

Research Subjects

Research Area	
Molecular Cell Biology and Oral Anatomy	<ul style="list-style-type: none"> • Molecular mechanism of osteoclast differentiation and activation • Specific regulation of pathological bone destruction • Human mesenchymal stem cell-based translational research in regenerative medicine and dental medicine • Function of mesenchymal stem cells in bone and mineral metabolism
Molecular and Cellular Biochemistry	<ul style="list-style-type: none"> • Analysis of the functional interaction among bone, gut and energy metabolism with a special reference to gender difference • The regulatory mechanism of NF-κB activity in organ development and its function
Aging Science and Pharmacology	<ul style="list-style-type: none"> • Studies on type 3 Diabetes and Alzheimer's Disease • Impact of chronic systemic inflammation on brain functions (especially focus on microglia) • Pathophysiological roles of cathepsins in inflammation
Oral Neuroscience	<ul style="list-style-type: none"> • Understanding of molecular mechanisms of taste signaling associated with various diseases (e.g. taste disorders, metabolic syndromes) and development of therapeutic methods for the diseases • Taste organ regeneration and functional analysis of taste related molecules by using new 3 dimensional organ culture system (organoid) • Analysis of taste signaling serving for different functions in multiple organs • Analysis of regulation of food intake and energy homeostasis via taste signaling in oral-brain-gut axis
Oral, Brain and Total Health Science	<ul style="list-style-type: none"> • Studies on predisposition to non-communicable diseases regulated by environmental factors and epigenomic memory • Studies on molecular basis of biological defense system regulation mediated by protease reaction • Studies on the sex differences in energy metabolism and cognitive function

Preventive and Public Health Dentistry	<ul style="list-style-type: none"> • Molecular epidemiology on relationship between oral microbiome and oral and systemic health • Epidemiology on relationship between oral and systemic health • Clinical study of relationship between oral function and systemic health • Development of preventive measures of oral diseases utilizing molecular biology
Pediatric Dentistry and Special Need Dentistry	<ul style="list-style-type: none"> • Translational research of applying primary tooth to regenerative medicine • Study of the energy metabolism on craniofacial growth and development • Molecular analysis of mitochondrial function during dento-craniofacial morphogenesis and development • Genetic analysis of congenital anomaly of craniofacial complex in children and special need children
Orthodontics and Dentofacial Orthopedics	<ul style="list-style-type: none"> • Profiling of microRNAs in embryonic craniofacial development • Analysis for the molecular mechanisms of tooth development • Molecular mechanism of the mechanical stress response during chondrogenesis and osteogenesis • Molecular and developmental biological analysis of the craniofacial region • Finite element analysis and biomechanics • An approach to evaluating the physiological and biochemical functions in masticatory muscle fatigue • Improvement of Quality of Life through orthodontic treatment for patients with malocclusion
Biomaterials	<ul style="list-style-type: none"> • Fabrication of carbonate apatite bone replacement • Development of three-dimensional interconnected bone replacement • Development of osteoconductive polymer • Development of high performance apatite cement • Analysis of the mechanism of osteoconductivity

Endodontology and Operative Dentistry	<ul style="list-style-type: none"> • Studies on identification of factors and scaffolds indispensable for periodontal ligament tissue regeneration • Studies on the induction of periodontal ligament stem cells derived from iPS cells • Development of novel pulp capping materials • Identification of principal molecules in microbes responsible for development of refractory endodontic diseases. • Studies on the aging of dental pulp cells
Periodontology	<ul style="list-style-type: none"> • Studies on the development of new assessment and diagnostic tool for periodontal diseases • Studies on etiology and bio-regulatory mechanisms of periodontal disease • Studies on biological periodontal tissue regeneration • Basic and clinical studies on the interaction between periodontal disease and systemic disease • Studies on the mechanism of development of low-grade inflammation caused by periodontal disease, and its influence on other tissues • Studies on the pathogenesis of unique periodontal disease such as drug-induced gingival overgrowth • Clinical studies on supportive periodontal therapy
Fixed Prosthodontics	<ul style="list-style-type: none"> • Studies on esthetic prosthesis • Studies on tooth regenerative therapy • Development of inhibitors to alveolar bone resorption • Analysis of pathogenic mechanisms in peri-implant mucositis and peri-implantitis • Development of dental implant navigation system using an infrared camera • Clinical and physiological study on maxillofacial rehabilitation
Implant and Rehabilitative Dentistry	<ul style="list-style-type: none"> • Development of biomaterials for prosthodontic treatment • Mechanobiology of dental implant and prosthodontics • Studies on bone regeneration therapy • Development of evaluation system for stomatognathic function • Development of evaluation system and treatment of bruxism

	<ul style="list-style-type: none"> • Epidemiological and physiological study on oral rehabilitation using removable dentures • Epidemiological and biomechanical study on oral rehabilitation using implants • Establishment of diagnosis and treatment system for temporomandibular disorders • Development of the treatment for patients with complaints related to occlusion • Mechanism of chronic masticatory muscles pain
Oral Pathology	<ul style="list-style-type: none"> • Molecular and genetic investigation on the development and regeneration of the tooth and periodontal tissues for regenerative therapy • Cellular and molecular biology of oral cancer • Investigation of a common mechanism of developmental formation and tumor formation
Oral and Maxillofacial Radiology	<ul style="list-style-type: none"> • Study on quantitative diagnosis • Computer-assisted diagnosis using dental images • Studies on direct digital introral imaging system • Analysis on patient radiation dose in dental radiography • Diagnostic image analysis for oral cancer • Image analysis on oral cancers • Studies on radiotherapy for oral cancers • Radiological analysis of cervical lymph node metastasis of malignant tumors • Image analysis on the structure and pathology of salivary glands • Application of ultrasonography to dentistry • Image analysis on the structure and pathology of the masticator muscles and related structures • Application of “interventional radiology” to dentistry • Development of the training system for dental radiography using virtual reality technique
Oral and Maxillofacial Surgery	<ul style="list-style-type: none"> • Accurate 3 dimensional measurement on cleft lip and palate / jaw deformity • Development of surgical simulation / navigation system • A study on bone regeneration and compatible biomaterials

	<ul style="list-style-type: none"> • Development of artificial temporo-mandibular joint • Development of new treatment method in cleft lip and palate • Development and evaluation of treatments in jaw deformity • Molecularly targeted therapy for oral cancer • A study on the mechanism of invasion and metastasis of oral cancer • Molecular mechanisms of salivary gland development and regeneration • Immunological studies on the pathogenesis of oral mucosal diseases • Immunological studies on the pathogenesis of Sjögren's syndrome • Experimental study on bone regeneration in jaw
Oral and Maxillofacial Oncology	<ul style="list-style-type: none"> • Development of the novel treatment for oral cancer • Studies on morphological and functional reconstruction after the surgery of oral cancer • Studies on host defense mechanism against oral cancer • Studies on the oncogenes of oral cancer • Studies on the mechanism of invasion and metastasis of oral cancer • Studies on the mechanism of the escape from immune surveillance by tumor-associated macrophages of oral cancer • Studies on relationship between oral bacterial flora and treatment of oral cancer • Studies on dysphagia after treatment of oral cancer (evaluation and rehabilitation) • Immunological studies on the pathogenesis of oral mucosal diseases • Analysis of the cell differentiation and intracellular transduction of oral epithelial cells • Immunological studies on the pathogenesis of Sjögren's syndrome • Immunological studies on the pathogenesis of IgG4-related disease • Studies on expanded T and B cells for IgG4-RD and other human autoimmune disease -Joint International Research-

	<ul style="list-style-type: none"> • Studies on the treatment of odontogenic tumors • Biological and cytological studies of odontogenic tumors • Studies on the orthognathic surgery for jaw deformities • Clinical studies on the preventive treatment of anti-resorptive agents related osteonecrosis of the jaw • Studies on the pathogenesis and treatment of cleft lip and or palate
Dental Anesthesiology	<ul style="list-style-type: none"> • Studies on nutrition and metabolism during perioperative period • Studies on cuff pressure of tracheal tube • Studies on life support for dental emergency • Effects of general anesthetics on the ion channels of central neurons • Studies on the general anesthetic drugs and hearts (circulation) effects on central nerve system • Studies on Combination of drugs for intravenous sedation • Studies on clinical pharmacokinetics of aspirin • Studies on electroencephalogram during general anesthesia • Studies on depth of tracheal tube during general anesthesia
Geriatric Dentistry and Perioperative Medicine	<ul style="list-style-type: none"> • Studies on the relationship among oral function, systemic disease, and nutrition • Studies on oral management of patients with systemic disease • Studies on oral function management for long healthy lives • Studies on the development of regenerative dental medicine for super-aged society
Interdisciplinary Dentistry	<ul style="list-style-type: none"> • Studies on oral tissue regeneration using stem cell populations and/or stem cell-inducing factors • Studies on oral care for the perioperative patients • Studies on the improvement of oral function for ADL elevation of the aged. • Studies on etiology and bacteria of periodontal disease • Development of novel training programs and evaluation systems for dental trainees • Research on mental health status of dental trainees