

ADA Science and Research Institute LLC

Kessler, Brett, 2023, Colorado, Chair
 Armstrong, Craig, 2023, Texas
 Cohlma, Raymond, ADA Executive Director
 Dolan, Teresa (Terri), Chief Dental Officer, Overjet, Massachusetts
 Featherstone, John, Professor Emeritus and Dean Emeritus, University of California-San Francisco School of Dentistry
 Geisinger, Maria (Mia), Professor and Program Director in Periodontology, University of Alabama at Birmingham School of Dentistry
 Klein, Ophir, Executive Director, Cedar-Sinai Guerin Children's, California
 Mascarenhas, AnaKarina, Associate Dean of Research, Texas Tech University Health Sciences Center El Paso
 Somerman, Martha, Field Chief Editor, Frontiers in Dental Medicine, Maryland
 Winston, Leslie, Vice President Global Health Care, Procter & Gamble, Ohio

Araujo, Marcelo, Chief Executive Officer
 Lyznicki, James, Director, Science Governance

Areas of Responsibility as Set Forth in the Bylaws or Governance and Organizational Manual of the American Dental Association

In October 2019, the ADA Board of Trustees (BOT) created a new wholly owned ADA subsidiary, in the form of a single member limited liability company, called the ADA Science and Research Institute LLC (ADASRI). Similar to its other ADA subsidiaries, the ADA is the sole member of the LLC, and controls ADASRI Board elections and removals, as well as approvals and amendments to the ADASRI *Operating Agreement*. As an ADA subsidiary, the BOT deemed that ADASRI allowed greater flexibility for science and scientific research activities, staffing, and resources than could be provided under the existing or alternative organizational structures.

The objective of the BOT in creating the ADASRI was to provide for centralized, coordinated leadership of all ADA science and research activities. This was accomplished by combining the operations of the research laboratories, based in Maryland (the former Volpe Research Center) and the ADA Science Institute (based in Chicago) to allow for a renewed focus on the creation and translation of scientific knowledge and the development of new dental products and technology, and the enhancement of clinical care outcomes through scientific research, innovation, and collaboration.

ADASRI Core Functions. In May 2021, the ADASRI Board of Directors approved the following core functions of ADASRI:

1. Operate as an independent Center of Excellence through original research and the translation and dissemination of scientific knowledge to improve oral health outcomes and advance the dental profession:
 - A. Conduct innovative scientific research, focused on select high priority oral health topics;
 - B. Maximize the ability to develop patents through innovative scientific research;
 - C. Apply for and receive government and private sector funding to support basic, applied, and translational scientific research;
 - D. Work with government agencies, universities, industry and other groups on scientific research programs and activities; and
 - E. Provide a mechanism to build a designated science and research reserve fund for investment in future projects/capital.

2. Provide support and expert advice to the ADA on science and research matters, according to the specifications in the ADA/ADASRI Services Agreement:
 - A. Provide scientific expertise to ADA for achieving public health goals and objectives specified in the ADA Strategic Plan; and
 - B. Provide infrastructure and capacity to support the operations of the ADA Council on Scientific Affairs (CSA) to ensure the optimal conduct of the Council's assigned duties and responsibilities.

Advancing ADA Strategic Goals and Objectives: Agency Programs, Projects, Results and Success Measures

[This section presents ADASRI key accomplishments and outcomes from May 2021 to May 2022.]

ADASRI serves as the primary contact for scientific support for the ADA to ensure alignment with its strategic plan, *Common Ground 2025*. Specifically, ADASRI staff support the following objective in the ADA Strategic Plan:

Objective 9: The ADA will be the preeminent driver of trusted oral health information for the public and profession.

Outcome: The leadership role of the ADASRI in supporting the ADA strategic plan, specifically the Public goal, is a key focus of ADASRI. "Science and evidence based" is a core value of the ADA and ADASRI continues to show commitment to the science-related tasks presented by the parent organization. As the ADA chief science officer and ADASRI Chief Executive Officer (CEO), Dr. Marcelo Araujo plays an important role as a member of the senior staff executive team aiming to establish the strategy that allows the ADA meet the goals for the strategic plan. More specifically, he is a key contributor to the group focused on the Public Goal in partnership with the Government Affairs team and the Dental Practice and Health Policy Institute leaders for:

- Providing scientific support for the overall advocacy, education and policy development plan of the ADA.
- Providing scientific support through the development of science-based resources for the ADA in accordance with the ADA/ADASRI Intercompany Services Agreement; and
- Leading the recognition of advancements made to the profession and/or public through execution of sponsored science and research award programs

In addition, ADASRI provided staff expertise and effort to:

- **Support the Council on Scientific Affairs (CSA).** ADASRI staff continue to focus on specific deliverables for the CSA including policy development, the ADA Seal of Acceptance program, scientific support for dental standards development, and the ADA Clinical Evaluators (ACE) Panel program. In the past year, ADASRI staff provided ongoing and active participation in the development of ANSI/ADA and ISO standards, including technical reports to address the cleanliness of dental instruments and on laboratory methods for assessing the safety of orthodontic aligner materials. The ADA Seal of Acceptance Program contributes considerable non-dues revenue for the ADA and continues to help dentists and consumers distinguish safe and effective products from unproven trends. Please refer to the CSA's Annual Report for more information on these programs.
- **Sustain ADA Scientific Collaborations.** Dr. Araujo continues to play a pivotal and involved role in working with US-based and international organizations, such as the American Association for Oral, Dental, and Craniofacial Research (AAODCR), International Association for Dental Research (IADR), World Health Organization (WHO), National Institute for Dental and Craniofacial Research (NIDCR), Centers for Disease Control and Prevention (CDC), and the FDI World Federation (FDI). This was accomplished by participating in key meetings, as well as by defining strategy that can impact policy worldwide. An example is his involvement as part of the delegation that is working towards the

Congress of the Parties 4, of the Minamata Convention. The goal is to continue to supporting the phase down of amalgam globally and understanding the opportunities for the creation of new restorative dental materials that can be used by dentists, as well as ensuring that regulations are implemented to avoid a negative impact on the environment due to the release of mercury when existing amalgam restorations are removed.

- **Support Efforts Related to ADA Covid-19 Response.** ADASRI staff continued to respond rapidly and efficiently to ADA members and federal agencies during the COVID-19 pandemic. ADASRI staff also provided direct member support by helping dentists navigate the triage of patients, supporting efforts to assist states on the development of their own COVID response strategies and answering questions from ADA members. Important contributions to this goal occurred with JADA publication of data on dental hygienists as well as a longitudinal study to determine the monthly incidence of COVID-19 disease among dentists. (See Araujo MWB, Estrich CG, Mikkelsen M, Morrissey R, Harrison B, et al. [COVID-19 among dentists in the US and associated infection control: a six-month longitudinal study](#). JADA. 2021; 152(6):425-433.

Advancing ADASRI Strategic Goals and Objectives: ADASRI Programs, Projects, Results and Success Measures

[Note: this section presents ADASRI key accomplishments and outcomes from May 2021 to May 2022.]

The ADASRI Board adheres to and promotes the following Purpose Statement:

Improving lives through oral health, science and research

In June 2020, the ADASRI Board adopted a three-year Strategic Plan, aligned with its Purpose Statement. As of May 2022, the ADASRI Board and staff were working with an outside consultant to develop the next iteration of this plan. More information on ADASRI programs and activities is available in a [video showcase](#) that can be viewed on the ADA website.

ADASRI Strategic Goal 1: The ADASRI will operate under a governance and organizational structure that is nimble, well understood, and will allow Board members and staff to do their work effectively and efficiently to support the ADASRI Purpose Statement.

Objective: Complete the establishment of the ADASRI as the new ADA subsidiary.

Success Measure: Establish and implement a governance structure based on a complete *Operating Agreement* with the ADA

Outcome: This measure was completed as planned. During the past year, considerable attention was focused on defining roles and responsibilities for the ADASRI Board and staff through adoption of several amendments to the ADASRI *Operating Agreement*. In addition, a number of policies and procedures were adopted by the ADASRI Board that allow the ADASRI Board and staff to be more efficient, as well as enhance operational effectiveness and compliance with federal grant-related research requirements. Key accomplishments of the ADASRI Board related to setting up the organization's governance structure included:

- Approval of a detailed roles and responsibilities matrix (or RACI matrix) to guide ADASRI Board and staff decision-making authority.
- Received approval from the ADA Board of Trustees to increase the size of the ADASRI Board from eight to 10 Directors.
- Approval of qualifications for ADASRI Board members
- Approval of the following policies:
 - Attendance of ADASRI Board Chair at Meetings of the ADA House of Delegates

- Board Development
- Confidentiality and Non-Disclosure Agreements
- Financial Conflict of Interest
- Reports to the ADA Board of Trustees and ADA House of Delegates
- Approval of the following processes:
 - Nomination and Selection of New Elected Directors to the ADASRI Board
 - Selection of the ADASRI Board Chair
 - Performance Review and Compensation of the ADASRI CEO
 - Review and Funding of Special Project Requests from the ADA and Other Stakeholders

Through its three standing committees (Budget and Finance, Governance, and Research) the ADASRI Board continues to develop a set of policies, rules, processes and procedures that help guide the Board and staff when making decisions related to strategy and operations. These are being collated into an *ADASRI Governance Manual*.

ADASRI Strategic Goal 2: To be a “research center of excellence” that advances dentistry, improves oral health and provides an evidence base for use by health care professionals, the public, policy makers and professional organizations.

Objective: Establish and maintain a research plan and portfolio to fulfill the ADASRI Operating Plan based on the high priority topics that most effectively and efficiently utilize the existing ADASRI personnel strengths, facilities and financial resources.

Success Measure: Publish peer reviewed manuscripts to disseminate research outcomes, and make it accessible to dental professionals and external stakeholders.

Target: 20

Range: 15-25

Success Measure: Develop additional scientific resources to be used by the ADA including oral health topics, abstracts to scientific conferences, standards, patents and other resources.

Target: 55

Range: 50-60

Outcome: Development and dissemination of science and research is a core function of ADASRI. Staff continue to produce peer reviewed manuscripts, abstracts and other resources for ADA members. Despite challenges imposed by the pandemic, ADASRI exhibited stellar performance by exceeding expectations for this goal by publishing 22 peer-reviewed manuscripts and 93 additional scientific resources. ADASRI also had a strong presence at the June 2021 and March 2022 AAODCR meetings. The Appendix lists ADASRI journal articles and other published resources from May 2021 to May 2022, along with key publication-related metrics. A complete list of all ADASRI publications is available on the ADA website at [ADASRI Publications List](#),

Success Measure: Apply for external grants based on the needs of the ADASRI to supplement the annual funding provided by the ADA.

Target: 12

Range: 10-15

Outcome: ADASRI exceeded this metric by submitting 14 proposals to different federal agencies, foundations, and associations. Among those submissions, four were funded, including an R01 grant; four

others were awaiting final funding decisions. In addition, three letters of intent yielded two invitations to submit full proposals. The revenue from external funding increased substantially (+\$745K) compared to the prior year.

Success Measure: Establish and maintain ADASRI initiated external collaborations, including dental student research projects, government, private, industrial and/or academic research facilities, agencies, and professional organizations.

Target: 7

Range: 5-10

Outcome: ADASRI established 11 new collaborations, including one with the American Dental Hygienists Association for the implementation of additional epidemiology research studies focused on the impact of the COVID-19 pandemic on dental professionals. Such efforts were recognized by several stakeholders, including the CDC.

During 2021, revisions to the Fifth Amendment to the Cooperative Research and Development Agreement (CRADA) between ADASRI and the National Institute of Standards (NIST) were completed. On March 7, 2022 ADASRI staff hosted a virtual joint research colloquium with NIST to share research resulting from the CRADA Agreement.

ADASRI Strategic Goal 3: The ADASRI will be well-focused and agile to best utilize funds from the ADA and other agencies to support research and the advancement of science in oral health aligned with the ADASRI Purpose Statement.

Objective: Develop and enact strategies to effectively and efficiently utilize available financial resources based on approved ADASRI research priorities.

Success Measures:

- Submit a draft 2022 budget to the ADASRI Board prior to submission to the ADA, in accordance with the ADA organizational process, by the end of Q2
- Manage the approved 2021 budget to a tolerance of $\pm 3\%$ by the end of Q4.

Outcome: In 2021, the ADASRI achieved these metrics and is expected to achieve these as well for 2022. The 2022 budget request was approved by the ADASRI Board in May/June 2022 and submitted to the ADA Board of Trustees. ADASRI budget-related details can be found in Board Report 2 at this House of Delegates meeting.

Other Key Accomplishments:

Awards and Recognition. Two [2021 Cuspies awards](#) were presented to ADASRI researchers: one for the category *Most Significant News Event* (which was won by Dr. Cameron Estrich, Dr. Marcelo Araujo, and colleagues for their [research into how the pandemic has impacted dental hygienists](#)), and one for the category *Scientific Paper of the Year* (which was won by Dr. Estrich, Dr. Araujo, and colleagues for their [research into COVID-19 incidence among US dentists](#)).

Procurement of Research Space. In October 2021, two external wet laboratory facilities with office space were successfully leased to allow ADASRI scientists in Maryland to conduct research and apply for grants without the need to include NIST researchers. This provides ADASRI researchers the autonomy to develop intellectual property (IP) that is owned completely by ADASRI.

Execution of the ADA/ADASRI Services Agreement. In November 2021, the ADA and ADASRI executed a formal *Intercompany Services Agreement and Memorandum of Understanding*. The document establishes certain understandings between ADASRI and ADA regarding their working

relationship, and delineates the services and resources provided by each organization to achieve mutual goals and objectives.

Approval of Proposed Terms to be Included in the Exclusive Patent License Granted by ADAF to ADASRI. Prior to the formation of the ADASRI, research activities were carried out under the American Dental Association Foundation (ADAF). This includes research activities from the group based in Maryland, as well as the IP created that was (and still is) assigned to the ADAF. To accomplish a transfer of IP-related duties, an agreement was required between ADAF and ADASRI to give ADASRI the right to engage in patent prosecution and licensing.

On February 8, 2022 an Exclusive Patent License and Management Agreement was executed between ADAF and ADASRI, reflecting the terms of the revised term sheet approved by the ADARI Board in 2021. The Agreement gives ADASRI the right to engage in patent prosecution and licensing activities for the portfolio of ADAF technologies transferred under the Agreement, in the same way it handles its own IP.

With respect to marketing, and seeking external validation for the technologies, ADASRI has started to:

- (a) Create technology marketing materials describing the technologies and their putative value propositions.
- (b) Publish these materials to bring visibility to the IP and ADASRI's ongoing research expertise (passive marketing). The materials are (or will be) posted to ADASRI's website and technology partnership websites such as those offered by iBridge and AUTM.
- (c) Actively market the technologies to potentially interested companies by leveraging ADASRI networks, and extending those networks by identifying appropriate personnel at potentially interested companies (including C-level executives, and those responsible for new business development).

With respect to patent prosecution and maintenance, ADASRI will derive feedback from marketing activities to determine which technologies likely have merit and are worth continued investment, while also identifying those technologies that likely have no return on investment, where patent prosecution and maintenance can cease. This will allow good stewardship of the IP portfolio and the associated budget. Furthermore, ADASRI has selected appropriate patent counsel, who also have experience in connecting clients with potential licensees, technology and licensing assistance, and litigation, to further enhance ADASRI's technology commercialization activities.

Emerging Issues and Trends

ADASRI External Review Process. External reviews of the three ADASRI research departments were conducted as one-day meetings via Zoom videoconference held on January 12, 2022 (Department of Innovation and Translation Research); January 21, 2022 (Department of Evidence Synthesis and Translation Research; and February 11, 2022 (Department of Applied Research). The purpose of the reviews was to critically assess the research departments and their respective research programs and activities to determine the level of performance at the project level.

Each expert review panel prepared a complete report for its respective research department to communicate recommendations to the ADASRI Board of Directors. The recommendations were approved by the ADASRI Board at its April 5, 2022 meeting and are currently being prioritized for implementation by ADASRI staff.

Delineation of Roles and Responsibilities for the ADASRI Board and Council on Scientific Affairs (CSA) Related to Science and Research. During the past two years, the CSA chair has reported periodically to the ADASRI Board of Directors on Council research priorities and projects. The current CSA chair is a full voting member of the ADASRI Board; the CSA vice chair attends ADASRI Board as an observer, with no voting privileges.

In December 2021, the ADASRI Board chair appointed an ad hoc Workgroup to help clarify

the respective duties and responsibilities of the ADASRI Board and CSA with respect to science and research. The Workgroup is co-chaired by Dr. Ana Karina Mascarenhas (current ADASRI Board member and CSA chair) and Dr. Brett Kessler (current ADASRI Board chair and ADA Trustee), and includes members from both ADASRI and CSA, including: Dr. Ophir Klein (current ADASRI Board member), Dr. Craig Armstrong (current ADASRI Board member and ADA Trustee), Dr. Mia Geisinger (current ADASRI Board member and past CSA chair), Dr. Sharukh Khajotia (current CSA Vice Chair), Dr. Jim Boyle (current ADA Board of Trustees liaison to the CSA), and Dr. Jeffrey Platt (past CSA chair and past JADA interim editor).

In February 2022, the CSA chair appointed an ad hoc Workgroup comprised of current and past CSA members to deliberate the Council's specific duties and responsibilities, as defined in the *ADA Bylaws* and the *ADA Governance and Organizational Manual*. Recommendations from this group will inform deliberations of the ADASRI Board's Workgroup.

ADASRI Research Programs. ADASRI researchers study and report on critical and emerging oral health issues that are relevant to the practice of dentistry and improvement of oral health. In August 2020, a list of high priority research areas was approved by the ADASRI Board with input from the CSA; these priorities are being reviewed in 2022 by the ADASRI Research Committee for consideration by the ADASRI Board. As described in a preceding section of this report, to help ensure alignment with these priorities, a review of research conducted within each of the ADASRI departments was conducted in January and February 2022 by external review panels under the oversight of the ADASRI Research Committee.

For the coming year, ADASRI staff activities and projects will be directed primarily to caries, periodontal disease, and novel technologies and methods. Specific research projects in the Maryland and Chicago laboratories are focused on the following distinct areas:

- Ether-based monomers for dental composite restoratives
- Antimicrobial and remineralizing composites for Class V restorations
- Carbonated hydroxyapatite-based dosimetry
- Electrochemical biosensors for oral environments
- 3D biomimetic model for Osteogenesis Imperfecta
- Microscale periodontal sensors
- Evaluation of oral impacts of electronic cigarettes
- Cellular and molecular periodontal research
- Dental zirconia (fracture toughness; degradation via accelerated aging; adjustment, finishing, and polishing; multi-layer yttria-stabilized zirconia; biofilm growth)
- Multi species oral biofilm model
- Charcoal toothpastes and tooth powders
- Standards development (oral rinses, toothbrushes, sequential orthodontic aligners)

Board Minutes

For more information on recent ADASRI activities, see the minutes of the ADASRI Board of Directors, which are posted on the House of Delegates ADA Connect site, or the [minutes](#) of the CSA as posted on ADA.org.

Appendix

Publications of the American Dental Association Science & Research Institute

May 1, 2021 to May 1, 2022
(ADASRI staff listed in bold)

Peer-Reviewed Publications

1. [“Dental Amalgam Restorations in Nationally Representative Sample of U.S. Population Aged ≥15 years: NHANES 2011–2016”](#) by **Cameron Estrich**, **Ruth Lipman**, and **Marcelo Araujo** in the *Journal of Public Health Dentistry* (May 5, 2021)
2. [“The Chairside Periodontal Diagnostic Toolkit: Past, Present, and Future”](#) by **Taejun Ko**, **Kevin Byrd**, and **Shinae Kim** in *Diagnostics* (May 22, 2021)
3. [“COVID-19 among Dentists in the United States: A 6-Month Longitudinal Report of Accumulative Prevalence and Incidence”](#) by **Marcelo Araujo**, **Cameron Estrich**, Matthew Mikkelsen, Rachel Morrissey, Brittany Harrison, Maria Geisinger, Effie Ioannidou, and Marko Vujicic in the *Journal of the American Dental Association* (June 1, 2021)
4. [“Kinetics of Solid-Liquid Interface Motion in Molecular Dynamics and Phase-Field Models: Crystallization of Chromium and Silicon”](#) by **Eaman Karim**, Miao He, Ahmed Salhoumi, Leonid Zhigilei, and Peter Galenko in *Philosophical Transactions of the Royal Society A: Mathematical, Physical & Engineering Sciences* (July 19, 2021)
5. [“The ‘Oral’ History of COVID-19: Primary Infection, Salivary Transmission, and Post-acute Implications”](#) by Julie Teresa Marchesan, Blake Warner, and **Kevin Byrd** in the *Journal of Periodontology* (August 14, 2021)
6. [“Science and Research Influenced Health Policy during the COVID-19 Pandemic”](#) by **Cameron Estrich** and **Marcelo Araujo** in *Dental Economics* (September 10, 2021)
7. [“Repair Versus Replacement of Defective Direct Resotrotions: A Cross-Sectional Study among US Dentists”](#) by Wafaa Kattan, **Olivia Urquhart**, Carissa Comnick, Michelle McQuistan, Sandra Guzmán-Armstrong, Justine Kolker, and Erica Teixeira in the *Journal of the American Dental Association* (September 3, 2021)
8. [“Biopolymer Hydroxyapatite Composite Materials: Adding Fluorescence Lifetime Imaging Microscopy to the Characterization Toolkit”](#) by **Quinn Easter** in *Nano Select* (September 13, 2021)
9. [“COVID-19 and Scientific Illiteracy, a Syndemic”](#) by Michael Glick, Mark Wolff, and **Alonso Carrasco-Labra** in the *Journal of the American Dental Association* (October 9, 2021)
10. [“Enamel Caries Detection and Diagnosis: An Analysis of Systematic Reviews”](#) by Tanya Walsh, Richard Macey, David Ricketts, **Alonso Carrasco-Labra**, Helen Worthington, Alex Sutton, Suzanne Freeman, Anne-Marie Glenny, Philip Riley, Janet Clarkson, and Enzo Cerullo in the *Journal of Dental Research* (October 12, 2021)
11. [“Novel Low-Shrinkage-Stress Bioactive Nanocomposite with Anti-biofilm and Remineralization Capabilities to Inhibit Caries”](#) by Hanan Filemban, Ghaliya Bhadila, Xiaohong Wang, Mary Ann Melo, Thomas Oates, Michael Weir, **Jirun Sun**, and Hockin Xu in the *Journal of Dental Sciences* (October 14, 2021)
12. [“How to Interpret and Use a Clinical Practice Guideline or Recommendation”](#) by **Romina Brignardello-Petersen**, **Alonso Carrasco-Labra**, and **Gordon Guyatt** in the *Journal of the American Medical Association* (October 19, 2021)
13. [“Blood Vessel-on-a-Chip Examines the Biomechanics of Microvasculature”](#) by Paul Salipante, Steven Hudson, and **Stella Alimperti** in *Soft Matter* (November 15, 2021)
14. [“Diagnosis and Management of Oral Extraintestinal Manifestations of Pediatric Inflammatory Bowel Disease”](#) by Muhammad Ali Shazib, **Kevin Byrd**, and Ajay Gulati in the *Journal of Pediatric Gastroenterology and Nutrition* (January 1, 2022)
15. [“Validating Cleanability of Dental Rotary Diamond Instruments Soiled with 2 Clinically Relevant Dental Test Soil Components”](#) by **Prerna Gopal**, **Erin Claussen**, **Kristy Azzolin**, and **Spiro Megremis** in the *Journal of the American Dental Association* (January 6, 2022)

16. [“COVID-19 Vaccine Intention and Hesitancy of Dental Hygienists in the United States”](#) by JoAnn Gurenlian, **Laura Eldridge**, **Cameron Estrich**, Ann Battrell, Ann Lynch, Rachel Morrissey, **Marcelo Araujo**, Marko Vujicic, and Matthew Mikkelsen in the *Journal of Dental Hygiene* (February 1, 2022)
17. [“Employment Patterns of Dental Hygienists in the United States during the COVID-19 Pandemic: An Update”](#) by Rachel Morrissey, JoAnn Gurenlian, **Cameron Estrich**, **Laura Eldridge**, Ann Battrell, Ann Lynch, Mikkelsen Matthew, Brittany Harrison, **Marcelo Araujo**, and Marko Vujicic in the *Journal of Dental Hygiene* (February 1, 2022)
18. [“Infection Prevention and Control Practices of Dental Hygienists in the United States during the COVID-19 Pandemic: A Longitudinal Study”](#) by **Cameron Estrich**, JoAnn Gurenlian, Ann Battrell, Ann Lynch, Matthew Mikkelsen, Rachel Morrissey, Marko Vujicic, and **Marcelo Araujo** in the *Journal of Dental Hygiene* (February 1, 2022)
19. [“Effect of Heating on Physicochemical Property of Aerosols during Vaping”](#) by **Taejun Ko** and **Shinae Kim** in the *International Journal of Environmental Research and Public Health* (February 8, 2022)
20. [“An Inkjet Printed Flexible Electrocochography \(ECoG\) Microelectrode Array on a Thin Parylene-C Film”](#) by **Yoontae Kim**, **Stella Alimperti**, Paul Choi, and Moses Noh in *Sensors* (February 8, 2022)
21. [“Multifunctional Periodontal Probes and Their Handheld Electronic System for Simultaneous Temperature, pH, and Depth Measurements”](#) by **Nicole Ritzert**, Asha Rani, **Taejun Ko**, Jeffrey Kim, and **Shinae Kim** in the *Journal of the Electrochemical Society* (February 17, 2022)
22. [“Engineering 3-D Printed Scaffolds with Tunable Hydroxyapatite”](#) by **Yoontae Kim**, **Eun-Jin Lee**, Anthony Kotula, **Shozo Takagi**, **Laurence Chow**, and **Stella Alimperti** in the *Journal of Functional Biomaterials* (March 23, 2022)

Additional Scientific Publications

American Dental Association Clinical Evaluators (ACE) Panel Surveys

1. [“Intraoral Scanners”](#) by Marta Revilla-Leon, Kevin Frazier, Juliana da Costa, Purnima Kumar, Mai-Ly Duong, Sharukh Khajotia, and **Olivia Urquhart** in the *Journal of the American Dental Association* (August 1, 2021)
2. [“Smoking Cessation Counseling and Treatment”](#) by Purnima Kumar, Thomas Viola, Kevin Frazier, Mai-Ly Duong, Sharukh Khajotia, and **Olivia Urquhart** in the *Journal of the American Dental Association* (October 1, 2021)
3. [“Dentist-Administered Vaccines”](#) by Mai-Ly Duong, Alessandro Villa, Lauren Patton, Kevin Frazier, Sharukh Khajotia, Purnima Kumar, and **Olivia Urquhart** in the *Journal of the American Dental Association* (January 1, 2022)
4. [“Oral-Systemic Health Considerations in Dental Settings”](#) by Alessandro Villa, Juliana da Costa, Mai-Ly Duong, Kevin Frazier, and **Olivia Urquhart** in the *Journal of the American Dental Association* (April 1, 2022)

“For the Patient” Columns in the Journal of the American Dental Association

5. [“Replacing Missing or Lost Teeth”](#) by **Anita Mark** (May 1, 2021)
6. [“Protecting Against COVID-19”](#) by **Anita Mark** (June 1, 2021)
7. [“Controlling Bad Breath”](#) by **Anita Mark** (July 1, 2021)
8. [“What Is MRONJ?”](#) by **Anita Mark** (August 1, 2021)
9. [“What Is Bruxism?”](#) by **Anita Mark** (September 1, 2021)
10. [“Keeping Your Smile Healthy”](#) by **Anita Mark** (October 1, 2021)
11. [“Talking about Sleep Apnea”](#) by **Anita Mark** (November 1, 2021)
12. [“Wearing a Crown”](#) by **Anita Mark** (December 1, 2021)
13. [“Key Points for Your Child’s Teeth”](#) by **Anita Mark** (January 1, 2022)
14. [“Options for Making Your Dental Treatment More Comfortable”](#) by **Anita Mark** (February 1, 2022)
15. [“Caring for Dental Instruments”](#) by **Anita Mark** (March 1, 2022)
16. [“Shopping Smart: Look for the Seal”](#) by **Anita Mark** (March 24, 2022)
17. [“Keeping Your Dentist Up to Date”](#) by **Anita Mark** (April 1, 2022)

18. ["Staying in the Game with Mouthguards"](#) by **Anita Mark** (April 19, 2022)

Meeting Abstracts

Abstracts presented at the [2021 Annual Meeting of the American Association for Oral, Dental and Craniofacial Research \(AAODCR\)](#), July 21–24, 2021

1. "3D Biomimetic Platform to Dissect Connexin 43-Mediated Osteoblast-Endothelial Function," presented by **Eun-Jin Lee**
2. "Antimicrobial Activity of Novel Hybrid Materials against Periodontal Pathogens," presented by **Theresa Biddinger**
3. "Appraisal of Patients' Values and Preferences Inclusion in Dental Guidelines," presented by **Sarah Pahlke**
4. "Biomanufacturing of Bioceramic Scaffolds for Bone Regeneration," presented by **Yoontae Kim**
5. "Comparison and Assessment of Viability Assays for Oral Multispecies Biofilms," presented by **Perna Gopal**
6. "Comparison of Stiffness Determination for Powered and Other Non-standard Brush Heads by Varying the Vertical Load," presented by **Ashley Bowers**
7. "COVID-19 Pandemic Related Dental Practice Trends on Teledentistry," presented by **Marcelo Araujo**
8. "Development of EPR Dosimetry Based on Carbonated Hydroxyapatite Cement," presented by **Eaman Karim**
9. "Electrochemical Sensors for Detecting Inflammation in Cell Culture Samples," presented by **Anna Kalmykov**
10. "Evaluation of Physical and Chemical Properties of Aerosols According to the Temperature Control of Electronic Cigarettes," presented by **Shinae Kim**
11. "Fluoride Deposition by Complex Fluoride Rinses at Different F Concentrations," presented by **Shozo Takagi**
12. "Intraoral Scanners: Results from an ADA Clinical Evaluators Panel Survey," presented by **Olivia Urquhart**
13. "Labile Fluoride Reservoirs Produced by Complex Fluoride Rinses," presented by **Laurence Chow**
14. "A Microsensor-Embedded Periodontal Probing Device for Periodontal Disease Assessment," presented by **Taejun Ko**
15. "Minimal Important Difference for Patient-Reported Outcome Measures in Dental Guidelines," presented by **Malavika Tampi**
16. "Physiochemical, Mechanical, and Antimicrobial Properties of Experimental Dental Composites," presented by **Stanislav Frukhtbeyn**
17. "Reduced Sugar Consumption and Caries Prevention: Overview of Practice Guidelines," presented by **Lauren Pilcher**
18. "Shrinkage Stress and Thermo-mechanical Properties of Quaternary Ammonium-Based Composites," presented by **Han Byul Song**
19. "Strategies for Disseminating Guidance to Dentists during the COVID-19 Pandemic," presented by **Ruth Lipman**
20. "Synchrotron X-ray Diffraction Analysis of 3Y-TZP Degradation via Accelerated Hydrothermal Aging," presented by **Yifeng Liao**
21. "US Dentists' Personal Protective Equipment Use during the COVID-19 Pandemic," presented by **Cameron Estrich**
22. "3D Printed Microfluidic Platforms for Oral and Craniofacial Diseases," presented by **Stella (Styliani) Alimperti**
23. "Combinatorial Dental Copolymer Matrix for Minimizing Protein Adsorption and Bacterial Presence," presented by **Diane Biemek**
24. "Fluorescence Microscopy Reveals Structure-Property Relationships and Polymer Dynamics in Biocomposites," presented by **Quinn Easter**

25. "Miniature pH sensors for Detecting Inflammation at Specific Gum Sites," presented by **Nicole Ritzert**
26. "Modeling the Pulp-Dentin Complex: Predicting the Regenerative Effect of Hydroxyapatite-Based Materials," presented by **Gili Kaufman**
27. "New Dental Primer and Adhesives Using Hydrolytically Stable Ether-Based Monomers," presented by **Xiaohong Wang**
28. Symposium "Conducting Network Meta-analysis to Inform Clinical Practice Guidelines and Policy," presented by **Olivia Urquhart, Lauren Pilcher, Malavika Tampi, Sarah Pahlke, and Alonso Carrasco-Labra**

Abstracts presented at the [2022 Annual Meeting of the American Association for Dental, Oral, and Craniofacial Research \(AAODCR\), March 21–26, 2022](#)

1. "Calcium and Phosphate Ion Release from Experimental Remineralizing Dental Composites," presented by **Stanislav Frukhtbeyn**
2. "Characterization of Materials Used to Produce Orthodontic Sequential Aligners," presented by **Raquel Miera**
3. "Connexin-43/MAPK Mechanisms Control Osteoblast-Endothelial Interaction," presented by **Eun-Jin Lee**
4. "Development of Fluorapatite-Titanium Composites for Dental Implant Applications," presented by **Eaman Karim**
5. "Discovery of Novel Cell Subpopulations in Human Gingival Epithelia," presented by **Quinn Easter**
6. "Effect of E-cigarette Vaping Temperature on Growth of *Streptococcus mutans*," presented by **Shinae Kim**
7. "Fluorapatite and CaF₂ Formation in Low Concentration Fluoride-Calcium-Phosphate Complex Solutions," presented by **Shozo Takagi**
8. "Influence of Water in Accelerated Degradation of 3Y-TZP Powder," presented by **Yifeng Liao**
9. "Metal Analysis in E-cigarette Aerosol Produced at High Power," presented by **Taejun Ko**
10. "Mounting Configuration as a Variable in Light Transmission Measurements in Spectrometer/Integrating-Sphere Systems," presented by **Henry Lukic**
11. "A Self-applied Fluoride-Calcium-Phosphate Complex Treatment Reduced Dentin Hydraulic Conductance," presented by **Laurence Chow**
12. "Stress, Burnout, and Wellness in U.S. Dentists during COVID-19 Pandemic," presented by **Cameron Estrich**
13. "Tunable Hydroxyapatite Bioscaffolds Using Underwater 3-D Printing Method," presented by **Yoontae Kim**
14. Symposia "The AADOCR Code of Ethics" and "Ethical Translation of Research to Clinical Practice" organized by **Marcelo Araujo**
15. Workshop "Single-Cell and Spatial Multiomics Resources to Advance Salivary Research" included presentation by **Kevin Byrd**
16. Symposium "Evidence-Based Clinical Practice Guideline for Managing Acute Dental Pain" included presentation by **Olivia Urquhart**

New Oral Health Topics Webpages

1. [Dental Curing Lights](#) by **Anita Mark** (May 5, 2021)
2. [Silver Diamine Fluoride](#) by **Arie Leme-Kraus** (July 19, 2021)

Updated Oral Health Topics Webpages

1. [Cardiac Implanted Devices and Electronic Dental Instruments](#) (May 14, 2021)
2. [Hypophosphatasia and X-Linked Hypophosphatemia](#) (May 18, 2021)

3. [Methamphetamine](#) (May 18, 2021)
4. [Caries Risk Assessment and Management](#) (June 9, 2021)
5. [Toothpastes](#) (July 8, 2021)
6. [Genetics and Oral Health](#) (July 13, 2021)
7. [Fluoride: Topical and Systemic Supplements](#) (July 15, 2021)
8. [Salivary Diagnostics](#) (July 19, 2021)
9. [Oncology Agents and Medication-Related Osteonecrosis of the Jaw](#) (July 28, 2021)
10. [Dental Erosion](#) (August 31, 2021)
11. [Tuberculosis](#) (September 7, 2021)
12. [Celiac Disease](#) (September 14, 2021)
13. [Denture Care and Maintenance](#) (September 14, 2021)
14. [Cannabis: Oral Health Effects](#) (September 16, 2021)
15. [Floss/Interdental Cleaners](#) (September 21, 2021)
16. [Chewing Gum](#) (October 6, 2021)
17. [Nutrition and Oral Health](#) (October 11, 2021)
18. [Athletic Mouth Protectors \(Mouthguards\)](#) (October 19, 2021)
19. [Sjögren Disease](#) (October 19, 2021)
20. [Tobacco Use and Cessation](#) (October 20, 2021)
21. [Aging and Dental Health](#) (November 9, 2021)
22. [Anesthesia and Sedation](#) (November 9, 2021)
23. [Human Immunodeficiency Virus \(HIV\)](#) (November 9, 2021)
24. [Nitrous Oxide](#) (November 29, 2021)
25. [Dental Sealants](#) (December 22, 2021)
26. [X-rays/Radiographs](#) (December 22, 2021)
27. [Oral-Systemic Health](#) (December 23, 2021)
28. [Antibiotic Prophylaxis Prior to Dental Procedures](#) (January 5, 2022)
29. [Diabetes](#) (January 24, 2022)
30. [Dental Unit Waterlines](#) (March 4, 2022)
31. [Anthropology and Dentistry](#) (March 16, 2022)
32. [Hepatitis Viruses](#) (April 1, 2022)

Patents Issued

1. "Multi-Functional, Stimuli-Responsive Materials, Methods of Preparation, Methods of Use and Uses Thereof," by **Jirun Sun, Nicole Ritzert, and Xiaohong Wang**, U.S. Patent No. [US 11,104,647 B2](#), issued August 31, 2021.
2. "Fluorapatite-Forming Calcium Phosphate Cements," by **Laurence Chow and Shozo Takagi**, European Patent [EP2588555 B1](#), issued December 29, 2021.

Patent Applications Published

1. **Stella Alimperti, Yoontae Kim, Eun-Jin Lee, Laurence Chow, and Shozo Takagi**, "Three-Dimensional Printed Calcium Phosphate Bone Cement Composite Scaffolds for Bone Regeneration, Precursor Compositions, and Methods of Printing," International Patent Application No. [WO 2021/173575 A1](#), published September 2, 2021 (*also published as US Patent Application No. [US 2021/0260249 A1](#) on August 26, 2021*).

Book Chapters

1. "[How to Identify, Interpret, and Apply the Scientific Literature to Practice](#)" by **Alonso Carrasco-Labra, Malavika Tampi, Olivia Urquhart**, Scott Howell, Austin Booth, and Michael Glick in *Burket's Oral Medicine, 13th Edition* (June 25, 2021)

2. "[Machine Learning in Evidence Synthesis Research](#)" by **Alonso Carrasco-Labra, Olivia Urquhart**, and Heiko Spallek in *Machine Learning in Dentistry* (July 25, 2021)

Miscellaneous

1. [The Chairside Instructor: A Visual Guide to Case Presentations](#) updated by **Anita Mark** and **Ruth Lipman** for publication in the ADA Catalog (August 2021)
2. "[How to Conduct and Publish Systematic Reviews and Meta-Analyses](#)" workshop includes presentations by Alonso Carrasco-Labra, Cameron Estrich, Sarah Pahlke, Lauren Pilcher, and Olivia Urquhart (November 11–13, 2021)
3. Webinar "[New Research Reveals Impact of COVID-19 on Dental Hygienists](#)" includes presentation by **Cameron Estrich** (February 22, 2022)
4. "[Livestream: Interview with Dr. Marcelo Araujo](#)" at SmileCon 2021 (October 12, 2021)
5. [Ask Me Anything with Kevin Byrd](#) sponsored by the International Association for Dental Research (February 28, 2022)

Notable ADASRI Publication Metrics

Since ADASRI's formation in January 1, 2020, through May 5, 2022, ADASRI publications have been cited **677 times** in peer-reviewed literature.

From January through March 2022 (Q1):

- ACE Panel reports were downloaded **11,810 times** (a **108% increase** over Q1 2021).
- "For the Patient" columns were downloaded **16,083 times** (a **41% increase** over Q1 2021).
- The third-most-visited ADA webpage was the Oral Health Topics webpage on antibiotic prophylaxis (**110,924 visits**).
- The top three most downloaded *JADA* papers were:
 1. [ADA guideline on antibiotic prophylaxis](#) (2014): **10,614 downloads**.
 2. [ACE Panel report on dentist-administered vaccines](#) (2022): **8,284 downloads**.
 3. [ADA guideline on antibiotics for dental pain and swelling](#) (2019): **8,227 downloads**.