; 2004.

**David A. Keith**

- Promotion to the academic rank of Professor of Oral and Maxillofacial Surgery, Harvard School of Dental Medicine, Boston (2003)
- Organizing OMFS lecture series at HSDM and making the initial change to case-based learning (1978-1996)
- Starting Orofacial Pain Course at HSDM and converting it to case-based learning format (1991-Present)
- Starting Orofacial Pain/Temporomandibular Disorders post-doctoral program at HSDM (1993-Present)

**Bonnie Padwa**

- Appointment to serve on the examination committee of the American Board of Oral and Maxillofacial Surgery (2004)
- Promotion to the academic rank of Associate Professor in Oral and Maxillofacial Surgery, Harvard School of Dental Medicine, Boston (2004)
- Invited Lecturer, 19th Annual Symposium of the College of Diplomats of the American Board of Pediatric Dentists. San Francisco, California. May 29, 2004
- Visiting Professor, Canada China Child Health Foundation. June 7-17, 2001. Tianjin Children's

Hospital, Capital Medical University Affiliated Beijing Children's Hospital, Chongqing Medical University Affiliated Children's Hospital, Guangzhou Children's Hospital

**Edward B. Seldin**

- Awarded patent for the world's first totally buried distraction device (1997)
- Reported the first use of a curvilinear semi-buried distraction device in an animal model with co-workers Kaban and Troulis (1999)

**Jeffrey Shaefer**

- Established certification in nitrous oxide sedation for pre-doctoral students at Harvard School of Dental Medicine (1999)
- Developed Pharmacology Course at Harvard School of Dental Medicine to allow multi-disciplinary training in pharmacotherapeutics for all post-graduate dental residents (1999)
- Received the Outstanding Faculty Award, Harvard School of Dental Medicine (2001)
- Dean's Award for Research: Massage therapy for the treatment of myofascial pain (2004)

**Maria J. Troulis**

- Publication of Pediatric Oral and Maxillofacial Surgery (Kaban LB, Troulis MJ, eds) Philadelphia: Saunders (2004).
- Principal Investigator, Hanson Foundation Grant: Minimally Invasive Techniques in Oral and Maxillofacial Surgery: Distraction Osteogenesis (1999-2007)
- Appointed Director, Minimally Invasive Oral and Maxillofacial Surgery Program at MGH (2000)
- Promotion to the academic rank of Associate Professor of Oral and Maxillofacial Surgery, Harvard School of Dental Medicine, Boston (2003)



Mural depicting the first operation under ether anesthesia in the Bullfinch operating theater, now known as the Ether Dome. The anesthesiologist is William Morton, the surgeon John Collins Warren and the patient had a jaw tumor, most likely a giant cell lesion.

Future Goals

CLINICAL CARE

The Faculty is dedicated to maintaining the MGH OMFS Service and the Harvard Department as a leading, cutting edge, full service clinical referral center for OMFS. Our programs in translational science and patient oriented research enhance to our national and international reputation as a leading Department of OMFS. The Department will invest resources in the continuing development of the minimally invasive OMFS program. In the next five years, we expect to train and recruit another faculty person for minimally invasive surgery and to develop a fellowship program in this new and exciting field.

We continue to search for a new faculty member with advanced training and experience in Head and Neck Oncology. We see this as an area of clinical growth for the Department and expect to eventually have 2 surgeons with a primary interest in oral cancer.

Our third area of expansion on the MGH campus will be in Pediatric OMFS, Pediatric Dentistry and Orthodontics. These activities are currently housed in the OMFS outpatient facility and the MGH Dental Group respectively. In coordination with future plans for the Mass General Hospital for Children, we hope to develop a 3rd facility on the MGH campus. This will be a pediatric OMFS/Dental facility co-located with Pediatric Surgical Specialties in Hospital for Children space. Once we have a commitment for this space we will recruit full time Pediatric Dentists and an Orthodontist and eventually have rotating residents in Orthodontics and Pediatric Dentistry. We also hope to develop a combined MGH/CH Pediatric OMFS fellowship. The new, multidisciplinary MGH Cleft

Palate/Craniofacial Clinic that currently meets in the OMFS Clinic also represents an opportunity for our department.

On the Longwood Campus we are committed to working with the BWH, CH, and BIDMC to build a first rate outpatient OMFS facility to serve the three hospitals and HSDM. We eventually hope to recruit a Chief of OMFS for the Longwood area and expand our faculty to 4 FTE.

RESEARCH

The research program has grown considerably over the past 10 years as noted above. In the near future, our Department Laboratory—Skeletal Biology Research Center—will be relocated to the Wellman Building. This is in recognition of our large animal research programs in distraction osteogenesis and bone tissue engineering. The move, as part of the overall MGH strategic plan for research space will provide us with 2300 square feet in close proximity to the large animal operating rooms where we do most of our work.

We plan to continue to grow the distraction osteogenesis program with an emphasis on the biology of distraction and the role of growth factors in the healing of the distraction wound; development of a miniature, buried, distraction device capable of accurate 3-dimensional movements (funded by a new Phase II SBIR grant from the NIH); and development of 3-dimensional imaging technology for surgical navigation.

The longterm goals of the tissue engineering project are to construct a growth center for reconstruction of the TMJ and Ramus/Condyle unit in children with congenital and acquired deformities.

The minimally invasive surgery program will grow in the areas of midface and mandibular reconstruction, laser bone cutting and bone welding as well as in the management of salivary gland disease and other pathology.

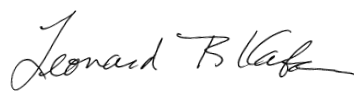
We plan to expand the Patient Oriented Research Program and to develop a Surgical Outcomes Unit in the Department. This will be a clinical research unit available for consultation by faculty and outside surgeons to help them develop clinical research projects, analyze data and interpret results. The quality assurance program will run out of this unit.

Finally, our major goal is to raise a 5 to 8 million dollar endowment fund for the Department to help our research, faculty development and to help fund our residents

during their medical school years.

The last 10 years have been exciting for me and for the faculty, residents and students. I am especially proud of the relationship I have had with my mentor, Walter C. Guralnick, and my friend and predecessor, Bruce Donoff. Three generations of chiefs working together is an unusual situation in OMFS. It has been particularly gratifying for me (Figure 15). We hope this enthusiasm is transmitted in this report.

Respectfully submitted,



Leonard B. Kaban, DMD, MD



Figure 15: Three generations of OMFS Service Chiefs: (left) R.B. Donoff, DMD, MD, 1983-1992; (center) L.B. Kaban, DMD, MD, 1994-present; W.C. Guralnick, DMD, 1967-1983.

1994

1. August M, Nguyen M. Evaluation of metastatic neck disease by computed tomography. *Int J Oral Maxillofac Surg* 1994;23:290-293.
2. Donoff RB: Dentists as physicians of the mouth. *JADA Special Issue* 1994; 125:20-25.
3. Dodson TB, Perrott DH, Gongloff R, Kaban LB: HIV Serostatus and the risk of postextraction complications. *Int J Oral Maxillofac Surg* 23:100-103, 1994.
4. Donoff RB: Dentists as physicians of the mouth. *JADA Special Issue* 1994; 125:20-25.
5. Kearns GJ, Perrott DH, Kaban LB, Rigid fixation of mandibular fractures: Does operator experience reduce complications? *J Oral Maxillofac Surg* 52:226-231, March 1994.
6. Perrott DH, Kaban LB: Temporomandibular joint ankylosis in children. *OMFS Clin N Amer*, 6:187-196, February, 1994.
7. Dodson TB, Kaban LB: Diagnosis and management of pediatric facial infections. *OMFS Clin N Amer*, 6:13-20, February, 1994.
8. Kaban LB. Discussion: Effect of Freeze-Dried Poly-L-Lactic-Acid (FDPLLA) Discs Mixed With Bone Morphogenetic Protein on Healing of Rat Skull Defects. *J Oral Maxillofac Surg*, 52:392, 1994.
9. Kaban LB, Treves, S, Pogrel, M.A, Hattner, R.: Skeletal scintigraphy for assessment of mandibular growth and asymmetry, in *Pediatric Nuclear Medicine*, 2nd Edition, Treves, S.T, (Editor), Pringer-Verlag, New York, Chapter 2, 1994.
10. Koury ME, Perrott DH, Kaban LB: The use of rigid internal fixation in mandibular fractures complicated by osteomyelitis. *J Oral & Maxillofac Surg*, 52:1114-1119,1994.
11. Perrott DH, Schmidt B, Dowd C, Kaban LB: Treatment of a high-flow arterio venous malformation by direct puncture coil embolization. *J Oral & maxillofac Surg* 52:1083-1085,1994.
12. Perrott DH, Lu FY, Pogrel MA, Kaban LB: Stability following sagittal split osteotomies: a comparison of three stabilization techniques. *Oral Surg* 78:696-703, 1994.
13. Stern M, Perrott DH, Lu, FY, Kaban LB: Ein Vergleich dreier Osteosyntheseverfahren nach sagittaler Spaltung des Unterkiefers. *Informationen Aus orthodontic & kieferorthopadie* 2, 94:227-232, 1994.

14. Perrott DH, Umeda H, Kaban LB: Costochondral graft construction/reconstruction of the ramus/condyle unit: long-term follow-up. *Int J of Oral & Maxillofac Surg* 23:321- 328; 1994.
15. Keith DA. Overview of severe orofacial sports-related injuries. *J Massachusetts Dent Soc* (43)4:11-13, 1994.
16. Lewanda AF, Cohen MM, Jackson C, Taylor EW, Li X, Beloff M, Day D, Clarren SK, Ortiz R, Garcia C, Hauselman E, Figueroa A, Wulfsberg E, Wilson M, Warman M, Padwa BL, Whiteman DAH, Mulliken JB, Jabs EW. Genetic heterogeneity among craniosynostosis syndromes: mapping the Saethre-Chotzen syndrome locus between D7S513 and D7S516 and exclusion of Jackson-Weiss and Crouzon loci from 7p. *Genomics*. 1994; 19:115-119.

1995

1. Brown E, August M, Pilch B, Weber A. Polycystic disease of the parotid glands. *Am J Neurorad* 1995;16:1128-1131.
2. Wang CC, Kelly J, August M, Donoff B. Early carcinoma of the oral cavity: a conservative approach with radiation therapy. *J Oral Maxillofac Surg* 1995;53:687-690.
3. Todd CR, McBride J, Tsuji T, Donoff RB, Nagai M, Chou MY, Chiang T, Wong DTW: Deleted in oral cancer-1 (doc-1), a novel oral tumor suppressor gene. *FASEB J*. 1995; 9:1368-1370.
4. Donoff RB. Surgical Management of Inferior Alveolar Nerve Injuries (Part I): the case for early repair. *J. Oral. Maxillofac. Surg.* 1995; 53:1327-1329.
5. Donoff RB. Nerve regeneration: basic and applied aspects. *Crit. Rev. Oral Bio. Med.* 1995; 6(1):18-24.
6. Donoff RB. Experimental topical tetracycline-induced neuritis in the rat. *J. Oral Maxillofac. Surg.* 1995; 53:434.
7. Koury M, Perrott DH, Regezi J, Kaban LB: "Atypical" fibro-osseous lesions: diagnostic challenges and treatment concepts. *Int J Oral & Maxillofac Surg* 24:162-169, 1995.
8. Perrott DH, Vargervik K, Kaban LB: Costochondral reconstruction in monkey models. *J Craniofac Surg* 6:227-237,1995.
9. Pogrel MA, Kaban LB: A comparison of single-photon emission computed tomography and planar imaging for quantitative skeletal scintigraphy of the mandibular condyle. *Oral Surg* 80:226-231, 1995.
10. Kearns GJ, Schmidt B, Perrott DH, Kaban LB: Infection following treatment of mandibular fractures in human immunodeficiency virus seropositive patients. *J Oral and Maxillofac Surg*, 53:1134-1139;1995.

11. Kearns GJ, Perrott DH, Kaban LB: A protocol for management of failed temporo mandibular joint alloplastic implants. *J Oral & Maxillofacial Surg*, 53:1240-1247, 1995.

12. Keith DA. Degenerative & Inflammatory Temporomandibular Joint Disorders: Basic Science Perspectives Reaction Paper, *Temporomandibular Disorders and Related Pain Conditions. Progression Pain Research and Management*, Vol 4, (Ed.) BJ Sessle, PS Bryant & RA Dionne, IASP Press, Seattle, pp151-5, 1995.

13. Wilkes JW, Lorente CA, Keith DA. *Oral & Maxillofacial Surgery. Oxford Textbook of Surgery*, Oxford Univ. Press, Oxford UK 1995.

14. Keith DA, Scrivani SJ. Temporomandibular joint implants. *Cranial Base Center Newsletter*, p8, Summer 1995.

15. Keith DA, Levine JD. Temporomandibular Disorders and Related Pain Conditions, *Progress in Pain Research and Management*, Vol 4, Chapter 7&8, IASP Press, Seattle, 1995.

16. Padwa BL, Hayward P, Mulliken JB. Cervicofacial lymphatic malformation: clinical course, surgical intervention, and pathogenesis of skeletal hypertrophy. *Plast Reconstr Surg*. 1995; 93:1123-1133.

17. Horan JE, Padwa BL, LaBrie RA, Mulliken JB. OMENS-Plus: An analysis of craniofacial and extracraniofacial anomalies in hemifacial microsomia. *Cleft Palat-Craniofac J*. 1995; 32:405-412.

18. Frim DM, Padwa BL, Buckley D, Crowell RM, Ogilvy CS. Mandibular subluxation as an adjunct to exposure of the distal internal carotid artery in endarterectomy surgery: Technical note. *J Neurosurg*. 1995; 83:926-928.

1996

1. August M, Gianetti K. Elective neck irradiation versus observation of the clinically negative neck of patients with oral cancer. *J Oral Maxillofac Surg* 1996;54:1050-1055.
2. August M, Wang J, Plante D, Wang CC. Complications associated with therapeutic neck radiation. *J Oral Maxillofac Surg* 1996;54:1409-1415.
3. Li K, Cheney M, Glicklich R, August M, Caradonna D. Fixed mandibular implant after microvascular mandibular reconstruction. *Arch Otolaryngol Head Neck Surg* 1996;122:1308-1312.

4. Yang J, Tyler LW, Donoff RB, Song BZ, Torio AJ, Gallagher GT, Tsuji T, Elovic A, McBride J, Chou MY, Galli SJ, Weller PF, Wong DW: Salivary EGF regulates eosinophil-derived TGF- α expression in hamster oral wounds. *Am. J. Physiol.* 1996; 270 (Gastrointest. Liver Physiol. 33):G191-G202.
5. Donoff RB, Domanowski GF: Case records of Massachusetts General Hospital: Weekly Clinicopathological Exercises: Case 29-1996: A 59-Year-Old Man with Gout and a Painful Preauricular Mass. *New Engl. J. Med.* 1996; Vol.335, 12:876-881.
6. Wong DTW, Todd CR, Tsuji T, Donoff RB: Molecular Biology of Human Oral Cancer. *Crit. Rev. Oral Biol. Med.* 1996; 7(4):319-328.
7. Kaban LB: Discussion - Functional therapy in hemifacial microsomia. *J. Oral & Maxillofac Surg.* 54:279-281, 1996.
8. Kung DS, Kaban LB: Supratarsal fold incision for approach to the superior lateral orbit. *Oral Surg.* 81:522-525, May 1996.
9. Vargervik K, Hoffman W, Kaban LB: Comprehensive surgical and orthodontic management of hemifacial microsomia, in *Facial Clefts and Craniosynostosis: Principles and Management*, Turvey T, Vig K, Fonseca RJ. (Editors), Saunders, Philadelphia, 537-564, 1996.
10. Movassaghi K, Goodman ML, Keith DA: Eosinophilic ulcer of the tongue: a report of five new cases. *Br J Oral & Maxillofac Surg* 34:115-117, 1996.
11. Urban SD, Keith DA, Goodman ML: Hyalinizing clear cell carcinoma: report of a case. *J Oral Path Med* 25:562-564, 1996.
12. Orup, HI, Keith DA, Holmes LB. Subtle effects of anti-epileptic drugs on tooth development. *Teratology* 53:87, 1996.
- 1997**
1. August M, Maginnis P, Dewitt D. Osteosarcoma of the jaws. Factors influencing prognosis. *Int J Oral Maxillofac Surg* 1997;26:198-204.
2. Todd CR, Donoff RB, Wong DTW: The Molecular Biology of Oral Carcinogenesis: Toward a Tumor Progression Model. *J. Oral Maxillofac. Surg.* 1997; 55:613-623.
3. Login GR, Ransil BJ, Meyer M, Truong NT, Donoff RB, McArdle, P.J.: Assessment of Preclinical Problem-Based Learning Versus Lecture-Based Learning. *J. Dent. Ed.* 1997; 61 (6): 473-479.
4. Yang J, Torio A, Donoff RB, Gallagher GT, Egan R, Weller PF, Wong DTW Depletion of Eosinophil Infiltration by Anti-IL-5 Monoclonal Antibody (TRFK-5) Accelerates Open Skin Wound Epithelial Closure. *Am. J. Pathol.* 1997; 151 (3): 813-819.
5. Donoff RB. Recommendations for management of trigeminal nerve defects based on a critical appraisal of the literature. *J. Oral Maxillofac. Surg.* 1997; 55:1387.
6. Guralnick WC. Quo Vadis? *J Am Coll Dent.* 1997 Fall;64(3):6-8.
7. Guralnick WC, Kaban LB. Keeping ether in vogue. The role of Nathan Cooley Keep, M.D, D.M.D. in the history of etherization. *Harv Dent Bull.* 1997 Spring;6(1):8-13.
8. Todd CR, Gallagher GT, Kaban LB: Clinicopathologic Conference: Mass in the Infra temporal Fossa. *Oral Surg.* 84:116-118, August 1997.
9. Padwa, B.L, Denhart, B, Kaban LB: Aneurysmal Bone Cyst-Plus. *J.Oral and Maxillo fac Surg.* 55:1144-1151, October 1997.
10. Huang, Y.L, Pogrel, M.A, Kaban LB: Diagnosis and management of condylar resorption. *J Oral & Maxillofac Surg.* 55:114-119, February, 1997.
11. Padwa, B.L, Kaiser, M.O, Kaban LB: Occlusal cant in the frontal plane as a reflection of facial asymmetry. *J Oral & Maxillofac Surg.* 55:811-816, August 1997.
12. Dodson TB, Kaban LB: Recommendations for management of trigeminal nerve defects based on a critical appraisal of the literature. *J Oral & Maxillofac Surg.* 55:1380- 1386, December 1997.
13. Kearns, G, Vargervik K, Sharma, A, Kaban LB: Use of implants in bone grafted alveolar clefts. *CL Pal/CF J.* 34:520-525, November 1997.
14. Li KK, Ung F, McKenna MJ, Keith DA. Combined middle cranial fossa and preauricular approach to the temporomandibular joint: report of a case. *J Oral Maxillofac Surg* 55:851-852, 1997.
15. Keith DA, Scrivani SJ. Cephalic Neuralgias. In: Conn RB, Borer WZ, Snyder JW (eds.) *Current Diagnosis* p807, WB Saunders, 1997.
16. Keith DA. The Long-Term Unfavorable Result in Temporomandibular Joint Surgery, Chapter 19, pp297-307. In: *Complications in Oral and Maxillofacial Surgery.* Kaban LB, Pogrel MA, Perrott DH (eds.) WB Saunders, Philadelphia, 1997.
17. Keith DA, Scrivani SJ. Diseases of the Temporomandibular Joint - Otolaryngology - Head and Neck Surgery Recertification Study Guide, Robbins KT, Glickman J (eds.) 1997.
18. Wilkes JW, Lorente CA, Keith DA, Buehler J. *Oral & Maxillofacial Surgery.* Oxford Textbook of Surgery, Oxford Univ. Press, 2nd Edition, Oxford UK 1997.
19. Hanson M, Padwa BL, Stieg P, Scott M, Mulliken JB. Synostotic frontal plagiocephaly: Anthropometric comparison of three techniques for surgical correction. *Plast Reconstr Surg.* 1997;100:1387-1395.
- 1998**
1. August M, Bast B, Jackson M, Perrott D. The fixed mandibular implant in oral cancer patients. *J Oral Maxillofac Surg* 1998;56:297-301.
2. Friedlander A, August M. The role of panoramic radiography in determining an increased risk of cervical atheromas in patients treated with therapeutic irradiation. *Oral Surg Oral Med Oral Pathol* 1998;85(3):339-344.
3. August M, Marchena J, Donady J, Kaban L. Neurosensory deficit and functional impairment after sagittal ramus osteotomy: a long-term follow-up study. *J Oral Maxillofac Surg* 1998;56:1231-1235.
4. Tsuji, T, Todd CR, Meyer, C, McBride, J, Liao, P.-H, Huang, M.-F, Chou, M.-Y, Donoff RB, Wong DTW: Reduction of Ornithine Decarboxylase Antizyme (ODC-Az) Level in 7,12-Dimethylbenz(a)Anthracene-Induced Hamster Buccal Pouch Carcinogenesis Model. *Oncogene* 1998; 16: 3379-3385.
5. Urban, S.D, Elovic, A, Todd CR, Gallagher GT, Donoff RB, Wong DTW: alignant Ameloblastoma: Prediction of Metastatic Potential Using In Situ Histone (H3) mRNA Analysis. *Int. J. Oral Bio.* 1998; 23 (2): 75-81.
6. Donoff RB, Todd CR, Elovic, A, Gallagher GT, Chou, M.-Y, and Wong DTW: Prediction of Human Oral Cancer Radiation Responsiveness by Histone (H3) mRNA In Situ Hybridization: A Preliminary Report. *J. Oral Maxillofac. Surg.* 1998; 56: 1410-16.
7. Donoff RB Raising lingual flaps increases the risk of nerve damage. *Evidence-Based Dentistry*, 1998: 14.
8. Kaban LB, Padwa, B.L, Mulliken, J.B.: Surgical correction of mandibular hypoplasia in hemifacial microsomia: The case for treatment in early childhood. *J Oral & Maxillofac Surg.* 56:628-638, February 1998.
9. Pogrel, M.A, McDonald, A.R, Kaban LB: Gore-Tex tubing as a conduit for repair of lingual and inferior alveolar nerve continuity defects: A preliminary report. *J Oral & Maxillofac Surg.* 56:319-321, 1998.

10. Padwa BL, Mulliken JB, Kaban LB, Maghen, A: Longterm results after costochondral construction in type IIB and type III hemifacial microsomia. *J Oral & Maxillofac Surg* 1998;56:122-7.
 11. Marchena, J.M., Padwa, B.L, Kaban LB: Sensory Abnormalities Associated with Mandibular Fractures: Incidence and Natural History. *J Oral & Maxillofac Surg*, 56:822- 825, July 1998.
 12. Ruescher, T.J, Sodeifi, A, Scrivani, S.J, Kaban LB, Sonis, S.T.: The Impact of Muco sitis on Alpha Hemolytic Streptococcal Infections in Patients Undergoing Autologous Bone Marrow Transplantation of Hematologic Malignancies. *Cancer*, 82:2275-2281, June 1998.
 13. Stelnicki, E.J, Vanderwall, K, Harrison, M.R, Longaker, M.T, Kaban LB, Hoffman, W.Y.: The in utero correction of unilateral coronal craniosynostosis. *Plast & Reconstr Surg* 101:287-296, February 1998.
 14. Padwa, B.L, Kearns GJ, Todd CRC, Troulis, M.J, Mulliken, J.B, Kaban LB: Simultaneous maxillary and mandibular distraction osteogenesis with a semiburied device. *Int J Oral & Maxillofac Surg*, 28:2-8, 1998.
 15. Scrivani, S.J, Keith, D.A, Mathews, E.S, Kaban LB: Percutaneous stereotactic differential radiofrequency thermal rhizotomy for the treatment of trigeminal neuralgia. *Int J Oral & Maxillofac Surg*, 57:104-111, 1998.
 16. Eckardt, A, Pogrel, M.A, Kaban LB, Chew, K, Mayall, B.H.: Central giant cell granulomas of the jaws: Nuclear DNA analysis using image cytometry. *Int J Oral & Maxillofac Surg*, 18(1):3-6, 1998.
 17. Thorne, C.H, Kaban LB, Longaker, M.G.: Craniofacial Malformations, in *Current Pediatric Therapy*, Burg, F.D, Ingelfinger, J.R, Wald, E.R, Polin, R.A. (Editors), W.B. Saunders, Philadelphia, 915-917, 1998.
 18. Troulis, M.J, Padwa, B, Kaban LB: Distraction osteogenesis: Past, present, and future. *Facial Plast Surg*, 14(3):205-215, 1998.
 19. Jampol M, Repetto G, Keith D, Curtin H, Remensnyder J, Holmes L. New Syndrome?: Prominent, constricted ears with malformed condyle of the mandible. *Am J Med Gen* 75: 449-452, 1998.
 20. Pennacchio E, Borg-Stein J, Keith DA. The incidence of pain in the muscles of mastication in patients with fibromyalgia. *J Mass Dent Soc* 47,3:8-12, 1998.
 21. Orup HI, Keith DA, Holmes LB. Prenatal anti-convulsant drug exposure: Teratogenic effect on dentition. *J Craniofac Genet Dev Biol* 18:129- 137, 1998.
 22. Scrivani SJ, Keith DA, Kulich R, Mehta N, Maciewicz R. Post-traumatic gustatory neuralgia: a clinical model of trigeminal neuropathic pain. *J Orofacial Pain* 12:287-292, 1998.
- 1999**
1. August M, Faquin W, Ferraro N, Kaban L. Fine needle aspiration biopsy of intraosseous jaw lesions. *J Oral Maxillofac Surg* 1999;57:1282-1286.
 2. Perciaccante V, Dodson TB, Och H. Head, neck and facial injuries as markers of domestic violence in women. *J Oral Maxillofac Surg* 57:760, 1999.
 3. Shintani, S, Matsuo, K, Crohin, C.C, McBride, J, Tsuji, T, Donoff RB, Posner, M, Todd CR, Wong DTW: Intragenic Mutation Analysis of the Human Epidermal Growth Factor Receptor (EGFR) Gene in Malignant Human Oral Keratinocytes. *Can. Res.* 1999; 59: 4142-47.
 4. Donoff RB Ex Vivo Development of a composite human oral mucosal equivalent. *J. Oral Maxillofac. Surg*, 1999; 57:577-578.
 5. Flynn TR, Piecuch JF, Topazian RG. Infections of the oral cavity. In: Oski FA, editor. *Principles and practice of pediatrics*. 3rd edition. Philadelphia: JB Lippincott; 1999. p. 1284-1295.
 6. Guralnick WC. Managing dental care. *J Mass Dent Soc.* 1999 Summer;48(2):10-2.
 7. Kaban LB. Discussion: Temporomandibular Joint Reconstruction in Children Using Costochondral Grafts. *J Oral & Maxillofac Surg*, 57:799-800, 1999.
 8. Stern, M, Longaker, M.T, Adzick, N.S, Kaban LB: Wound healing and regeneration in a fetal cleft lip model, in *Tissue Engineering: Applications in Maxillofacial Surgery and Periodontics*, Lynch, S.E, Genco, R.J, Marx, R.E. (Editors), Quintessence Publishing Co, Inc, Chicago, 55-70, 1999.
 9. Troulis, M.J, Perrott DH, Kaban LB: Endoscopic mandibular osteotomy, and placement and activation of a semiburied distractor. *J Oral & Maxillofac Surg* 14(3):1110-1113, 1999.
 10. Seldin, E.B, Troulis, M.J, Kaban LB: Evaluation of a semiburied fixed-trajectory curvilinear distraction device in an animal model. *J Oral & Maxillofac Surg* 57(12):1442- 1446, 1999.
 11. Kearns GJ, Perrott, D.A, Sharma, A, Schmidt, B, Kaban LB, Vargervik K: The placement of endosseous implants in children and adolescents with hereditary ectodermal dysplasia. *Oral Surg* 88(1):5-10, 1999.
 12. Kaban LB, Mulliken, J.B, Ezekowitz, R.E, Ebb, D, Smith, P.S, Folkman, J.: Anti- angiogenic therapy of a recurrent giant cell tumor of the mandible with interferon alfa- 2A. *Pediatrics* 103(6):1145-1149, 1999.
 13. Steinberg, B, Padwa, B.L, Boyne, P, Kaban LB: State of the art in oral and maxillofacial surgery: treatment of maxillary hypoplasia and anterior palatal and alveolar clefts. *Cl Pal Craniofac J.* 36(4):283, 1999.
 14. August, M, Kaban LB: The aging maxillofacial skeleton, in *The Aging Skeleton*, Glowacki, J. (Editor), Academic Press, Shippensburg, PA, 359-371, 1999.
 15. Goldberg RT, Pachas WN, Keith DA. Relationship between traumatic events in childhood and chronic pain. *Disability and Rehabilitation* 21(1):23-30, 1999.
 16. Scrivani SJ, Chaudry A, Maciewicz RJ, Keith DA. Chronic neurogenic facial pain: lack of response to IV Phentolamine. *J Orofacial Pain* 13:89-96, 1999.
 17. Keith DA. Long-term changes in clinical signs and symptoms and disc position and morphology in patients with non-reducing disc displacement in the temporomandibular joint. Discussion. *J Oral Maxillofac Surg* 57:29-30, 1999.
 18. Keith DA. Summary: Patient-controlled TENS reduces the discomfort of ID nerve block. *Evidence Based Dentistry* 1(2),6, 1999.
 19. Padwa BL, Sonis A, Bagheri S, Mulliken JB. Premaxillary osteotomy: Effect of age on facial growth in children with bilateral cleft lip/palate. *Plast Reconstr Surg*. 1999;104:1261-1269.
 20. Kearns GJ, Padwa BL, Kaban LB. Hemifacial Microsomia: The disease and its surgical management. In: Booth PW, Hausamen JE, Schendel S, eds. *Maxillofacial Surgery*. London: Churchill Livingstone, 1999:917-942.
 21. Nelson LP, Padwa BL, Needleman HL. Dental Trauma. In: Fleisher GR and Ludwig S, eds. *Pediatric Emergency Medicine*. Baltimore: Williams & Wilkins, 4th edition, 1999:1417-1426.
 22. Seldin EB. Biomechanics of mandibular distractor orientation: an animal model analysis. Discussion. *J Oral Maxillofac Surg* 57:963-964, 1999.
 23. Troulis MJ. Discussion: Mandibular lengthening using preprogrammed intraoral tooth-borne distractions devices. *J Oral Maxillofac Surg* 1999;57:1322-1323.

2000

1. August M, Tompach P, Chang Y, Kaban L. Factors influencing long term outcome of mandibular reconstruction. *J Oral Maxillofac Surg* 2000;58:731-737.

2. Louis PJ, Fugler RC, August M. Mixed radiolucent/radiopaque lesion of the maxilla. *J Oral Maxillofacial Surg* 2000;58:86-90.

3. August M, Faquin W, Troulis M, Kaban L. Differentiation of odontogenic keratocysts from non-keratinizing cysts using fine needle aspiration biopsy and cytokeratin-10 staining. *J Oral Maxillofacial Surg* 2000;58:935-940.

4. Reiter ER, Varvares MA, August M, Curtin HD. Mucocele of the infratemporal fossa as an unusual complication of midfacial fractures. *Ann Otol Rhinol Laryngol* 2000;109(5):522-525.

5. August M, Glowacki J, Chung K, Chang Y. Influence of age and estrogen status on implant osseointegration. *J Oral Maxillofac Surg* 2000;59(11):1285-1289.

6. Manus RC, Dodson TB, Miller EJ, Perciaccante VJ. Nutritional status of substance abusers presenting for treatment of mandibular fractures. *J Oral Maxillofac Surg* 58:153, 2000.

7. Lee JT, Dodson TB. The effect of mandibular third molar presence and position on the risk of an angle fracture. *J Oral Maxillofac Surg* 58:394, 2000.

8. Perciaccante VJ, Dodson, TB, Miller EJ, Manus, RC. Substance use, compliance, and nutrition: Risk factors for complications in patients with mandible fractures. *J Craniomaxillofac Traum* 6:26-34, 2000.

9. Dodson TB. Epidemiology of temporomandibular disorders. In: *Oral and Maxillofacial Surgery*, Eds: Bays RA. WB Saunders: Philadelphia, 2000 pp. 93-107.

10. Tompach P, Dodson TB, Kaban LB. Autogenous temporomandibular joint reconstruction. In: *Oral and Maxillofacial Surgery*, Eds: Bays RA. WB Saunders: Philadelphia, PA, 2000 pp. 301-15.

11. Dodson TB, Kaban LB. Special considerations for the pediatric emergency patient. *Emergency Medicine Clinics of North America*. 18:539, 2000.

12. Dodson, TB. Discussion: Complication rates associated with different treatments of mandible fractures. *J Oral Maxillofac Surg* 58: 280, 2000.

13. Dodson TB, Halpern LR. Commentary on "Prophylactic antibiotics reduce infectious complications of orthognathic surgery." *Evidenced-based Dentistry* 2:66, 2000.

14. Dodson TB, Kaban LB. Special considerations for the pediatric emergency patient. *Emergency Med Clin of N America* 18(3):539-548, 2000.

15. Scrivani, S.J, Moses, M, Donoff RB, Kaban LB: Taste Perception After Lingual Nerve Repair. *J. Oral Maxillofac. Surg.* 2000; 58:3-5.

16. Todd CR, Donoff RB, Wong DTW: The Chromosome: Cytogenetic Analysis and Its Clinical Application. *J. Oral Maxillofac. Surg.* 2000; 58: 1034-39.

17. Donoff RB It works in my hands. *Evidence-Based Dentistry*, 2000; 2: 1-2.

18. Flynn TR. Surgical management of orofacial infections. *Atlas of the oral and maxillofacial surgery clinics of North America* 2000;8(Mar):77-100.

19. Flynn TR. The swollen face. *Emergency medicine clinics of North America* 2000;15(Aug):481-519.

20. Flynn TR, guest editor. Oral and maxillofacial infections. *Atlas of the oral and maxillofacial clinics of North America* 2000;8(Mar):1-132.

21. Guralnick WC. History of Harvard/MGH Oral and Maxillofacial Surgery. *J Mass Dent Soc.* 2000 Autumn;49(3):36.

22. Troulis M, J, Glowacki, J, Perrott DH, Kaban LB: Effects of latency and rate one bone formation in a porcine mandibular distraction model. *J Oral & Maxillofac Surg.* 58(5):507-514, 2000.

23. Kearns GJ, Padwa B, Mulliken JB, Kaban LB. Progression of facial asymmetry in hemifacial microsomia. *Plast Reconstr Surg* 2000;105(2):492-8.

24. Troulis MJ, Nahlieli O, Castano F, Kaban LB. Minimally invasive orthognathic surgery: endoscopic vertical ramus osteotomy. *Int J Oral Maxillofac Surg* 29:239-242, 2000.

25. Troulis MJ, Kearns GJ, Perrott DH, Kaban LB. Extended genioplasty: long-term cephalometric, morphometric and sensory results. *Int J Oral Maxillofac Surg* 29:167-175, 2000.

26. Everett PC, Seldin EB, Troulis M, Kaban LB, Kikinis R. A 3-D system for planning and simulating minimally-invasive distraction osteogenesis of the facial skeleton. In: Delp SL, DiGioia AM, Jaramaz B, editors. *MICCAI 2000. Proceedings of the 3rd International Conference on Medical Image Computing and Computer-Assisted Intervention*; 2000 Oct; Pittsburgh, PA. New York: Springer-Verlag; 2000. P. 1029-39.

27. Schmidt BL, Kearns G, Gordon N, Kaban LB. A financial analysis of maxillomandibular fixation versus rigid internal fixation for treatment of mandibular fractures. *J Oral & Maxillofac Surg* 58(11):1206-10, 2000.

28. Keith DA. Spread of actinomyces to the temporal space. *J Oral Maxillofac Surg* Apr 58(4):454, 2000.

29. Kearns GJ, Padwa BL, Mulliken JB, Kaban LB. Progression of facial asymmetry in Hemifacial Microsomia. *Plast Reconstr Surg.* 2000;105:492-498.

30. Seefelder C, Ko JH, Padwa BL. Fiberoptic intubation for massive gingival hyperplasia in juvenile hyaline fibromatosis. *Paediatric Anaesth.* 2000; 10:682-684.

31. Padwa, BL. Distraction osteogenesis. *J Southeast Soc Ped Dent.* 2000; 6:16-18.

32. Seldin EB. An in vitro study of the accuracy of a new protocol for planning distraction osteogenesis of the mandible. Discussion. *J Oral Maxillofac Surg* 58:990-991, 2000.

33. Sikes JW, Ghali GE, Troulis MJ: Expansile intraosseous lesion of the maxilla. *J Oral Maxillofac Surg* 2000;58:1395.

2001

1. August M, Dodson T, Nastri A, Chuang SK. Nasopharyngeal carcinoma: clinical assessment and review of 176 cases. *Oral Surg Oral Med Oral Pathol* 2001;91:205-214.

2. August M. Cerebrovascular and carotid artery disease. *Oral Surg Oral Med Oral Pathol* 2001;92(3):253-256.

3. Chuang SK, Tian L, Wei LJ, Dodson TB. Kaplan-Meier Analysis of Dental Implant Survival: A Strategy for Estimating Survival with Clustered Observations. *Journal of Dental Research* 2001 Nov;80(11): 2016-20.

4. Carey J, Dodson TB, Miller E. Hospital course of HIV-positive patients with odontogenic infections. *Oral Surg Oral Med Oral Pathol* 91:23-7, 2001.

5. Chuang SK, Dodson TB. Evaluation and management of pediatric midface fractures. *Knowledge Update Vol III, American Association of Oral and Maxillofacial Surgery*, pp. Ped 37, 2001.

6. Thurmüller P, Dodson TB, Kaban LB: Nerve injuries associated with facial trauma: Natural history, management, and outcome of treatment. *Oral Maxillofac Clin of N America* 13: 283-93, 2001.

7. Todd CR, Donoff RB, Kim, Y, Wong DTW: From the Chromosome to DNA: Restriction Fragmentation Length Polymorphism Analysis and Its Clinical Application. *J. Oral Maxillofac. Surg.* 2001; 59: 660-67.

8. Alevizos, I, Mahadevappa, M, Zhang, X, Ohyama, H, Kohno, Y, Posner, M, Gallagher, G, Varvares, M, Cohen, D, Kim, D, Kent, R, Donoff RB, Todd CR, Chou, M.-Y, Warrington, J, and Wong DTW: Oral Cancer In Vivo Gene Expression Profiling Assisted by Laser Capture Microdissection and Microarray Analysis. *Oncogene* 2001; 20: 6196-6204.
 9. Donoff RB Commentary on Bertolami article. *J. Dent. Ed.*, 2001; 65 (8): 739-741.
 10. Donoff RB Surgical treatment of inferior alveolar nerve injuries. In *Atlas of the Oral and Maxillofacial Surgery Clinics of North America*, 2001; 9 (2): 23-30.
 11. Guralnick WC. Different views of managed care. *J Oral Maxillofac Surg.* 2001 Oct;59(10):1254.
 12. Troulis MJ, Kaban, LB. Endoscopic approach to the ramus/condyle unit: clinical applications. *J Oral & Maxillofac Surg* 59(5):503-509, 2001.
 13. Castano FJ, Troulis MJ, Glowacki J, Kaban LB, Yates KE. Analysis of masseter myocytes after distraction osteogenesis of the porcine mandible. *J Oral & Maxillofac Surg* 59:302-307, 2001.
 14. Aghabeigi B, Hiranaka D, Keith DA, Kelly JP, Crean SJ. Effect of orthognathic surgery on the temporomandibular joint in patients with anterior open bite. *Int J Adult Orthodont Orthognath Surg* 16(2):153-160, 2001.
 15. Wilkes JW, Lorente CA, Keith DA, Buehler J. *Oral & Maxillofacial Surgery.* Oxford Textbook of Surgery, Oxford Univ. Press, 2nd Ediction, Morris PH, Wood WC (eds), Oxford, UK 2001.
 16. Scrivani SJ, Keith DA. Temporomandibular disorders. *Dentistry Today* 19,7:78-86, 2001.
 17. Keith DA, Shaefer J. Orofacial pain. *Encyclopedia of Neurology*, (ed) N. Katz, 2001.
 18. Keith DA. The case of the 10 AM headache. *Neurology Pain*, 2001.
 19. Maruko E, Hayes C, Evans CA, Padwa BL, Mulliken JB. Hypodontia in hemifacial microsomia. *Cleft Palate Craniofac J.* 2001; 38:15-9.
 20. Padwa BL, Mulliken JB. Facial infiltrating lipomatosis. *Plast Reconstr Surg.* 2001; 108:1544-1554.
 21. Seldin EB. Mandibular distraction force: laboratory data and clinical correlation. Discussion. *J Oral Maxillofac Surg* 59: 544-545, 2001.
 22. Shaefer J, Jackson D, Schiffman E, Anderson Q. Pressure Pain Thresholds and MRI Effusions in TMJ Arthralgia, *J Dent Res* 2001;80(10):1935-1938.
 23. Troulis MJ. Discussion: Influence of distraction rates on the temporomandibular joint and cartilage morphology in a rabbit model of mandibular lengthening. *J Oral Maxillofac Surg* 2001;59:1460.
 24. Troulis MJ, Kaban LB: Maxillofacial applications of distraction osteogenesis. *Oral and Maxillofacial Surgery Knowledge Update.* 2001, Volume 3pp 85-92.
- 2002**
1. August M. Stability of dental implants in microvascular osseous transplants--Discussion. *Plast Reconstr Surg* 2002;109(3):922-924.
 2. Kaban LB, Troulis MJ, Ebb D, August MA, Hornicek F, Dodson TB. Antiangiogenic therapy with interferon-alpha for giant cell lesions of the jaws. *J Oral Maxillofac Surg* 2002;60:1103-1111.
 3. Vehemente VA, Chuang SK, Daher S, Muftu A, Dodson TB. Risk factors Affecting Dental Implant Survival. *Journal of Oral Implantology* 2002; 28(2): 74-81.
 4. Chuang SK, Wei LJ, Douglass CW, Dodson TB. Risk Factors for Dental Implant Failure: A Strategy for the Analysis of Clustered Failure Time Observations. *Journal of Dental Research* 2002 Aug;81(8): 572-577.
 5. Chuang SK, Tian L, Wei LJ, Dodson TB. Predicting Dental Implant Survival by Use of Marginal Approach of the Semi-Parametric Survival Methods for Clustered Observations. *Journal of Dental Research* 2002 Dec; 81(12): 851-855.
 6. Dodson TB. Strategies for managing anticoagulated patients requiring dental extractions: An exercise in evidenced-based clinical practice. *J Massachusetts Dental Society* 50:44, 2002.
 7. Dodson TB. Strategies for managing anticoagulated patients requiring dental extractions: An exercise in evidenced-based clinical practice. *Evidence-based Dentistry* 3:23, 2002.
 8. Fuselier JC, Ellis, EE, Dodson TB. Do mandibular third molars alter the risk of angle fracture. *J Oral Maxillofac Surgery* 60:514-518,2002.
 9. Dodson TB. Hematologic disorders. Eds. Bennett, J. WB Saunders: Philadelphia, 2002, pp, 389-408.
 10. Dodson TB. Commentary on "Can warfarin be continued during dental extraction? Results of a randomized controlled trial." *Evidence-based Dentistry* 3:100-1, 2002.
 11. Yong, K, Flynn, T.R, Donoff RB, Wong DTW, Todd CR: The Gene: The Polymerase Chain Reaction and Its Clinical Application. *J. Oral Maxillofac. Surg.* 2002; 60: 808-815.
 12. Yong, K, Donoff RB, Wong DTW, Todd CR: The Nucleotide: DNA Sequencing and Its Clinical Application. *J. Oral Maxillofac. Surg.* 2002; 60: 924-930.
 13. Kohno, Y, Patel, V, Kim, Y, Tsuji, T, Chin, B.R, Sun, M, Donoff RB, Kent, R, Wong DTW, Todd CR: Apoptosis, Proliferation and p12(doc-1) Profiles in Normal, Dysplastic and Malignant Squamous Epithelium of the Syrian Hamster Cheek Pouch Model. *Oral Oncol.* 2002 Apr; 38(3): 274-80.
 14. Donoff RB The Gies Report and Research. *J. Am. Coll. Dent.*, 2002; 69 (2): 22-25.
 15. Flynn TR. Update on the antibiotic therapy of oral and maxillofacial infections. In: Piecuch JF, editor. *Oral and maxillofacial surgery knowledge update 2002.* Rosemont, IL: American Association of Oral and Maxillofacial Surgeons; 2002.
 16. Flynn TR. The timing of incision and drainage. In: Piecuch JF, editor. *Oral and maxillofacial surgery knowledge update 2002.* Rosemont, IL: American Association of Oral and Maxillofacial Surgeons; 2002.
 17. Flynn TR. Anatomy of Oral and Maxillofacial Infections. In: Topazian RG, Goldberg MH, Hupp JR, editors. *Oral and Maxillofacial Infections.* 4th edition. Philadelphia: WB Saunders Company; 2002. p. 188-213.
 18. Bennett JD, Flynn TR. Anesthetic Considerations in Orofacial Infections. In: Topazian RG, Goldberg MH, Hupp JR, editors. *Oral and Maxillofacial Infections.* 4th edition. Philadelphia: WB Saunders Company; 2002. p. 439-455.
 19. Yates KE, Troulis MJ, Kaban LB, Glowacki J. IGF-1, TGF- α , and BMP-4 are expressed during distraction osteogenesis of the pig mandible. *Int J Oral Maxillofac Surg* 31(2): 173-178, 2002.
 20. Thurmüller P, Troulis MJ, O'Neil MJ, Kaban LB. Use of ultrasound to assess healing of a mandibular distraction wound. *J Oral & Maxillofac Surg* 60:1038-1044, 2002.
 21. Kaban LB. Biomedical Technology Revolution: Opportunities and Challenges for Oral & Maxillofacial Surgeons. *Int J Oral Maxillofac Surg* 31:1-12, 2002.
 22. Levine M, Yates K, Kaban LB. Nerve growth factor is expressed in rat femoral vein. *J Oral & Maxillofac Surg* 60:739-744, 2002.

23. St John D, Mulliken JB, Kaban LB, Padwa BL. Anthropometric analysis of mandibular asymmetry in infants with deformational posterior plagiocephaly. *J Oral & Maxillofac Surg* 60(8):873-877, 2002.
 24. Troulis MJ, Everett P, Seldin EB, Kikinis R, Kaban LB. Three-dimensional treatment planning system based on computed tomographic data. *Int J Oral Maxillofac Surg* 31:349-357, 2002.
 25. Thurmüller P, Troulis MJ, Rosenberg A, Kaban LB. Changes in the condyle and disk in response to distraction osteogenesis of the minipig mandible. *J Oral & Maxillofac Surg* 60:1327-1333, 2002.
 26. Padwa BL, Zaragoza S, Sonis A. Proximal segment displacement in mandibular distraction osteogenesis. *J Craniofac Surg*. 2002; 13:293-296.
 27. Wong GB, Padwa BL. LeFort I Soft tissue distraction: A hybrid technique. *J Craniofac Surg*. 2002; 13:572-576.
 28. Pheling J, Schiffman E, Looke J, Shaefer J, Lenton P, Friction J. Interexaminer Reliability and Clinical Validity of the Temporomandibular Index: A New Outcome Measure for Temporomandibular Disorders: The Temporomandibular Index. *J of Orofacial Pain* 2002;16(4):296-304.
 29. Troulis MJ. Discussion: Does position and soft tissue affect distraction vector? An in vitro investigation. Denman and Haug. *J Oral Maxillofac Surg* 2002;60(2):155-156.
- 2003**
1. Blaeser B, August M, Kaban LB, Donoff RB, Dodson TB. Radiographic risk factors for inferior alveolar nerve injury during third molar extraction. *J Oral Maxillofac Surg* 2003; 61:417-421.
 2. August M, Faquin W, Troulis M, Kaban L. Clear cell odontogenic carcinoma. Evaluation of reported cases. *J Oral Maxillofac Surg* 2003; 61:580-586.
 3. August M, Faquin W, Troulis M, Kaban L. Dedifferentiation of odontogenic keratocyst epithelium after decompression. *J Oral Maxillofac Surg* 2003; 61:678-683.
 4. Halpern LR, Carter JB, Chuang SK, Dodson TB. A comparison of 2 consultation and treatment strategies to manage impacted third molars. *Journal of Oral and Maxillofacial Surgery* 2003 Jul;61(7): 779-84.
 5. McDermott NE, Chuang SK, Woo VV, Dodson TB. Complications of Dental Implants: Identification, Frequency and Associated Risk Factors. *International Journal of Oral and Maxillofacial Implants* 2003 Nov-Dec;18(6): 848-55.
 6. Lam NP, Kaban LB, Donoff RB, Dodson TB. Patient satisfaction after trigeminal nerve repair. *Oral Surg Oral Med Oral Pathol* 95:538-43, 2003.
 7. Perrott DH, Yuen J, Andresen R, Dodson TB. Office-based Ambulatory Anesthesia: An overview of the clinical practice of oral and maxillofacial surgeons in the United States. *J Oral Maxillofac Surg* 61:983-95, 2003.
 8. Bui CH, Seldin EB, Dodson TB. Types, frequencies, and risk factors for complications following third molar extraction. *J Oral Maxillofac Surg* 61:1379-89, 2003.
 9. Ardekian L, Dodson TB. Complications associated with the placement of dental implants. *Oral Maxillofac Clin North Am* 15:243-51, 2003.
 10. Kaban LB, Dodson TB. Commentary on "Calcitonin therapy for central giant cell granuloma." *J Oral Maxillofac Surg* 61:653-4, 2003.
 11. Wrzosek, M, Warner, G, Donoff RB, Howell, T.H, and Karimbux, N.: A Survey of Information Technology Management at U.S. Dental Schools. *J. Dent.* Ed. 2003; 67 (10); 1095-1106.
 12. Flynn TR, Halpern LR. Antibiotic selection in head and neck infections. *Oral Maxillofac Surg Clin N Am* 2003;15 (Feb):17-38.
 13. Lin GC, Qiu WL, Lu CY, Guo YQ, Cao Y, Guralnick WC, Hsich CC, Albert T, Wood WC, Everts E. Long term follow-up results of Chinese prescription "Shen Yang" in the combined and sequential treatment of oral squamous cell carcinoma. *Shanghai Kou Qiang Yi Xue*. 2003 Oct;12(5):321-3. Chinese.
 14. Feldman S, An G, Halpern LR: The importance of medical history risk assessment when applying dental therapeutics to the geriatric patient. *J Mass Dent Soc* 2003;52(1):14-21.
 15. Troulis MJ, Kaban LB. Complications of mandibular distraction osteogenesis. *Oral & Maxillofac Surg Clin N America* 15:251-264, 2003.
 16. Kaban LB, Thurmüller P, Troulis MJ, Glowacki J, Wahl D, Linke B, Rahn B, Perrott DH. Correlation of biomechanical stiffness with plain radiographic and ultrasound data in an experimental mandibular distraction wound. *Int J Oral Maxillofac Surg* 32(3):296-304, 2003.
 17. Abukawa H, Terau H, Kaban LB, Hannouch D, Tevoda S, Vacanti J, Troulis MJ: Formation of ramus/condyle unit by tissue engineering. *J Oral Maxillofac Surg* 61(1):94-100, 2003.
 18. Kaban LB, Dodson TB. Discussion: Calcitonin therapy for central giant cell granuloma. *J Oral Maxillofac Surg* 61(6):653-654, 2003.
 19. Perrott DH, Rahn B, Wahl D, Linke B, Thurmüller P, Troulis MJ, Glowacki J, Kaban LB. Development of a mechanical testing system for a mandibular distraction wound. *Int J Oral Maxillofac Surg* 32:523-527, 2003.
 20. Troulis MJ, Coppe C, O'Neill MJ, Kaban LB. Ultrasound: Assessment of the distraction osteogenesis wound in patients undergoing mandibular lengthening. *J Oral Maxillofac Surg* 61:1144-1149, 2003.
 21. Orup HI, Holmes LB, Keith DA, Coull BA. Craniofacial skeletal deviations following in utero exposure to the anticonvulsant phenytoin: monotherapy and polytherapy. *Orthod Craniofac Res* 6:2-19, 2003.
 22. Keith DA. Complications of temporomandibular joint surgery. *Oral Maxillofac Clin N Amer*, 15:187-194, 2003.
 23. Keith DA, Shaefer J. Temporomandibular disorders. *Enc Neurolog Sciences* 4: April, 2003.
 24. Keith DA, Shaefer J. Facial Pain. *Enc Neurolog Sciences*:2: May, 2003.
 25. Keith DA. Orofacial Pain, Chapter 26. *Principle and Practice of Pain Medicine*, 2nd Edition. Warfield CA, Bajwa ZH (eds) (in press), 2003.
 26. DaSilva A, Shaefer J, Keith DA. The temporomandibular joint: clinical and surgical aspects. *Neuroimag Clin N Am* 13:573-582, 2003.
 27. Mulliken JB, Burvin R, Padwa BL. Binderoid complete cleft lip/palate. *Plast Reconstr Surg*. 2003; 111:1000-1010.
 28. Mulliken JB, Wu J, Padwa BL. Repair of bilateral cleft lip: Review, revisions and reflections. *J Craniofac Surg*. 2003; 14:609-620.
 29. Padwa BL, Mulliken JB. Complications Associated with Cleft Lip and Palate Repair. *Oral Maxillofac Surg Clin N Amer*. Philadelphia: WB Saunders; 2003. 15:2, 285-296.
 30. Padwa BL, Sonis ST. Oral and Maxillofacial Surgery. In: Sonis ST, editor. *Dental Secrets*, 3rd Edition. Philadelphia: Hanley & Belfus; 2003. 207-231.
 31. Caruso PA, Harris GJ, Padwa BL. CT Imaging of Craniofacial Malformations. In: AL Weber, editor. *Imaging of the Mandible, Maxilla, and Pharynx*. Neuroimag Clin N Amer. Philadelphia: WB Saunders; 2003; 13:3,541-572.
 32. Troulis MJ: Discussion: Effects of latency period in mandibular distraction osteogenesis. *Int J Oral Maxillofac Surg* 2003, 32:63.

2004

1. Woo VV, Chuang SK, Muftu A, Daher S, Dodson TB. Dentoalveolar Reconstructive Procedures as a Risk Factor for Implant Failure. *Journal of Oral and Maxillofacial Surgery* 2004 Jul; 62(7):773-80.
2. Dodson TB, Guralnick WC, Donoff RB, Kaban LB. Massachusetts General Hospital/Harvard Medical School MD Oral and Maxillofacial Surgery Program: A 30-year review. *J Oral Maxillofac Surgery* 62:62-65, 2004.
3. Dodson TB, Caruso PA, Nielsen GP. Case records of the Massachusetts General Hospital. Case 2-2004: A 32-year old man with pain and swelling of the jaw. *New Engl J Med* 350:267-75. 2004.
4. Halpern LR, Kaban LB, Dodson TB. Perioperative neurosensory changes associated with treatment of mandibular fractures. *J Oral and Maxillofac Surgery* 2004 62:576-581).
5. Dodson TB. Management of 3rd molar extraction sites to prevent periodontal defects. *J Oral Maxillofac Surg* 62:1213-1224, 2004.
6. Halmos DR. Ellis E 3rd, Dodson TB. Mandibular third molars and angle fractures. *J Oral Maxillofac Surg* 62(9):1076-81, 2004.
7. Dodson TB, Kaban LB. Pediatric Maxillofacial Infections. In: *Pediatric Oral and Maxillofacial Surgery*, 2nd edition. Eds. Kaban LB, Troulis MJ. Philadelphia: Saunders; 2004. pp 171-84.
8. Hammoudeh J, Kaban LB, Dodson TB. Evaluation and acute management of maxillofacial trauma. In: *MGH Manual of Trauma*. Ed: Sheridan R. Lippincott, Williams and Wilkins: New York, 239-57, 2004.
9. Simos C, Flynn TR, Piecuch JF, Topazian RG. Infections of the oral cavity. In: Feigin RD, Cherry JD, editors. *Textbook of pediatric infectious diseases*. 5th edition. Philadelphia: Saunders; 2004. p. 147-161.
10. Glowacki J, Shusterman EM, Troulis MJ, Homes R, Perrott D, Kaban LB. Distraction Osteogenesis of the Porcine Mandible: Histomorphometric Evaluation of Bone Formation. *Plast Reconstr Surg* 113(2): 566-573, 2004 .
11. Troulis MJ, Williams WB, Kaban LB: Staged protocol for resection, skeletal reconstruction and oral rehabilitation of children with mandible tumors. *J Oral Maxillofac Surg* 62:335-343, 2004.
12. Troulis MJ, Kaban LB. Endoscopic vertical ramus osteotomy: Early clinical results. *J Oral Maxillofac Surg* 62:824-828, 2004.
13. Troulis MJ, Williams WB, Kaban LB: Endoscopic mandibular condylectomy and reconstruction: Early clinical results. *J Oral Maxillofac Surg* 62:460-465, 2004.
14. Abukawa H, Shin M, Williams WB, Vacanti JP, Kaban LB, Troulis MJ. Reconstruction of mandibular defects with autologous tissue engineered bone. *J Oral Maxillofac Surg* 2004;62:601-606.
15. Zimmermann CE, Harris G, Thurmüller P, Troulis MJ, Perrott DH, Rahn B, Kaban LB. Assessment of bone formation in a porcine mandibular distraction wound by computed tomography. *Int J Oral Maxillofac Surg* 2004;33:569-574.
16. Zimmermann CE, Troulis MJ, Kaban LB. Diagnosis and management of facial fractures in children. In: Thaller SR, McDonald WS, editors. *Facial trauma*. New York: Marcel Dekker; 2004. p. 415-437.
17. Wong GB, Nargoizian C, Padwa BL. Anesthetic concerns of external maxillary distraction osteogenesis. *J Craniofac Surg*. 2004; 15:78-81.
18. Werler MM, Sheehan JE, Hayes C, Padwa BL, Mitchell AA, Mulliken JB. Demographic and reproductive factors associated with hemifacial microsomia. *Cleft Palate Craniofac J*. 2004; 41:494-50.
19. Padwa BL. Orthognathic Surgery in the Growing Child. In: Kaban LB, Troulis MJ, eds. *Pediatric Oral and Maxillofacial Surgery*. W.B. Saunders, 2nd edition, 2004:377-399.
20. Padwa BL, Mulliken JB. Sequential Management of the Child with Cleft Lip and Palate. In: Kaban LB, Troulis MJ, eds. *Pediatric Oral and Maxillofacial Surgery*. W.B. Saunders, 2nd edition, 2004:410-422
21. Shaefer J. Facial Pain in Children In: Kaban LB, Troulis MJ, editors. *Pediatric Oral And Maxillofacial Surgery*. Philadelphia: Saunders; 2004, pp. 286-299.
22. Nakagawa K, Abukawa H, Shin MY, Terai H, Troulis MJ, Vacanti JP: Osteoclastogenesis on tissue-engineered bone. *Tissue Eng* 2004;10(1):93-100.
23. Troulis MJ. Endoscopic open reduction and internal rigid fixation of subcondylar fractures. *J Oral Maxillofac Surg* 2004;33:569-574.
24. Kaban LB, Troulis MJ, editors. *Pediatric Oral and Maxillofacial Surgery*. Philadelphia: Saunders; 2004.



A HARVARD MEDICAL SCHOOL
TEACHING AFFILIATE



MASSACHUSETTS
GENERAL HOSPITAL

**Department of Oral and
Maxillofacial Surgery**

Warren 1201

55 Fruit Street

Boston, MA 02114