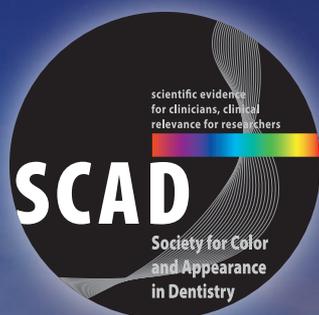


WHERE ART MEETS SCIENCE A Pathway 2 Success

**15th Annual Conference
of the Society for Color and Appearance in Dentistry (SCAD)**

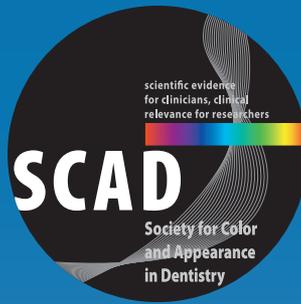


Oct 18-19, 2024

Novotel Hotel, Miami, FL

PROGRAM BOOK

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15th Annual Conference of the Society for Color and Appearance in Dentistry (SCAD)
 Novotel Hotel, Miami, FL

Table of Contents

A Message from the President	3
Program	4
Meeting Sponsors and Corporate Members	6
Oral Presentations	8
About SCAD.....	24
Posters	26

Cover Photo: <https://freepik.com/>

Recommended Attire

Welcome Reception and Educational Session - Business casual
 President's Dinner - Miami Vice, 80's theme

Event Venues

Board Meeting - *Optimism Room*, lobby level
 Welcome Reception - *Lima restaurant*, lobby level
 Breakfast and Lunch and President's Dinner - *Skyline Ballroom*, 12th floor
 General Session - *Brickell Ballroom*, lobby level
 Poster Display - *Foyer outside Brickell Ballroom*, lobby level
 Sponsor Tables - *Foyer outside Brickell Ballroom*, lobby level



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A Message from the President



Dear Colleagues,

The Executive Board of the Society for Color and Appearance in Dentistry (SCAD) cordially welcomes you to our 15th Annual Conference.

The meeting features high-quality, evidence-based information on color and esthetic dentistry, presented by many of the leaders in this field (up to 13.5 CE hours).

We look forward to sharing the information and passion with you!

Sabiha S. Bunek, DDS
President, SCAD



Program

Thursday, October 17, 2024

18:00-19:30 *SCAD Executive Board Meeting*

19:30-21:00 *Welcoming Reception*

Friday, October 18, 2024

7:00-8:00 *Breakfast*

8:00-8:15 *Opening Ceremony*

8:15-8:55 Gerard J. Chiche
Relating Scientific Data with Clinical Management of Zirconia Restorations

9:00-9:40 Sung Bin Im
Excellence in Esthetic Dentistry: A Comprehensive Journey from Precision Shade Matching to Full Mouth Rehabilitation

9:45-10:25 Javier Vasquez
Antiaging Dentistry and Facial Growth Assistance

10:25-11:00 *Break*

11:00-12:00 Sam Alawie & Mehrdad Razaghy
Facially Guided Ultra-conservative Esthetic Rehabilitation - A Team-based Approach

12:00-13:00 *Lunch*

13:00-13:45 *Posters*

13:45-14:25 Alvaro Della Bona
Exploring the Complexities of Color and Optical Properties in 3D Printing for Restorative Structures

14:30-15:10 Stefano Gracis
Implant Positioning from the Prosthetic Perspective: the Issues with Buccally Inclined Implants in the Esthetic Area

15:10-15:35 *Break*

15:35-16:15 Tal Morr
Considerations in Management of Failing or Missing Anterior Teeth

16:20-17:00 *Round table*

19:00-22:00 *President's Dinner*

Saturday, October 19, 2024

7:00-8:00 *Breakfast*

8:00-8:40 Federico Ferraris
Color Changes with Restorations

8:40-9:10 Josko Viskic
The Colors of Social Media

9:10-9:50 Newton Fahl, Jr.
***The Single Discolored Central Incisor:
Color and Form Challenges
with Composite Resin Veneers***

9:50-10:25 Rade D. Paravina & Razvan Ghinea
Color of Natural Teeth

10:25-11:00 Amelia Orta
***Biomimetic Approach to
the Prosthetic Management of Acid Erosion***

11:00-11:25 *Break*

11:25-12:00 Taiseer A. Sulaiman
***Restorative Considerations
for Tooth Rehabilitation in the Esthetic Zone***

12:00-12:35 Marcos Vargas
***Injectable Techniques
for Direct Anterior Restorations***

12:35-13:25 Edward A. McLaren & Anvita Maharishi
***Contemporary Monolithic Ceramics and
the Digital Dental Team: the Evolution of
Ceramic Technologies with the Human Touch***

13:25 *Closing Ceremony*

Meeting Sponsors and Corporate Members

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Oral Presentations

Friday, October 18
8:15-8:55

Relating Scientific Data with Clinical Management of Zirconia Restorations

Gerard J. Chiche, DDS

Lecture Description

It may be at times difficult to precisely know and evaluate the zirconia material received from the dental laboratory. This presentation will provide an in-depth comparison of the different types of zirconia materials (full-strength, translucent, strength gradient) presently available for every-day-use. Ceramic selection and clinical techniques will be discussed in light of relevant and critical literature. Finally, precise selection will be utilized when deciding when to cement or to bond zirconia.

Objectives:

- [1] Understand the various types of zirconia materials available;
- [2] Select and manage zirconia restorations according to esthetics and strength properties;
- [3] Decide when to cement or bond zirconia restorations.



Gerard J. Chiche, DDS

Dr. Chiche is presently Clinical and Emeritus Professor at Louisiana State University School of Dentistry. He is a Past President of the American Academy of Esthetic Dentistry, and he has lectured in Esthetic Dentistry nationally and internationally in 35 countries. He is the author of two textbooks in Esthetic Dentistry published by Quintessence Publishing Co. He became in 2009 the first recipient of the Endowed Chair sponsored by the Thomas P. Hinman Dental Society during his tenure as Director of the Center of Esthetics and Implants at Augusta University. Finally, he is the 2020 recipient of the Icon Award for Lifetime Achievement in Dentistry of the Seattle Study Club.

Oral Presentations

Friday, October 18
9:00-9:40

Excellence in Esthetic Dentistry: A Comprehensive Journey from Precision Shade Matching to Full Mouth Rehabilitation

Sung Bin Im, MDC, CDT, BS

Lecture Description

In this lecture, Mr. Sung Bin Im will demonstrate the integration of analog and digital technologies in fabricating esthetic dental cases. He will showcase applications in clinical situations, from single shade matching to full mouth rehabilitation. The presentation will cover comprehensive material selection, effective communication protocols between clinicians and technicians, and the use of digital photography, digital shade matching software, all aimed at achieving more predictable outcomes in esthetic dentistry.

Objectives:

- [1] Discover the impact of AI-driven digital shade matching software on enhancing accuracy and efficiency in dental shade matching;
- [2] Learn practical strategies for transitioning dental prosthesis workflows from analog to digital, exploring the benefits and addressing the challenges involved;
- [3] Explore the integrated techniques of digital smile design for complete mouth rehabilitation.



Sung Bin Im, MDC, CDT, BS

Sung Bin Im is a Master Dental Ceramist who is the CEO of SUNG BIN IM Dental Studio in Fort Lauderdale, Florida. He was formerly with the Goldstein, Garber, and Salama practice in Atlanta, Georgia and previously worked with Center for Esthetic and Implant Dentistry at Augusta University College of Dental Medicine (Directed by Dr. Gerard Chiche).

Having earned his Master in Dental Ceramics from UCLA School of Dentistry — Center for Esthetic Dental Design, under the auspices of Prosthodontist and Master Ceramist Dr. Edward McLaren (2010-2012), California, United States.

Previously, he received his Bachelor of Science degree in Dental Technology from Shin Heung University (2001-2010), Gyeonggi-do, South Korea.

Currently, Mr. Sung Bin Im is actively involved in many areas of prosthodontics as a Noritake (KURARAY) International Instructor since 2016. Also, he has published numerous articles on QDT (2016, 2017, 2018), *Journal of Cosmetic Dentistry* (2017), *Noritake 30th Anniversary Book* (2018), *Labline* (2015, 2018, 2019), and *Qunitessenz Zahntechnik* (2020), and has presented several podium lectures nationally and internationally.



Javier Vasquez, DMD

Dr. Vasquez obtained his Doctor in Dental Medicine degree at the Metropolitan University in 1997. He obtained his Fellowship in Fukuoka, Japan and a Mastership in the USA from ICCMO (International College of Cranio-mandibular Orthopedics).

Dr. Vasquez the founder of Miami Natural Smiles by Oral Design Dental Clinic where together with an amazing clinical team of Doctors develop the most comprehensive and high end esthetic cases implementing the most advanced technology, science and dental art.

As part of his education commitments Dr. Vasquez is a current Clinical Adjunct Faculty at the Dental College of Augusta University in the Prosthodontist Program where he shares educational programs several times per year and also at the Biofunctional Dynamics Academy in Dijon, France, Barranquilla, Colombia and Miami, USA.

Dr. Vasquez is one of the early adopters in CAD CAM evolution for over 18 years and in the last 6 years has been an active developer into the integration and interdisciplinary treatment using 3D Data Integration.

Dr. Vasquez is a member of the world renowned organization Oral Design founded by Master Ceramist Mr. Willi Geller. He owns Oral Design Miami, dental laboratory studio focusing on high esthetics and function.

As a dentist, master ceramist, passionate education leader, clinical consultant and international speaker in the areas of occlusion, craniocervical dysfunction and high end esthetics he lives by his motto: "The limit is the sky! to dream, to learn, and to do! Live life!"

Oral Presentations

Friday, October 18
9:45-10:25

Antiaging Dentistry and Facial Growth Assistance

Javier Vasquez, DMD

Lecture Description

This lecture will cover the concept of antiaging dentistry and its impact on facial growth and aesthetics. This is a fascinating field that combines elements of dental science with aesthetic considerations to address how changes in dental structures can affect the overall appearance of the face.

The lecture will review the stages of facial growth from childhood through adulthood, emphasizing critical periods when dental interventions could have significant impacts. Explaining how different facial structures develop and mature, and how this knowledge is essential for effective dental treatment planning.

This concept understands the implications of growth into esthetic conditions such as: incisal display, gingival display, length of the face, and features related with face and esthetics.

Objectives:

- [1] To understand the sequence and process of facial growth to be able to diagnose in adults when was the time and the lack to be able to make corrections;
- [2] To understand the proper mechanism of facial growth and discuss the consequences of an altered occlusal plane, including functional issues and their aesthetic implications.

Oral Presentations

Friday, October 18
11:00-12:00

Facially Guided Ultra-Conservative Esthetic Rehabilitation - A Team-based Approach

Sam Alawie, MDT & Mehrdad Razaghy, DDS

Lecture Description:

During this lecture, Dr. Mehrdad Razaghy DDS, along with Mr. Sam Alawie MDT, will delve into a comprehensive discussion of the latest techniques in minimally invasive options for esthetic rehabilitations. This presentation will encompass a thorough examination of both clinical and laboratory processes essential for executing extensive esthetic makeovers. The evolution of dental photography has revolutionized data collection, case design, and patient communication, highlighting the immense value of accurately captured images. Leveraging advanced applications, attendees will explore the Dentofacial Digital Diagnostic approach, a cutting-edge method for facial analysis and the creation of hyper-realistic digital designs. This lecture will also showcase contemporary dental photography methodologies for capturing high-quality diagnostic images. Throughout the session, participants will be guided through essential restorative checkpoints, adhering to the most current biomimetic protocols for tooth preparation, IDS, and the bonded delivery of final restorations.

Objectives:

- [1] Dentofacial Digital Diagnostics;
- [2] Dental Photography and utilization of portraits into case design;
- [3] Biomimetic approaches to esthetic options for facially driven esthetic rehabilitation.



Sam Alawie, MDT & Mehrdad Razaghy, DDS

Sam Alawie completed his Master Dental Technician degree in Brussels, Belgium in 1994. He migrated to the United States in 2003. In 2006 he established and founded Beverly Hills Dental Laboratory and Training Center in Beverly Hills, California.

Sam is a recognized leader in the dental industry and has been featured in various dental publications for his influence and dedication to the profession of dental technology. He is a avid supporter and member of many study groups, including the Aesthetic Excellence Study Club where he serves as President.

Mr. Alawie is founder and CEO of Magne Education, which Dr. Pascal Magne is the director of. His facility hosts an array of comprehensive training programs, study cohorts, and continuing education opportunities. Sam is an active member of the Willi Geller's Oral Design Foundation, associate member of the American Academy of Esthetic Dentistry, and affiliate member of the Pacific Coast Society for Prosthodontics.

Dr. Razaghy's passion for creation and research, allowed him to engage in various research projects at Herman Ostrow School of Dentistry at USC. Together with his mentor, Dr. Pascal Magne, he has contributed to numerous books, journals, publications, and educational modules in the field of minimally invasive and biomimetic restorative dentistry.

Dr. Razaghy currently practices general and restorative dentistry alongside being a resident faculty at Magne Education in Beverly Hills California. He is an active member of the Bio-Emulation and Esthetic Excellence groups and lectures both locally and internationally.



Alvaro Della Bona, DDS, MMS, PhD, FADM

Senior Professor and Chair, Postgraduate Program in Dentistry, University of Passo Fundo
Adjunct Faculty, University of Mississippi Medical Center (UMMC), USA

Adjunct Scientist, Houston Center for Biomaterials & Biomimetics (HCBB), UTHSCH, USA

Honorary Professor, Faculty of Dentistry, The University of Hong Kong

President, Brazilian Group of Dental Materials (GBMD)

Treasurer, International Association for Dental, Oral, and Craniofacial Research (IADR)

ADM Paffenbarger award (2000)

IADR Wilmer Souder (2021) and Distinguished Service (2023) Awards.

Oral Presentations

Friday, October 18
13:45-14:25

Exploring the Complexities of Color and Optical Properties in 3D Printing for Restorative Structures

Alvaro Della Bona, DDS, MMS, PhD, FADM

Lecture Description:

Understanding color and optical properties are essential to succeed in esthetic dentistry. As additive processes gain prominence in dental restoration manufacturing, scientific investigations into material properties have intensified. The development and clinical applicability of additive technologies hinge on the continuous refinement of the manufacturing process, which implies controlling variables related to materials properties and technology parameters. Yet, the printed structures should fulfill the mechanical and biocompatibility requirements needed for the oral service and satisfy patients and clinicians for the esthetic demands.

Objectives:

- [1] To present a critical and comprehensive review on color and optical properties of 3D-printing polymer-based restorative materials;
- [2] To explore the influence of 3D-printing parameters on the color and translucency of printed restorative resin materials;
- [3] To suggest further research development to improve color and optical properties of 3D-printing polymer-based materials.

Oral Presentations

Friday, October 18
14:30-15:10

Implant Positioning from the Prosthetic Perspective: the Issues with Buccally Inclined Implants in the Esthetic Area

Stefano Gracis, DMD, MSD

Lecture Description:

Proper implant positioning is a prerequisite for a naturally looking implant-supported restoration which blends in the patient's dentition. Ideally, implant positioning should be planned carefully through the collection of specific data: a CBCT, an intraoral scan of the dental arches, and a tooth setup to define clinically the proper 3-D position of the planned prostheses.

When the volume of the hard and soft tissues are not ideal and/or the position of the implant is not prosthetically driven, the prosthodontist is likely to face difficulties in obtaining a satisfactory outcome from an esthetic and/or functional point of view.

In this conference, the presenter will focus on situations of implants placed with a pronounced buccal inclination, that is, with an axis which projects the prosthetic screw access hole on the buccal surface or on a cusp tip of the tooth. He will illustrate the consequences and challenges for the prosthodontist restoring that implant and suggest a number of solutions which can be employed to fabricate an esthetically satisfactory restoration with the proper dimensions and profiles to facilitate plaque control and promote hard and soft tissue stability.

Objectives:

- [1] Understand the importance and implications of proper 3-D implant position;
- [2] Learn the indications for cement-retained and for screw-retained implant-supported restorations;
- [3] Observe a range of prosthetic solutions and their relative limitations.



Stefano Gracis, DMD, MSD

Dr. Gracis received his D.M.D. degree in 1986 from the University of Pennsylvania, (Philadelphia, USA). After his American title was recognized in Italy at the University of Pavia, he went to the University of Washington in Seattle where, in 1990, he obtained the certificate in Prosthodontics and the Master of Science in Dentistry. Presently, he maintains a private practice limited to prosthodontics and restorative dentistry in Milan. He is a Past President of the European Academy of Esthetic Dentistry (EAED) and of the Italian Academy of Prosthetic Dentistry (AIOP). He has contributed several articles and chapters in the field of restorative dentistry and he lectures regularly, both nationally and internationally. Dr. Gracis also has served on multiple editorial boards including the International Journal of Prosthodontics and the European Journal of Esthetic Dentistry.



Tal Morr, DMD, MSD

Dr. Tal Morr maintains a private practice in Aventura Florida limited to Aesthetic, Implant, and Complex Restorative Dentistry. Dr. Morr received his DMD degree from Tufts University School of Dental Medicine. He then continued his studies at the University of Washington Prosthodontic program where he received a certificate in Prosthodontics and a Masters of Science in Dentistry (MSD) degree. Dr. Morr is considered a leader in the field of complex restorative, esthetic, and implant dentistry and has lectured extensively for the last 29 years both nationally and internationally on these topics. Dr. Morr is also a published author on aesthetically related dental topics such as veneers, implants, and complex restorative dentistry. Dr. Morr is a member of numerous professional organizations such as the American College of Prosthodontics, the American Academy of Esthetic Dentistry, the American Academy of Restorative Dentistry, and the American Dental Association as well as many local and international study clubs. He recently was awarded the Saul Schlugar award; the highest honor from the Seattle Study Club for excellence in diagnosis, treatment planning and execution of complex restorative cases.

Oral Presentations

Friday, October 18
15:35-16:15

Considerations in Management of Failing or Missing Anterior Teeth

Tal Morr, DMD, MSD

Lecture Description:

There are many people with missing or failing anterior teeth that present to the office wanting an implant. That is usually the first request by the patient. Although implants have dramatically improved our abilities to replace missing teeth, they can be somewhat challenging and may not always be the answer in achieving the highest esthetic result. Understanding the limitations and options available is critical to make the right decision for each case individually.

Objectives:

- [1] Options for replacement of missing or failing teeth in the anterior region;
- [2] Pros and Cons of each type of treatment;
- [3] Examples and thought process for managing challenging clinical situations.

Oral Presentations

Saturday, October 19
8:00-8:40

Color Changes with Restorations

Federico Ferraris, DDS, MS

Lecture Description:

In Esthetic Restorative Dentistry the goal is to achieve the appearance that the patient desires in terms of morphology, texture and, moreover, the color. An important point is the possible modification in terms of color that we can achieve with different types of materials considering the final goal and the initial situation and using techniques and approaches that can be selected considering many indications.

This type of changing color can be obtained with whitening protocols with direct composite restorations or indirect restorations like ceramic veneers or full crowns.

In this lecture we will cover this topic and we will propose different protocols for excellence in order to give to the patient the best result having different strategies in our hands.

Objectives:

- [1] Protocols for color change with direct composite restorations;
- [2] Protocols for color change with indirect ceramic veneers;
- [3] Protocols for color change with full crowns.



Federico Ferraris, DDS, MS

Graduated in Dental School at Genoa University as DDS in 1999. ADHETHETICS founder. EAED (European Academy of Esthetic Dentistry) Active Member since 2006. AIC (Italian Academy of Conservative) Active Member since 2007. Vice-president from 2016 to 2019. President for the biennium 2023-2024.

SCAD (Society for Color and Appearance in Dentistry) Regional Councilor for Europe of for the biennium 2013/14 and 2015/16. Secretary for biennium 2017-2018. President for the biennium 2022- 2023.

Member of the Editorial Board of IJED (International Journal of Esthetic Dentistry) since 2010. Member of the Editorial Review Board of JERD (Journal of Esthetic and Restorative Dentistry) since 2021.

AARD (American Academy of Restorative Dentistry) Member since 2014. DSD (Digital Smile Design) Master since 2013. International speaker at dental congresses and courses in more than thirty Countries. Other informations: National President of AISO (Italian Association of Dental Students) in 1997-99. Trainer at the Dr. Massironi Prosthodontics Annual Master Course from 2004 to 2018. Co-author of several Italian and International scientific publications including the book on Prosthodontics "Precision in Dental Esthetics" by D. Massironi, R. Pascetta, and G. Romeo published in 2004.

Active and Founder Member of MSC (Massironi Study Club) from 2007 to 2018.

Active and Founder Member of GICC (Interdisciplinary Gymnasium CAD CAM); IAED (Italian Academy of Esthetic Dentistry) Active Member, IAAD (International Academy for Adhesive Dentistry)... Visiting Professor in Esthetic and Restorative Dentistry in different Universities.

Dental practice in Alessandria, focusing in Operative Dentistry and Prosthodontics.



Joško Viskiđ, DDS, MS, PhD

Joško Viskiđ is an associate professor at the Department of Fixed Prosthodontics, School of Dental Medicine, University of Zagreb. He graduated at the top of his class in 2008 and completed his PhD in 2015 from the same institution where he works today. He has authored numerous publications in national and international journals, with a recent emphasis on social media and professionalism in health care.

Prof Viskiđ is actively involved in continuing education, delivering lectures and participating in various international conferences in clinical restorative and implant dentistry, and social media professionalism. He has been serving as the president of the Croatian Society for Aesthetic Dental Medicine since 2018 and has been on the Board of Directors of SCAD since 2023.

Oral Presentations

Saturday, October 19
8:40-9:10

The Colors of Social Media

Joško Viskiđ, DDS, MS, PhD

Lecture Description:

Social media has infiltrated every aspect of daily life, and dentistry has embraced this new arena with open arms. They offer unique platforms for education, networking, and, most interestingly, self-promotion and business marketing. However, as with any new social construct, a lack of understanding and guidelines opens the possibility of many new dangers. This presentation will discuss the true colors of social media and how to navigate these new waters ethically, successfully, and professionally.

Objectives:

- [1] Understand the dangers and benefits of social media for dental professionals;
- [2] Analyze and select best practice examples for social media usage;
- [3] Evaluate different social media platforms for adequate management.

Oral Presentations

Saturday, October 19
9:10-9:50

The Single Discolored Central Incisor: Color and Form Challenges with Composite Resin Veneers

Newton Fahl, Jr., DDS

Lecture Description

Restoring a single discolored maxillary central incisor is a challenge that requires achieving symmetry in form and color. When indicated, composite resin veneering is an effective and conservative approach to achieving life-like esthetics. Among the critical challenges involved are reproducing ideal two-dimensional and three-dimensional anatomic profiles. At the same time, matching the correct color value, chroma, and hue with the use of opaquers, dentin, and enamel layers requires a systematic protocol. This presentation will introduce and explain the visual and operative criteria for achieving form and color symmetry when veneering a single maxillary central incisor with composite resins.

Objectives:

- [1] Resorting to gritted visual frames to achieve morphological symmetry;
- [2] How to interpret the perceived color and select the restorative materials for an optimal color match;
- [3] Replicating anatomical details of natural enamel texture.



Newton Fahl, Jr., DDS

Dr. Newton Fahl Jr. received his DDS degree from the Londrina State University, Brazil, in 1987. In 1989 he received the Certificate in Operative Dentistry and Master of Science degree from the University of Iowa, USA. Dr. Fahl is a fellow member of the American Academy of Esthetic Dentistry (AAED). He is an MCG-Hinman Foundation fellow.

His passion and dedication to education have led Dr. Fahl to be the recipient of the Academy of Esthetic Dentistry (AAED) 2008 President's Award for Best Teacher and the 2011 American Academy of Cosmetic Dentistry (AACD) Excellence in Cosmetic Dentistry Education Award. Dr. Fahl is an Adjunct Professor of Operative Dentistry at the University of North Carolina (UNC). Dr. Fahl has extensively published on direct and indirect bonding techniques and is the author of the book *Composite Resin Veneers – The Direct-Indirect Technique* (2020). He is on the editorial board of several peer-reviewed journals.

Oral Presentations

Saturday, October 19
9:50-10:25

Color of Natural Teeth



Rade D. Paravina,
DDS, MS, PhD

Razvan Ghinea,
BSc, MS, PhD

Rade D. Paravina is a tenured professor in the Department of Restorative Dentistry and Prosthodontics, University of Texas School of Dentistry at Houston. He serves as Director of the John M. Powers, PhD, Houston Center for Biomaterials and Biomimetics (HCBB). Dr. Paravina has authored/co-edited three books, 15 book chapters, 300+ peer-reviewed publications (papers and abstracts), and has designed/developed several dental products and tests. Dr. Paravina is founder and past president of the Society for Color and Appearance in Dentistry. He is President-Elect of the American Academy of Esthetic Dentistry. He serves as Editor-in-Chief of the Journal of Esthetic and Restorative Dentistry.

Dr. Ghinea is presently Associate Professor in the Department of Optics at the Faculty of Science, University of Granada, Spain. He is a PhD Advisor at the Doctoral School in Physics and Space Science of the University of Granada, Secretary of the Society for Color and Appearance in Dentistry (SCAD) and Section Editor for Color and Appearance for the Journal of Esthetic and Restorative Dentistry.

Dr. Ghinea's has published 47, eight book chapters, 14 conference proceedings, and over 60 conference abstract communications. He is a recipient of VITA Award for Excellence in Research Related to Color and Appearance in Dentistry and Best Poster Communication Awards at SCAD 2010, SCAD 2011, and SEPES IFED 2019.

Rade D. Paravina, DDS, MS, PhD **Razvan Ghinea, BSc, MS, PhD**

Lecture Description

Color and appearance are pertinent for esthetic outcomes and the natural appearance of dental restorations. This lecture will inform on a prospective clinical study of the in-vivo color range of human teeth using a research-grade non-contact spectroradiometer. The database was subsequently subjected to machine learning-based spectral modeling.

This presentation will contribute to understanding the color appearance and provide clinical and research recommendations, a biomimetic guide for enhancing esthetics.

Objectives:

- [1] Understand the nature of color appearance and their clinical relevance from the day-to-day dentistry point of view;
- [2] Review and contrast traditional (empirical) and contemporary (evidence-based) approaches to tooth color;
- [3] Learn about the benefits of spectral modeling.

Oral Presentations

Saturday, October 19
10:25-11:00

Biomimetic Approach to the Prosthetic Management of Acid Erosion

Amelia L. Orta, DMD

Lecture Description

Continued advancements in adhesive materials and techniques provide clinicians the ability to preserve tooth structure, optimize bond strengths and restore teeth with biomimetic principles. When applied to prosthodontic procedures, these principles allow for less invasive treatment options by relying on adhesion rather than classic retention and resistance form. This lecture will discuss how concepts of biomimetic dentistry can be readily applied to fixed prosthodontics in the restoration of acid erosion cases.

Objectives:

- [1] Understand what is biomimetic dentistry;
- [2] Understand principles of advanced adhesive techniques;
- [3] Understand how this approach can be used for prosthetic management of acid erosion.



Amelia L. Orta, DMD

Dr. Orta is Board Certified with the American Board of Prosthodontics and is both a Diplomate of the American Board of Prosthodontics and Fellow of the American College of Prosthodontists. Dr. Orta is a Clinical Assistant Professor with the Department of Advanced Oral Sciences and Therapeutics, Division of Prosthodontics, University of Maryland School of Dentistry where she enjoys sharing her passion for minimally invasive restorative dentistry with the Pre-doctoral students, Prosthodontic residents and Perio/Prosth fellows. Prior to academia, Dr. Orta practiced in Washington, DC.

Dr. Orta is past Editor-in-Chief to the American College of Prosthodontists Messenger publication. Outside of dentistry, Dr. Orta enjoys spending time with her husband and family on their 100-year-old horse farm.



Taiseer A. Sulaiman, DDS, PhD

Taiseer A. Sulaiman is a tenured associate professor and the director of Advanced Operative Dentistry and Biomaterials Research at the Adams School of Dentistry, University of North Carolina at Chapel Hill, where he earned his clinical certificate in Operative Dentistry and his PhD in Dental Materials from the Department of Prosthetic Dentistry and Biomaterial Sciences at the University of Turku in Finland in collaboration with the Department of Operative Dentistry at UNC. Dr. Sulaiman is a wet-handed clinician and a researcher who is passionate about bridging the gap between dental research and clinical application. Dr. Sulaiman's research focus is on dental ceramics, adhesion, cements, color, and appearance in dentistry. He has published over 80 peer-reviewed articles, abstracts, and book chapters. He is a member of many academies, including the Academy of Operative Dentistry (where he serves as councilor to the academy), the Society of Color and Appearance in Dentistry, IADR/AADR, and the American Dental Association. He has presented on numerous national and international stages and serves as a reviewer for many peer-reviewed journals.

Oral Presentations

Saturday, October 19
11:25-12:00

Restorative Considerations for Tooth Rehabilitation in the Esthetic Zone

Taiseer A. Sulaiman, DDS, PhD

Lecture Description:

Composite resins and ceramics have been used to restore teeth in the esthetic zone for decades. Evidence supporting long-term esthetic outcomes is limited, leaving clinicians unsure which procedure and material is more reliable. Also, can artificial aging methods and in-vitro studies provide insight into esthetic longevity?

Optimizing the clinical and esthetic outcomes of resin-based materials necessitates an understanding of their basic composition and properties, knowledge and training in the skills required to apply and finish them, and, most importantly, efficient light curing. The same is true for ceramic-based restorations, where understanding their optical characteristics, necessary tooth preparation design, and bonding procedure is critical to their longevity.

Objectives:

- [1] Learn about the direct and indirect restorative materials available for tooth rehabilitation in the esthetic zone, as well as how they compare to the optical properties of natural teeth;
- [2] Provide clinical recommendations for finishing and polishing steps, as well as how to choose and use light curing to improve the potential and longevity of composite resin restorations;
- [3] Classify ceramic materials used for esthetic tooth rehabilitation, their optical properties, and optimum bonding protocols.

Oral Presentations

Saturday, October 19
12:00-12:35

Injectable Techniques for Direct Anterior Restorations

Marcos Vargas, DDS, MS

Direct anterior composites represent the bread and butter of dentistry. As composites have evolved and improved in esthetics and physical properties, their indications have expanded. Newer techniques like injection have streamlined their insertion and made easier to achieve great anterior esthetic restorations. This lecture will present modern techniques and materials through analog and digital protocols, as well as clinical cases to illustrate the step-by-step of injecting composites.

Objectives:

- [1] Learn the planning of injection restorations;
- [2] Learn about the materials used in injection techniques;
- [3] Create direct composite restorations using injectable composites.



Marcos Vargas, DDS, MS

Dr. Marcos Vargas attended Cayetano Heredia University School of Dentistry in Lima, Peru and graduated in 1985. He spent two years, 1990 to 1992, in the AEGD program at the Eastman Dental Center in Rochester, New York. Dr. Vargas received his Certificate and master's degree in Operative Dentistry in 1994 at the University of Iowa where he is currently a Professor in the Department of Family Dentistry. His primary research interests are in dental materials including glass ionomers, dentin bonding, composite resins and esthetic dentistry. Dr. Vargas is also recognized for his expertise of Direct Restorative Treatment Procedures and conducts numerous lectures and hands-on seminars in the US and internationally. Dr. Marcos Vargas has published extensively in dental adhesion and resin composites for over 30 years. He maintains a private practice limited to Restorative Dentistry.

Oral Presentations

Saturday, October 19
12:35-13:25

Contemporary Monolithic Ceramics and the Digital Dental Team: the Evolution of Ceramic Technologies with the Human Touch

Edward A. McLaren, DDS, MS & Anvita Maharishi, BDS, MS

Lecture Description

This lecture will cover the current evolution of esthetic monolithic ceramic materials highlighting their material and esthetic properties. This lecture introduces a concept called the “Digital Dental Team” DDT for short. The concept DDT incorporates digital processes in the esthetic anterior workflow with all the clinical steps from case design, preparation techniques, and current adhesive materials and techniques, but with an analog “final touch” to the restorations to create an ideal individualistic customization of the surface textures and surface color. The “team” consists of digital scanning technology, digital printing, the dentist, the highest evolution of machinable monolithic materials, and an and a highly qualified technician who can apply the final artistic touch to make a believable restoration. How I do final touch comprising of texture, colorize, glaze and polish will be covered in detail.

Objectives:

- [1] Learn the most appropriate materials and how to select them for machined minimally invasive veneers;
- [2] Learn the specific preparation requirements for machined monolithic veneers to optimized mechanical and esthetic success;
- [3] Learn characterization techniques to optimize esthetics of monolithic digital veneers.



Edward A. McLaren, DDS, MS & Anvita Maharishi, BDS, MS

Dr. McLaren is a Prosthodontist and Master Dental Ceramist. He is a retired Professor from both UCLA and UAB School of Dentistry. He was founder and director of the many advanced programs and both schools.

Dr. McLaren currently is the CEO of ArtOral America a private teaching institute based in Park City Utah, he maintains a private practice limited to prosthodontics and esthetic dentistry.

Dr. McLaren has authored or co-authored over 90 articles, presented numerous lectures, hands-on clinics and postgraduate courses on ceramics and esthetics across the nation and internationally. He recently published a book entitled “The Art of Passion: Ceramics, Teeth, Faces, and Places.”

Dr. Maharishi an assistant professor in the department of Family Dentistry at the University of Iowa, College of Dentistry, and dental clinics. She received her dental degree (BDS) from Devi Ahilya University in India. She completed her Master of Science degree in Biomaterials and Clinical Dentistry Science at University of Alabama Birmingham, School of Dentistry and worked on wear with ceramic-based dental materials. Dr. Maharishi completed 3-year advanced graduate education in Prosthodontics at Harvard School of Dental Medicine along with Master of Medical Science (Oral Biology) degree.

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The SCAD goals are as follows:

- To serve as a uniting force in the profession by promoting and fostering greater awareness for color and appearance;
- To advance multidisciplinary collaboration and discovery among industrial and institutional researchers, clinicians, laboratory technicians, and others with an interest in color and appearance in dentistry;
- To create and implement educational and training programs on color and appearance for dental professionals and students;
- To promote dental health for the general public through the advanced art and science of color and appearance in dentistry.

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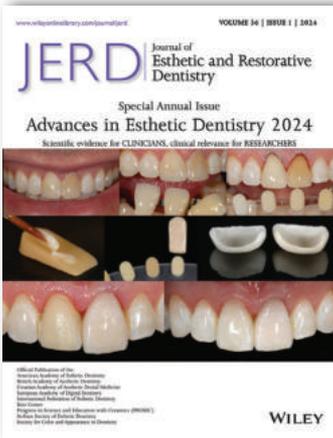
Journal of Esthetic and Restorative Dentistry (JERD) and SCAD

The Journal of Esthetic and Restorative Dentistry (JERD), an official publication of SCAD, publishes two issues per year devoted to color and appearance in dentistry.

JERD is the only journal devoted to esthetic dentistry with Impact Factor (IF), which is presently 3.2.

To submit a manuscript, go to <https://mc.manuscriptcentral.com/jerd>

We look forward to collaborating with you in supporting and promoting the best clinical and laboratory practice and research related to color and appearance.



Abstracts • Poster Presentations

Abstract #1 (Research)

Predicting Final Restoration Color Using Neural Network Models: The Impact of Substrate Lightness, Ceramic Thickness, and Translucency

M. AlMedaires*, N. Jafarbekloo, N. Jafarbekloo, P. Pereira, O. Dayane

Department of Restorative Dental Sciences,
University of Florida, Gainesville, FL, USA

Objectives: This study aimed to assess the influence of background color, ceramic shade, translucency and thickness on the color matching of dental restorations; and use machine learning to predicting parameters for color matching.

Methods: A multiple regression model was applied to evaluate how each factor affects color matching. The dataset included variations in lithium disilicate ceramic shade (A1, A2 and A3), translucency (HT, MT and LT) and thickness (0.5, 1.0, and 1.5 mm), as well as background color (black, white, enamel shades, and dentin shades, and their respective color measurements) taken with aspectrophotometer. A neural network model consisted of two layers, with 128 neurons in the first layer and 16 in the second was employed. The ReLU activation function and Stochastic GradientDescent optimizer was used. Performance metrics such as R^2 , mean squared error, and mean absolute error were calculated to evaluate the model. The model was trained over 1,000 epochs to refine its predictions, aiming to minimize discrepancies between predicted and actual color values.

Results: Background color was the most significant factor, with 71.45% of the variance in the final color values was explained by the model. Component-wise, the L^* component had an R^2 score of 0.7594 and an MAE of 1.0645, reflecting greater difficulty in predicting lightness. The a^* component had the lowest R^2 score (0.5993) but also the lowest MAE (0.4633), indicating more accurate predictions for the red-green spectrum. The b^* component exhibited strong performance with an R^2 score of 0.7848 and an MAE of 1.0454, indicating reliable predictions for the blue-yellow spectrum. SHAP analysis identified the initial L^* value (42.32%), ceramic thickness (19.51%), and ceramic translucency (10.36%) as the most influential factors.

Conclusions: Background color is a critical factor in minimizing color differences in dental restorations. The developed model demonstrates promising potential in predicting the color outcomes of lithium disilicate restorations.

Abstracts • Poster Presentations

Abstract #2 (Research)

Aging-dependent Translucency Parameter of Nine Flowable Resin Composites**F. Dini^{1*}, Y. Korkmaz-Ceyhan¹, M.M. Sly¹, R.L. Ocampo Escobedo², E. Abram³, R.D. Paravina^{1,2}**¹University of Texas, School of Dentistry, Restorative Dentistry & Prosthodontics, USA²University of Texas, School of Dentistry, John M. Powers, PhD Center for Biomaterials and Biomimetics (PCBB), USA³Semmelweis University, Department of Prosthodontics, Hungary**Objective:** To compare the translucency parameter (TP) of nine flowable resin composites exposed to artificial accelerated aging (AAA).**Methods:** Nine flowable composites were used to fabricate disc-shaped composite specimens (10-mm in diameter, 2-mm thick, n=5). The flowable composites were 3M Filtek Supreme Flowable Restorative (FS) Omnichroma Flow (OM), Gradia Direct LoFlo (GD), G-ænial Flo X (GF), G-ænial Universal Injectable (GU), Vertise Flow (VF), Beautiful Flow Plus X F00 (BF00), Beautiful Flow Plus X F03 (BF03) and Luna Flow (LF). Specimens were fabricated using cylindrical molds. Material was loaded into the mold, pressed between two glass slides lined with polyester film and polymerized for 40 seconds using a LED curing light (Valo, Ultradent). Specimens were finished using 600-grit SiC paper disks, and subsequently polished with PoGo one-step polishing disks (Dentsply) and a handpiece for 40 seconds. Spectral measurements were performed using a benchtop spectrophotometer before and after 150 kJ/m² of AAA. The differences in CIEDE2000 TP values (ΔTP_{00}), were calculated. A one-way ANOVA was used to compare the effect of material and AAA, while a Tukey's posthoc multiple comparison test was used to assess differences among levels within each variable ($\alpha=0.05$).**Results:** BF00 and BF03 had the most stable TP when exposed to AAA. Statistically significant differences were recorded among materials and AAA ($p<0.001$), and their interactions ($p<0.01$).Table: Means (SD) of CIEDE2000 Translucency Parameter (ΔTP_{00}) after exposure to 150 kJ/m²AAA.

Material	ΔTP_{00}
FS	-0.3 (0.03)
OM	-0.2 (0.01)
GD	-0.4 (0.03)
GF	-0.3 (0.02)
GU	-0.4 (0.03)
VF	-0.3 (0.01)
BF00	-0.5 (0.02)
BF03	-0.5 (0.02)
LF	-0.3 (0.02)

Conclusions: AAA provoked statistically significant material- and procedure-dependent changes of the translucency parameter of flowable composites.

Abstracts • Poster Presentations

Abstract #3 (Research)

Effect of Artificial Accelerated Aging on Gloss of Flowable Composites

Y. Korkmaz-Ceyhan^{1*}, F. Din¹, M.M. Sly¹,
R.L. Ocampo Escobedo², E. Abram³, R.D. Paravina^{1,2}

¹University of Texas, School of Dentistry,
Restorative Dentistry & Prosthodontics, USA

²University of Texas, School of Dentistry, John M. Powers,
PhD Center for Biomaterials and Biomimetics (PCBB), USA

³Semmelweis University, Department of Prosthodontics, Hungary

Objective: To evaluate gloss retention (GR%) of nine different flowable composites after artificial accelerated aging (AAA)..

Methods: Nine flowable composites were used to fabricate disc-shaped composite specimens (10-mm in diameter, 2-mm thick, n=5). The flowable composites were 3M Filtek Supreme Flowable Restorative (FS) Omnichroma Flow (OM), Gradia Direct LoFlo (GD), G-aenial Flo X (GF), G-aenial Universal Injectable (GU), Vertise Flow (VF), Beautifil Flow Plus X F00 (BF00), Beautifil Flow Plus X F03 (BF03) and Luna Flow (LF). Specimens were fabricated using cylindrical molds. Material was loaded into the mold, pressed between two glass slides lined with polyester film and polymerized for 40 seconds using a LED curing light (Valo, Ultradent). Specimens were finished using 600-grit SiC paper disks, and subsequently polished with PoGo one-step polishing disks (Dentsply) and a handpiece for 40 seconds. Gloss measurements were performed before and after exposure to 150 kJ/m² of AAA using a glossmeter (Rhopoint). The gloss retention percentages were calculated. A one-way ANOVA was used to compare the effect of material and AAA, while a Tukey's post hoc multiple comparison test was used to assess differences among levels within each variable ($\alpha=0.05$).

Results: The highest gloss was recorded for GU and FS. GR% upon AAA ranged from 87 and 113%. Statistically significant differences were recorded among materials and their interactions ($p<0.001$).

Table: Gloss (GU – gloss units) (SD) of flowable composites before and after 150 kJ/m² of AAA.

Restorative Material	GU Before	GU After	Gloss Retention (%)
FS	72.9 (6.3)	82.2 (4.8)	113 (5)
OM	66.5 (4.2)	69.5 (4.5)	105 (3)
GD	59.7 (10.3)	51.3 (7.3)	87 (9)
GF	55.9 (9.8)	56.6 (9.6)	101 (7)
GU	73.3 (7.1)	77.5 (7.3)	106 (1)
VF	60.4 (8.3)	52.3 (8.3)	87 (7)
BF00	65.9 (2.4)	69.0 (3.3)	105 (6)
BF03	63.6 (2.4)	66.4 (3.0)	104 (4)
LF	50.6 (8.7)	45.7 (11.9)	89 (12)

Conclusions: AAA provoked material- and procedure-dependent changes in gloss-retention of flowable composites. However, the gloss retention was high across all materials.

Abstracts • Poster Presentations

Abstract #4 (Research)

Aging-dependent Color Changes of Nine Flowable Resin Composites**R.L. Ocampo Escobedo^{1*}, Y. Korkmaz-Ceyhan², F. Dini², M.M. Sly², E. Abram³, R.D. Paravina^{1,2}**¹University of Texas, School of Dentistry, John M. Powers, PhD Center for Biomaterials and Biomimetics (PCBB), USA²University of Texas, School of Dentistry, Restorative Dentistry & Prosthodontics, USA³Semmelweis University, Department of Prosthodontics, Hungary**Objective:** To compare the color stability of nine flowable resin composites exposed to artificial accelerated aging (AAA).**Methods:** Nine flowable composites were used to fabricate disc-shaped composite specimens (10-mm in diameter, 2-mm thick, n=5). The flowable composites were 3M Filtek Supreme Flowable Restorative (FS) Omnichroma Flow (OM), Gradia Direct LoFlo (GD), G-ænial Flo X (GF), G-ænial Universal Injectable (GU), Vertise Flow (VF), Beautiful Flow Plus X F00 (BF00), Beautiful Flow Plus X F03 (BF03) and Luna Flow (LF). Specimens were fabricated using cylindrical molds. Material was loaded into the mold, pressed between two glass slides lined with polyester film and polymerized for 40 seconds using a LED curing light (Valo, Ultradent). Specimens were finished using 600-grit SiC paper disks, and subsequently polished with PoGo one-step polishing disks (Dentsply) and a handpiece for 40 seconds. Spectral measurements were performed using a benchtop spectrophotometer before and after 150 kJ/m² of AAA. The CIEDE2000 color differences (ΔE_{00}) were calculated. A one-way ANOVA was used to compare the effect of material and AAA, while a Tukey's post hoc multiple comparison test was used to assess differences among levels within each variable ($\alpha=0.05$).**Results:** BF00 and BF03 exhibited the best color stability when exposed to AAA, followed by FS and LF. Statistically significant differences were recorded among materials AAA ($p<0.001$), and their interactions ($p<0.01$).Table: Means (SD) of CIEDE2000 color differences of flowable resin composites before and after exposure to 150 kJ/m² AAA.

Material	ΔE_{00}
FS	2.4 (0.2)
OM	3.8 (0.1)
GD	4.2 (0.1)
GF	3.8 (0.1)
GU	4.4 (0.2)
VF	2.9 (0.1)
BF00	1.7 (0.1)
BF03	1.7 (0.1)
LF	2.6 (0.0)

Conclusions: AAA provoked statistically significant material- and procedure-dependent color changes of flowable composites.

Abstracts • Poster Presentations

Abstract #5 (Research)

Effect of Dehydration on Dental Color: An In-vivo Analysis

**J. Ruiz-López*, M. Chacón Werner, J.C. Cardona Pérez,
M. Tejada-Casado, M.M. Pérez Gómez, R.I. Ghinea**

Department of Optics, Faculty of Science, Campus de Fuentenueva,
University of Granada, Edificio Mecenas, s/n 18071, Granada, Spain.

Objectives: Objectively assess and monitor changes in dental color caused by the dehydration process.

Methods: Spectral reflectance measurements were conducted on the upper central incisors of 35 participants. Measurements were recorded at baseline and then at 15-second intervals over a period of 5 minutes, resulting in 20 measurement points per tooth. A PR 670 spectroradiometer (PhotoResearch, Chatsworth, CA) was employed alongside two LED light sources (ML46231122, BoliOptics, Rancho Cucamonga, CA) positioned at a 45° angle to illuminate and measure the teeth. Before testing, all participants brushed their teeth, and their measurements were taken in an air-conditioned room without oral breathing to avoid affecting the results. Using the spectral reflectance data, the CIE Lab* color coordinates were calculated using the CIE 2° Standard Observer and the CIE D65 Standard Illuminant. The CIEDE2000 color difference formula was used to evaluate the color changes over different time intervals and clinically assesses based on perceptibility (PT) and acceptability (AT) thresholds for dentistry.

Results: Throughout the 5-minute dehydration process, the CIE a* coordinate remained stable, whereas the CIE b* coordinate showed a clear decrease with time. Notably, significant changes in the CIE L* coordinate were observed within just 5 minutes, with the most pronounced changes occurring during the first 90 seconds. Specifically, after 1 minute of dehydration, 50% of the samples exhibited color differences exceeding the perceptibility threshold (PT), and 12% exceeded the acceptability threshold (AT). At 2 minutes, 68% of the samples surpassed PT and 24% exceeded AT. By the end of the 5-minute period, over 84% of the color differences exceeded PT and 41% exceeded AT.

Conclusions: Dental dehydration results in substantial changes in tooth color. To ensure an optimal aesthetic outcome, color determination and shade matching should be completed within 60 seconds, minimizing the impact of dehydration on color perception.

Abstracts • Poster Presentations

Abstract #6 (Research)

Impact of Color Science Training on Shade Selection of Light-colored Teeth

V. Schussler da Silva*, N. Jafarbekloo, N. Jafarbekloo, P. Pereira, M. Rocha, D. Oliveira

University of Florida College of Dentistry,
Restorative Dental Sciences, Operative Division

Objectives: The study aimed to assess whether additional education in color science could improve the accuracy and consistency of shade selection in patients with lighter teeth shades, which are known to be more difficult to match compared to darker shades.

Methods: 52 dental providers were recruited and divided into two groups: a control group that received no additional training and a test group that underwent color science training. Participants selected the shade of the maxillary left central incisor of 5 patients using the VITA Linearguide 3D Master in two separate sessions. Shade selection accuracy was measured by calculating the ΔE_{00} using the CIEDE2000 formula. The results were analyzed using paired t-tests and ANOVA.

Results: The results of the ANOVA for lightness (ΔL) revealed no significant difference between the test and control groups (F-statistic: 0.042, p-value: 0.837). However, paired t-tests for the test group indicated a significant improvement in lightness after training (t-statistic: 2.08, p-value: 0.039), while the control group showed no significant change (t-statistic: 1.37, p-value: 0.174). For the B-axis color metric (Δb), ANOVA showed no significant difference between groups (F-statistic: 0.078, p-value: 0.780), and paired t-tests revealed no significant changes within either group. Similarly, ANOVA for the A-axis color metric (Δa) found no overall group difference (F-statistic: 0.111, p-value: 0.740), though a paired t-test for the test group showed a significant improvement (t-statistic: -2.02, p-value: 0.046), while the control group did not show a significant change (t-statistic: 0.49, p-value: 0.628).

Conclusions: This study demonstrates that color science training may improve shade selection accuracy, particularly in lightness and A-axis color metrics. However, the training did not significantly affect B-axis color selection. The findings suggest that targeted training may enhance dental professionals' ability to select shades in more challenging cases, such as those with lighter teeth.

Abstracts • Poster Presentations

Abstract #7 (Research)

Color Change and TP of an Extrinsically Characterized 3D-Printed Resin

R. Nisie Tango*, **N.M.F. Gonçalves**, **J.R.C.S. Siqueira**,
N.C.R. Ribeiro, **M.A. Bottino**

Department of Dental Materials and Prosthodontics,
Institute of Science and Technology/ Campus of São José dos
Campos – São Paulo State University/ UNESP, Brazil

Objectives: To verify the color change (ΔE_{00}) and translucency parameter (TP) of extrinsically characterized 3D-printed resin, after simulated toothbrushing.

Methods: Twenty-four discs of resin - VarseoSmile Crownplus (BEGO) were 3D-printed, processed and polished with fine-grained sandpaper. The specimens were divided into three groups: control (no treatment), self-etching silane - Monobond Etch & Prime, and 5% hydrofluoric acid etching ($n = 8$). The extrinsic characterization layer was applied, followed by color measurements against white and black tiles, using a reflectance benchtop spectrophotometer (Konica Minolta CM2600D, CIE D65 standard illuminant, $d/8^\circ$, 2° 1931 standard observer, specular component included (SCI), UV component included, and small area view (SAV) aperture (6 mm in diameter)). Measurements were repeated after simulated toothbrushing of 1; 2; 5 and 10 years. Data of ΔE_{00} and ΔTP_{00} were submitted to 2-way ANOVA and Tukey's test ($\alpha=0.05$).

Results: The highest color change was registered for baseline x characterization comparison - $\Delta E_{00} = 6.78$, and continued toothbrushing increased the color change - $\Delta E_{00} = 0.49$; 0.63 and 1.49 for 1x 2 years; 2 years x 5 years; 5 years x 10 years comparisons, respectively. Results of ANOVA showed significance of surface treatment and toothbrushing interaction on ΔTP_{00} values.

Conclusions: Simulated toothbrushing increased the color change and modified the TP_{00} values of an extrinsic characterized 3D-printed resin.

Abstracts • Poster Presentations

Abstract #8 (Research)

Color Prediction Algorithm for Multilayer Dental Materials: A Pilot Study

M. Tejada-Casado^{1*}, R. Ghinea¹, R. Vazquez-Conejo¹, H. Lübbe², V. Duveiller², J. Ruiz-López¹, L.J. Herrera³

¹Department of Optics, Faculty of Science, Campus de Fuentenueva, University of Granada, Edificio Mecenas, s/n 18071, Granada, Spain.

²Vita Zahnfabrik H. Rauter GmbH & Co. KG, Ballyweg 6, 79713 Bad-Säckingen, Germany.

³Department of Computer Engineering, Automatics and Robotics, E.T.S.I.I.T. University of Granada, School of Technology and Telecommunications Engineering. Calle Periodista Daniel Saucedo Aranda s/n 18071, Granada, Spain

Objectives: Development of a regression-based color prediction method for resin-based composite prosthetic teeth of different shades.

Methods: Monolithic samples of enamel (shades: SH1, S1, S2, S3, SSB3, SS5M2 and SSL6), dentine (shade: 2M2) and root (shades: 0M3, 1M2, 2M1, 2M2, 2M3, 3M2 and 4M2) of clinically relevant thicknesses, and tooth-shaped samples of enamel (S3), dentine (2M2) and the aforementioned root shades, as well as, tooth-shaped samples of the aforementioned enamel shades, dentine (2M2) and root (2M2) were fabricated. This algorithm was designed to operate color prediction as a function of enamel and root variations. A non-contact spectroradiometer (CIE 45°/0° geometry) was used to measure the spectral reflectance of all samples over a black background. Reflectance values were converted into CIE-L*a*b* color coordinates using CIE 2° Standard Observer and CIE D65 Standard Illuminant. A partial-least-squares (PLS) regression algorithm was built and tested using a Cross Validation (leaving-one-out) approach. Therefore, for each shade combination, the training-set consisted of the CIE-L*a*b* values of the corresponding monolithic samples and the 6 tooth-shaped samples fabricated with those monolithic shades, while the remaining tooth was used for performance evaluation (test-set). ΔE_{00} and corresponding 50:50% acceptability and perceptibly thresholds (AT_{00} and PT_{00}) for dentistry were used as performance assessment.

Results: Mean ΔE_{00} among predicted and measured (real) CIE-L*a*b* values were $\Delta E_{00} = 0.67$, with 100% of the color differences lower than AT_{00} and 57.14% lower than PT_{00} , for enamel variations. For root variations, $\Delta E_{00} = 0.48$, with the 100% of the color differences below AT_{00} and 85.71% below PT_{00} , were obtained.

Conclusions: The proposed predictive method allowed, from monolithic samples data, color estimation of prosthetic teeth of different shades with a high degree of accuracy. These results enable the custom design and manufacture of new prosthetic teeth, supporting the clinical success of dental restorations.

Abstracts • Poster Presentations

Abstract #9 (Clinical)

Non-retentive CAD/CAM Onlays for Rehabilitation of Extensively Damaged Vital Teeth

G. Arossi*, C. Grover, A. Eisner, D. Barnes, Q. Alkhubaizi

University of Maryland School of Dentistry,

Department of Comprehensive Dentistry, AEGD Program, USA

Background: A 60-year-old female patient presented extensively destroyed teeth (20; 29; 30; 31), and a non-restored 10-year-old implant (19). All teeth were vital and asymptomatic. Occlusion was not influenced by the teeth condition, and the patient presented protrusive and lateral guides, as well as proper position of the Spee curve.

Objective: The treatment planning considered a minimally invasive approach to avoid root canal treatments, by using non-retentive onlays on teeth number #20, 29, 30 and 31, as well as a temporary crown at the implant site.

Case report: Ceramic onlays followed the same protocol: (1) x-ray and pulp vitality assessment, (2) rubber dam isolation, (3) removal of old restoration, (4) preparation sandblasting with 50µm Al₂O₃ particles, (5) enamel etching with 34% phosphoric acid for 30 sec., (6) Prime&Bond Elect application (7) bulkfill SDR flow+ composite created the resin coating, (8) core build-up using TPH Sprecra ST. After rubber dam removal, (9) non-retentive onlay preparation, (10) scan using CEREC Omnicam and (11) CAD/CAM Tessera onlay fabrication, (12) check marginal adaptation, (13) glazing and firing, (14) Intaglio etched with Porcelain Etch 9% for 20 seconds, (15) Caulk 34% phosphoric acid for 30 seconds, (16) Calibra Silane application, (17) rubber dam isolation, (18) prep sandblasting, (19) prep etching with Caulk 34% tooth conditioner (20), Prime&Bond Elect application (21) Calibra Ceram used to cement the restoration, (22). Enhance and PoGo were used to polish the margins after cement excess removal, (23) occlusal adjustments.

Clinical Consideration: Same-day delivery; minimally invasive approach, esthetic materials, high bond strength adhesive technique and conservative preparation techniques are some of the advantages that allowed this treatment in a predictable way. Conclusions: The intelligent use of ceramic, composite, and adhesive systems can produce restorative procedures with long-lasting clinical outcomes, preserving tooth vitality in extensively destroyed teeth.

Abstracts • Poster Presentations

Abstract #10 (Clinical)

Interdisciplinary Approach for a Predictable Esthetics Outcome, a Case Report

A. Roberts, M. Eldiwany*

The University of Texas School of Dentistry at Houston,
Department of Restorative Dentistry and Prosthodontics, USA

Background: Lack of oral hygiene, and poor dietary habits will have devastating long-lasting detrimental effects on dentition. It causes poor quality of life and low self-esteem, and it is our responsibility to educate our patients that oral health reflects overall health.

Objective: This case report outlines that a multidisciplinary approach results in a predictable esthetics outcome. This approach starts with patient education and establishing good oral hygiene and dietary habits.

Case report: A 21-year-old male patient presented with extensive decay and demineralization of the six maxillary anterior teeth. The patient's lack of oral hygiene and a poor diet led to severely demineralized and chipped teeth. The patient was self-conscious about his smile and was ready to improve his oral health.

Clinical and radiographic evaluation revealed demineralization of teeth approximating the gum line on six anterior teeth, and a diagnosis of altered passive eruption. Bone sounding was done to determine the need for osseous crown lengthening. After consulting with the periodontist frenectomy and crown lengthening procedures were performed to expose healthy tooth structure. Demineralized and decayed tissue were removed from teeth #6-11 and core build ups using TPH Spectra ST A2 composite material were done. After maintaining healthy oral tissue, teeth #s 6-11 were prepped for CAD/CAM Cerec Tessera crowns. Reduction guide fabricated from a duplicate of the wax up was used to ensure adequate reduction. Final Cerec Tessera crowns were bonded using Calibra Ceram cement following manufacturer's instructions.

Clinical consideration: Three months follow up showed that patient education and multidisciplinary approach provides predictable outcomes

Conclusion: Taking the time to communicate with the patient and discover the external factors contributing to his oral health was crucial for a lasting success. Through the concerted effort to understand his unique circumstances, both his oral and overall health have significantly improved.

Abstracts • Poster Presentations

Abstract #11 (Clinical)

Long-Term Temporaries with Injectable Flowable Resin Composite: a Case Report

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A 45 year old patient presented to the AEGD clinics with the chief complaint: "I want bigger and whiter teeth". The patient presented no incisal display and an inverted incisal plane. Intraoral analysis showed upper and lower partially edentulous arches, lack of posterior support, wear facets, and a failing PFM crown on #13. No occlusal stability, and incorrect anterior and canine guidance were noticed. A full-mouth restorative treatment plan was proposed.

Objectives:

- Raise the VDO
- Reestablish adequate occlusion, canine and anterior guidance
- Improve overjet and overbite
- Improve teeth dimensions and incisal display
- Reestablish the incisal and occlusal plane
- Restore posterior support.

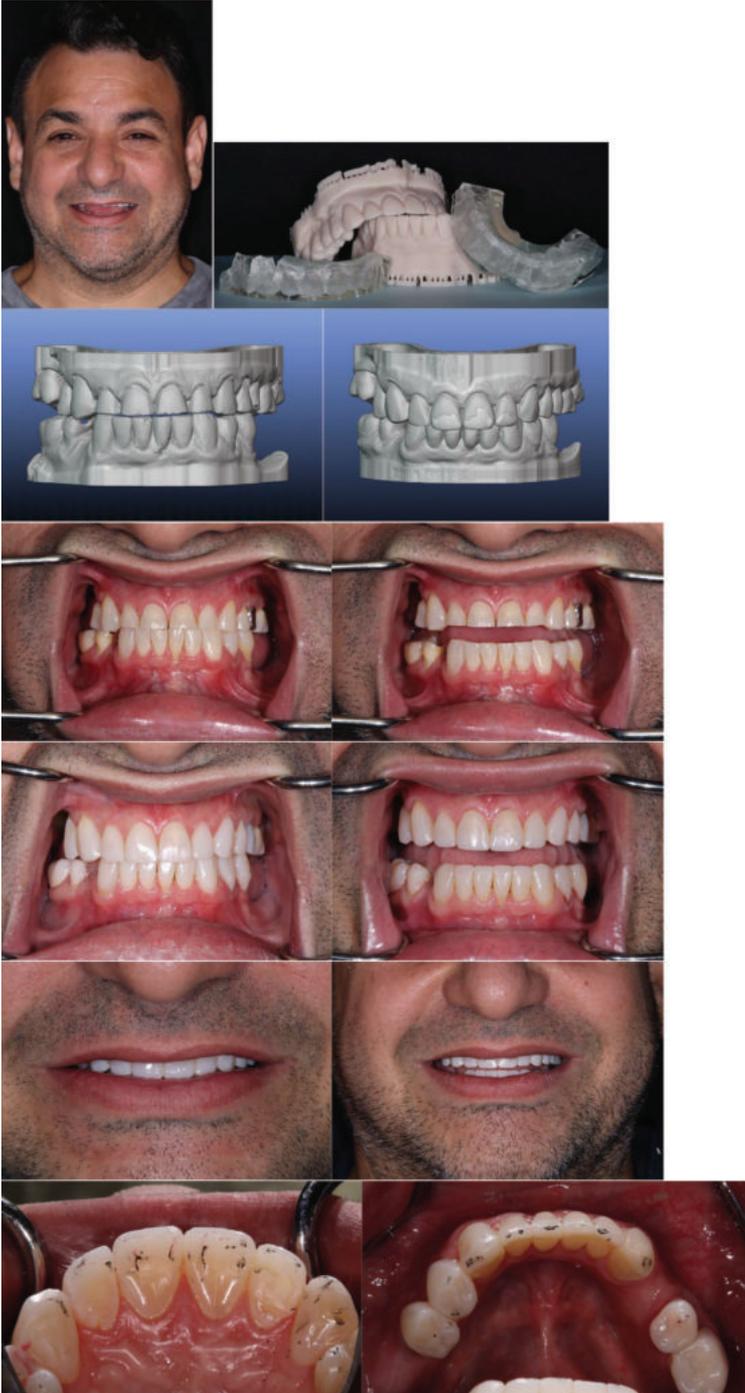
Clinical Consideration: Because the patient is going to be in temporaries for a long period of time, injectable flowable composite provisional restorations were fabricated. It is an easy procedure to do, there is no need to do teeth preparations, accurate occlusal contacts, teeth dimensions and contours can be achieved, and it allows us to test the new proposed occlusal scheme.

Clinical Workflow:

- Intraoral scans, digital smile design and waxup (B4D, Blender for Dental software)
- Printed 3d models and fabrication of clear matrices (Exaclear PVS GC America, Alsip, IL)
- Isolation with teflon tape of every other tooth
- Etching with 38% phosphoric acid (Scotchbond Etchant, 3M ESPE, St Paul, MN)
- Adhesive application (Adhese Universal, Ivoclar Vivadent, Schaan, Liechtenstein)
- Clear matrix placement and injection of flowable composite (Filtek Supreme Flowable, 3M ESPE, St Paul, MN)
- Finishing and polishing with #12 blade and polishing discs (Sof-Lex Discs, 3M ESPE, St Paul, MN)
- Procedure repeated for the remaining teeth.

Conclusions: This technique allows us to achieve beautiful results and a stable occlusion for long periods of time in full mouth restorative cases.

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Abstract #12 (Clinical)

Enhancing Dentistry: The Power of Dental Mock-up Previews

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Background: Mock-ups in dentistry enable patients to visualize the final outcome of their dental procedures, providing a clear preview of their anticipated results.

Objectives: This case report reviews the advantages of utilizing mock-up prior dental treatment in the esthetic zone.

Case Report: The patient initially reported the CC of “My teeth are breaking”. Upon assessment, notable findings included erosion of the lingual surfaces of anterior teeth and fractured incisal edges. Diagnostic casts were made, and a comprehensive digital smile design was completed. Subsequently, a 3D printed model was generated and a PVS matrix was fashioned to create a mock-up, providing the patient with a visual representation of the proposed treatment plan.

Clinical Considerations: Recognizing the need to increase the clinical crown, crown lengthening was determined necessary. Following this procedure, crown preparations were completed. Provisional restorations were fabricated based on mock-up template, allowing the patient to preview the anticipated outcome. After ensuring optimal occlusion through final adjustments, the patient was scanned with the temporaries in place. This scan was then forwarded to the dental laboratory for the fabrication of the definitive restorations.

Conclusions: Mock-ups play a crucial role in the dental treatment process by helping to visualize the final restorations, customize treatment plans, facilitates communication with the dental laboratory and ensure patient satisfaction. Incorporating mock-ups in the dental practice can enhance the patient experience and achieve optimal treatment outcomes.

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Abstract #13 (Clinical)

No Time to Waste: Laser Removal of Ceramic Restorations

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Objectives: Removing existing porcelain veneers without causing additional damage to the underlying tooth structure is notoriously difficult. The investigation aimed to explore a minimally invasive method for removing porcelain veneers while preserving the underlying tooth structure.

Case Report: A patient presented with 26-year-old labial porcelain veneers spanning from the right maxillary canine to the left. In addition, lingual class III composite were noted. A fracture in the porcelain motivated the patient to replace all veneers. Clinical findings confirmed a fractured on the right central incisor restoration in addition to recurrent caries in all six veneers.

Methods: A minimally invasive approach using an Erbium laser was selected to preserve remaining teeth structures and conservatively remove the defective restorations. The Er,Cr:YSGG laser was set to 3 watts, 20 Hz, 50% air, and 50% water using the turbo handpiece with an MX7 700- μ m-diameter tip, per the manufacturer's recommendations. No anesthetic was used during the procedure. The laser was positioned in noncontact mode 3-5 mm above and perpendicular to the existing restorations. The laser beam was used in a scanning mode moving at a pace of 2 mm per second. Each tooth was irradiated for 60 seconds per cycle and allowed to cool down. The maximum number of irradiations per tooth was 4 cycles. The cement under the veneers was successfully disrupted and each restoration was retrieved without damaging the underlying tooth structure.

Results: The Er,Cr laser effectively disrupted the cement beneath the veneers, allowing for their removal without damaging the underlying tooth structure. The procedure successfully addressed the fractured restoration and recurrent caries in all six veneers.

Conclusions: This clinical case demonstrates that when appropriate settings are used, the Er,Cr:YSGG laser can be a great adjunctive tool to remove ceramic restorations without damaging tooth structure.

Abstracts • Poster Presentations

Abstract #14 (Clinical)

Old School and New School: Combining Contemporary Shade Matching Technology for Treating a Single Central Incisor — A Case Report

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Objectives: This case report aims to demonstrate the implementation of advanced shade matching and communication tools to address a patient's complaint of a discolored resin-restored single central incisor using traditional layered feldspathic porcelain.

Clinical Considerations: A 33-year-old female patient presented with a discolored composite restoration on tooth #9, resulting from a childhood accident. Her chief complaint was, "I don't like the shape and color of my front tooth." The restoration covered the labial, mesial, and lingual surfaces with well-adapted margins. Radiographic examination revealed a radiopaque pin on the mesial aspect of the direct Class IV restoration. An intraoral spectrophotometer (Vita Easyshade V) was used for the initial shade evaluation. Polarized clinical photographs were taken for shade communication using traditional shade tabs and a balanced reference gray card. Images were imported into color mapping software to generate an objective color formula for the feldspathic porcelain and virtual shade trial (eLab Prime). Digital techniques were employed to mirror the contours of the contralateral incisor for provisionalization. The final restoration was fabricated using layered feldspathic porcelain.

Conclusions: Integrating digital shade-matching tools and communication techniques with traditional concepts provides a comprehensive approach to simplifying challenging shade communication and clinical protocols, especially in high esthetic demand cases.

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Abstract #15 (Clinical)

Conservative Esthetic Approach Using Injection Molding Technique in Academia

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Direct composite resins are popular in dentistry due to their high esthetics,, affordability, and effective bonding properties, making them a minimally invasive and cost-effective option for restorations. Especially for anterior teeth, it is essential to optimize direct restorations to achieve ideal function, esthetics, and anatomy. Digital planning enhances this process by allowing for precise measurements and visualizing the outcome before treatment begins, improving efficiency and reducing the number of appointments.

Free-hand techniques for esthetic composite restorations are often complex and time-consuming, particularly for students and novate clinicians who are still developing their skills. The Injection Molding Technique simplifies this process by using a flowable composite injected into a silicone matrix, reducing chair time and improving precision. This technique is especially useful in academic settings, serving as a teaching tool to guide students through anterior tooth restorations.

Objective: To introduce a systematic, step-by-step approach designed for senior dental students to enhance their skills in anterior direct restorations using the Injection Molding Technique.

Clinical Consideration: A digital workflow was utilized, starting with intraoral scanning and 3D-printed models to create silicone matrices for precise composite placement. The approach improves predictability and efficiency, helping students overcome challenges in recreating natural contours and esthetics.

Conclusions: The combination of digital workflows and the injection molding technique offers a highly predictable and efficient method for anterior direct composite restorations. This structured method improves students' practical skills, enhances clinical outcomes, reduces chairside time, and increases patient satisfaction. By following these guidelines, both students and clinicians can achieve consistent and esthetic results in anterior direct composite restorations, promoting long-term success.

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