Color and Esthetics for a Lifetime

5th Annual Conference of the Society for Color and Appearance in Dentistry (SCAD)

Denver, Oct 3-5, 2013 • Ritz Carlton Hotel

www.scadent.org • info@scadent.org

Color and Esthetics for a Lifetime

5th Annual Conference • Denver, Ritz Carlton Hotel, October 3-5, 2013

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Recommended Attire

Welcoming reception and educational sessions: Business casual
President's Dinner: Black tie

The formal continuing education programs of Vident are accepted by AGD and ADA CERP for Fellowship/Membership credit. The current term of acceptance extends from 7/1/2013 to 5/1/2016. This activity is designated for 16 continuing education credits.

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The 5th Annual Conference of the Society for Color and Appearance in Dentistry (SCAD) will comply with appropriate disclosure policies as set forth by the American Dental Association's code of ethics and professional standards. The SCAD speakers will verbally disclose any material, financial or other relationships that pose a potential conflict of interest. Speakers will also disclose any unapproved use of products or devices that they will be discussing. Disclosure requirements are not intended to imply any impropriety, but rather to inform the audience that they exist.

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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 the beautiful Ritz-Carlton Hotel Denver for our 5th Annual Conference. The meeting features high-quality, evidence-based information on color-related issues in dentistry presented by many of the leaders in this field, including:

Pinhas Adar • Naoki Aiba • Luiz Narciso Baratieri • Lawrence E. Brecht • Theodore P. Croll • Krikor Derbabian • Kevin J. Donly • Sillas Duarte • Ronald E. Goldstein • Dan Grauer • Charles J. Goodacre • Jens Fischer • Francisco H. Imai • So-Ran Kwon • Ernesto A. Lee • Tal Morr • Dan Nathanson • Jacinthe M. Paquette • Stefan Paul • Wolfgang Rauh • Irena Sailer • Herbert Scheller • Thomas Sing • Van P. Thompson • Marcos Vargas

Our poster session will offer an additional valuable source of evidence-based information on a variety of topics. This year, we will identify recipients of the newly established SCAD VITA Awards for excellence in research related to color and appearance in esthetic dentistry. We received many applications from US and international pre-doctoral students, graduate students, and non-tenured junior faculty for these awards. The 2013 award for each category consists of a stipend, complimentary registration, and lodging during the Annual Meeting.

We are also pleased to announce a new partnership with the Journal of Esthetic and Restorative Dentistry published by Wiley Blackwell. Beginning in 2014, JERD will be the official publication of SCAD and one issue per year is reserved for Journal of Color and Appearance in Dentistry guest-edited by Dr. Rade Paravina.

Sincerely,

Edward J. Swift, Jr., DMD, MS
President, Society for Color and Appearance in Dentistry

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SCAD Mission and Goals

The Society for Color and Appearance in Dentistry (SCAD) was founded in 2008 as a consortium of dental professionals and other experts interested in this area of esthetic dentistry specifically related to scientific investigation and application of color and appearance.
The goals of SCAD are as follows:

- To serve as a uniting force in the profession by promoting and fostering greater awareness of color and appearance in dentistry;
- 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.

SCAD Membership

The membership of this Corporation consists of dentists, researchers, and other persons whose qualifications and classifications are as established in the Bylaws.
The members of this Corporation are classified as follows:

Associate Member shall be a person ineligible for any other type of membership in the Corporation.

Active Member in the Corporation is a distinctive honor. It shall comprise persons invited by the Executive Committee or Associate Members nominated and endorsed by at least three (3) Active Members in good standing.

Fellows A Fellowship may be bestowed on any Active Member by majority vote of the Board of Directors for such term as the Board of Directors may determine.

Corporate Members are available to organizations associated with color and appearance in dentistry, and which support the purposes of the Corporation.

For more details on SCAD membership classifications and requirements, please refer to our bylaws available online at http://www.scadent.org/about-scad/scad-bylaws

SCAD Governance

EXECUTIVE COMMITTEE

President (2012-2014) Edward J. Swift, Jr.
President-Elect (2012-2014) Dan Nathanson
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Yumiko Hosoya, Asia-Pacific (2010-2012)
Gerard Kugel, North America (2012-2014)
Esam Tashkandi, Africa & Middle East (2012-2014)

SCAD VITA Award - Funding Opportunities

Society for Color and Appearance in Dentistry (SCAD) has established the VITA Award for Excellence in Research Related to Color and Appearance in Esthetic Dentistry (SCAD VITA Award) to acknowledge the successful professional collaboration with and the long-term support of VITA Zahnfabrik.

Three categories of applicants are eligible for the awards: pre-doctoral students, graduate students, and non-tenured junior faculty. Applicants are required to submit an application and abstract following the instruction provided at the SCAD website (www.scadent.org) by August 15, 2014. The awardees will be announced at the annual meeting and each recipient will receive a $1,500 stipend.

Program

Thursday, October 3, 2013

5:00-6:00	*SCAD Executive Committee Meeting*
7:30-9:30	*Welcoming Reception*

Friday, October 4, 2013

8:00-8:15	Opening Ceremony
8:15-8:40	Ronald E. Goldstein: *Color and Esthetics for a Lifetime*
8:40-9:05	Lawrence E. Brecht: *Improving Facial Appearance in Cleft Lip & Palate Patients Through Early Intervention*
9:05-9:30	Theodore P. Croll: *Enamel Microabrasion: A 26-Year Retrospective*
9:30-9:55	Kevin J. Donly: *Esthetics Achieved from Microabrasion and Bleaching in Children*
9:55-10:35	*Q/A, Break, Poster Viewing*
10:35-11:00	Stefan Paul: *Immediate Implant Placement: Treatment at Risk or Taking Esthetic Advantage?*
11:00-11:25	Jens Fischer: *Zirconia Implants*
11:25-12:00	**VITA Award recipients**
11:50-1:00	*Q/A, Lunch, Lunch& Learn*
1:00-1:25	Wolfgang Rauh: *Advances in Dental Shade Measurement and Shade Selection*
1:25-1:50	Francisco H. Imai: *From Physical Properties to Material Identification – What One Needs to Know before Considering Color Appearance in Dentistry*
1:50-2:15	So-Ran Kwon: *Scope and Mechanism of Tooth Whitening*
2:15-2:40	Charles J. Goodacre: *Uniting Morphology, Color, Cervical Contour, Surface Smoothness, and Marginal Fit for Optimal Esthetics and Biologic Health*
2:40-3:20	*Q/A, Break, Poster Viewing*
3:20:3:45	Marcos Vargas: *To Layer or not to Layer, That is the Question*
3:45:4:25	Sillas Duarte: *Clinical Challenges for Esthetic Restorations: Defying the Optical Properties of Current Esthetic BioMaterials*
4:25-4:30	*Q/A, Mini Break*
4:25-5:00	*SCAD Open Meeting*
7:00-11:00	*Presidents Dinner*

Saturday, October 5, 2013

8:00-8:25 Van P. Thompson: *Tooth Enamel Decussation: Role in Esthetics and Mechanical Response*
8:25-8:50 Naoki Aiba: *Shade Communication through Photograph*
8:50-9:15 Thomas Singh: *Layers of Creation - The Art Behind the Smile*
9:15-9:40 Pinhas Adar: *The Latest Technology & Solutions with Restorative and Implant Esthetics*
9:40-10:20 *Q/A, Break*
10:20-10:45 Dan Grauer: *Brace-Face no More*
10:45-11:10 Jacinthe M. Paquette: *Meeting the Challenge of High Esthetic Expectations*
11:10-11:35 Ernesto Lee: *Pink and White Zirconia Restorations for the Treatment of the Compromised Dentition*
11:35-12:00 Tal Morr: *CAD CAM Based Provisional Restorations - Advantages, Limitations, and Applications*
12:00-1:00 *Q/A, Lunch, Lunch & Learn*
1:00-1:25 Herbert Scheller: *Aspects of Esthetics in Dentures in the Anterior Maxilla*
1:25-1:50 Irena Sailer: *Mucosal Discoloration - Do Reconstructions Influence the "Pink Esthetics"?*
1:50-2:15 Krikor Derbabian: *Applying Removable Prosthodontic Principles with Current Day Materials and Technologies*
2:15-2:55 *Q/A, Break*
2:55-3:20 Dan Nathanson: *The Important Role of Cements in Esthetic Dentistry*
3:20-4:00 Luiz Narciso Baratieri: *Using Composites in Anterior Teeth-Details that Make a Difference*
4:00-4:10 *Closing Ceremony*

Lunch & Learn

Friday, Oct 4 11:50-1:00

Mark Baker: *New Materials and Technologies for Predictable Esthetics*

Saturday, Oct 5 11:50-1:00

Shigemi Nagai & Aki Yoshida: *How to Translate and Apply Color Readings for Perfect Color Match on Ceramic Restorations*
Joe C. Ontiveros: *Advances in Tooth Whitening*
Sabiha S. Bunek: *Cement Selection for All-Ceramic Restorations*
Ghazal Khashayar: Blending Effect and Color Matching

Ronald E Goldstein, DDS

Dr. Ronald Goldstein is currently Clinical Professor of Oral Rehabilitation at the Georgia Regents University School of Dentistry, Augusta, Georgia, Adjunct Clinical Professor of Prosthodontics at Boston University Henry M. Goldman School of Dental Medicine, and an Adjunct Professor of Restorative Dentistry at The University of Texas Health Science Center at San Antonio, Texas. Dr. Goldstein has presented continuing education courses at more than twenty universities and lectured at over 600 dental meetings worldwide. He is a contributor to ten published texts and author of the text Esthetics In Dentistry, published by PMPH. He is co-author of other texts, including Bleaching Teeth, Porcelain Laminate Veneers, Porcelain and Composite Inlays & Onlays, Complete Dental Bleaching, and Imaging in Esthetic Dentistry – all published by Quintessence Publishing Company. His best-selling consumer book for the public entitled Change Your Smile, now in its fourth edition, is also published by Quintessence, and has been read by over 1,000,000 people and has been translated into twelve languages.

Oral Presentations

Friday, October 4
8:15-8:40

Color and Esthetics for a Lifetime

Ronald E Goldstein, DDS

Description
Color and Esthetics for a Lifetime is a major goal for those of us who practice, teach, and contribute to the dental profession. Manufacturers continue to develop new products and materials so no doubt we have come a long way, especially in the last decade. The advent of various CAD/CAM solutions plus stronger ceramics and methods to become more accurate with shade selection and technologies are edging us closer to our goal. Nevertheless, there are major obstacles in our way and this presentation will highlight the problems and offer recommendations for the future.

Objectives
- Provide information on how far we have come in the last decades.
- Create awareness of some of the problems that threaten our progress in esthetic dentistry.
- Offer recommendations to keep us on track to eventually accomplish our goals.

Oral Presentations

Friday, October 4
8:40-9:05

Improving Facial Appearance in Cleft Lip & Palate Patients Through Early Intervention

Lawrence E. Brecht, DDS

Description
Our society places a premium on beauty and pleasing facial esthetics. The quest for improving the appearance of patients with facial differences has led to the development of techniques that have markedly improved the esthetic results in patients born with a cleft lip and palate. Prosthodontists have an integral role in the interdisciplinary care that these patients receive. Advances in cleft management techniques over the last decade have greatly improved the esthetic and functional results of cleft repair while reducing the associated stigmata of the condition. The prosthodontist serves an important role in the care of these patients from birth through adulthood. There is increasing evidence that intervention during the earliest stages after birth may result in predictably better outcomes while reducing the number of surgical procedures a cleft patient will be required to undergo to achieve an acceptable functional and esthetic outcome.

Objectives
Attendees of this presentation will:
- Develop familiarity with the infant cleft lip, palate and nose anomaly.
- Become familiar with nasoalveolar molding (NAM).
- Have a familiarity with the advantages and disadvantages of NAM and GPP.

Lawrence E. Brecht, DDS

Lawrence E. Brecht, DDS, is the Director of Maxillofacial Prosthetics in at New York University College of Dentistry. He has a joint appointment at the Institute of Reconstructive Plastic Surgery of New York University School of Medicine where he is Director of the Dental Services and serves on many of the Institute's reconstructive teams. In addition to memberships in many prosthodontic organizations, he is currently the president of the American Academy of Maxillofacial Prosthetics as well as the president-elect of the Greater New York Academy of Prosthodontics. He is a frequent contributor to the plastic and maxillofacial prosthetics literature. He also maintains a practice limited to prosthodontics and maxillofacial prosthetics in New York City.

Theodore P. Croll, DDS

Ted Croll is a diplomate of the American Board of Pediatric Dentistry, practicing since 1978 in Doylestown, Pennsylvania. Dr. Croll was Clinical Professor of Pediatric Dentistry at the University of Pennsylvania School of Dental Medicine when after a 25 year tenure, he resigned in 2004. He currently has affiliate staff appointments in pediatric dentistry at the University of Texas Health Science Center (Dental Branch) in San Antonio and at the University of Washington School of Dentistry in Seattle.

Oral Presentations

Friday, October 4
9:05-9:30

Enamel Microabrasion: A 26-Year Retrospective

Theodore P. Croll, DDS

Description
Rather than cutting away enamel and restoring a discolored tooth with bonded porcelain or resin-composite materials, many dysmineralization and decalcification lesions, and even some texture defects, can be permanently eliminated using a compound that simultaneously erodes and abrades the enamel. This treatment, analogous to dermabrasion on skin surfaces, is termed "enamel microabrasion." Enamel microabrasion removes an insignificant and unrecognizable amount of enamel and leaves behind an attractive, smooth enamel surface that attains additional luster as time passes. This presentation reviews the concept of enamel microabrasion from its beginnings in the mid-1980s. Results of treatment with and without dental bleaching will be documented.

Objectives
Participants in this presentation will learn:
- The difference between dysmineralization and decalcification.
- A method of hastening the enamel microabrasion technique without altering results.
- How to protect a patient from the acid content of the microabrasion slurry.
- The long term results of enamel microabrasion, with and without dental bleaching.

Oral Presentations

Friday, October 4,
9:30-9:55

Esthetics Achieved from Microabrasion and Bleaching in Children

Kevin Donly, DDS, MS

Description
This presentation will discuss the microabrasion technique and vital tooth bleaching in children to achieve a pleasing esthetic outcome for tooth discolorations, including demineralization(white spot lesions).

Objectives
- Understand the microabrasion technique.
- Understand vital tooth bleaching technique alone and in conjunction with microabrasion.

Kevin Donly, DDS, MS

Kevin Donly is currently a Professor and Chair in the Department of Developmental Dentistry and Professor in the Department of Pediatrics at the University of Texas Health Science Center at San Antonio. Previous positions include Professor and Associate Director of the Center for Clinical Studies at the University of Iowa, Associate Professor, Pediatric Dentistry at the University of Texas Dental Branch at Houston and Associate Professor, The University of Texas Medical School. He received his D.D.S. in 1984, Certificate in Pediatric Dentistry in 1986, and M.S. in 1986 from the University of Iowa.

Dr. Donly is a Diplomat of the American Board of Pediatric Dentistry, was on the Board of Trustees for the American Academy of Pediatric Dentistry, was on the Board of Directors for the American Academy of Pediatric Dentistry Foundation, is the previous Chair of the American Academy of Pediatric Dentistry Council on Post-doctoral Education, is Past-President of the American Society of Dentistry for Children and past Chair of the Public Information Committee for the American Academy of Pediatric Dentistry. He is currently the Pediatric Dentistry Commissioner for the Commission on Dental Accreditation. He has published over 300 chapters, manuscripts and abstracts associated with pediatric dentistry and dental restorative materials research and clinical utilization. Presently, he is a principal investigator on an R01 Grant sponsored by the National Institute of Dental and Craniofacial Research. He has received grants or research support from the 3M, ESPE, Premier, Bisco, GC, Dentsply, Ivoclar, Kerr, Procter and Gamble, Church and Dwight, Optiva, Oral-B, Enamelon, Atrix Laboratories, Inc. and Guidor companies.

Stefan J. Paul, PD Dr Med Dent

After graduation in 1985 at the University of Freiburg/ Germany Dr. Paul did postgraduate training in Operative Dentistry, Periodontology and Fixed Prosthodontics before joining the Department of Fixed Prosthodontics at the University of Zurich (Prof. Dr. P. Schärer, MS) in 1991. From 1997 until 1999 Dr. Paul served as Director of the Center for Esthetic Dentistry at UCLA School of Dentistry. In 2000 Dr. Paul received his dental license for the State of California/USA.
In 2000 Dr. Paul earned a degree as „Privatdozent" from the University of Zurich and was an appointed lecturer until 2009. Since 2009 Dr. Paul continues his teaching assignment at the University of Freiburg/Germany.

Since August 2002 Dr. Paul is maintaining a private practice in the heart of Zurich/Switzerland dedicated to implantology, esthetic fixed and removable prosthodontics. Since 2007 Pediatric Dentistry and Oral Surgery (Dr. Antje Paul) and Orthodontics (Dr. Thomas Drechsler) are additional specialties offered in our modern, fully digitalized dental office.

Dr. Paul's clinical work includes implantology, all ceramic restorations and complex esthetic dentistry. Many publications accompany the clinical and research activities. He is both a nationally and internationally active lecturer on prosthodontics and implantology. Dr. Paul is Active Member of the European Academies of Esthetic Dentistry (1999) and Osseointegration (1998). He is member of the Editorial Boards of the Journal of Adhesive Dentistry (1999), the Journal of Practical Periodontics and Aesthetic Dentistry (1998), the Schweizerische Monatschrift für Zahnmedizin (1995) and the European Journal of Esthetic Dentistry (2005). Dr. Paul is a reviewer for the Journal of Dentistry (2004), the Journal of Oral Rehabilitation (2004), and Quintessence International (2007).

Oral Presentations

Friday, October 4
10:35-11:00

Immediate implant placement: treatment at risk or taking esthetic advantage

Stefan J. Paul, PD Dr Med Dent

Immediate implant placement with immediate temporization is gaining interest because it reduces the number of appointments for the patient and is much less invasive. It causes much less postoperative problems and esthetic results are optimal.
Risk assessment vs. esthetic advantage will be discussed as well as the step-by-step of planning and treatment in the bicuspid - to - bicuspid sector. Statements will be based on what is currently known in research in this field.

Objectives

- Delegates will learn about the biologic advantages of immediate implant placement with immediate temporization.
- A step-by-step description will visualize how to integrate this technique into daily routine.
- Outlook on future developments.

Oral Presentations

Friday, October 4
11:00-11:25

Zirconia implants

Jens Fischer, DDS, PhD

The impact of titanium implants on our treatment options is beyond doubt. High success rates prove their reliability. The biocompatibility of titanium is not questioned at present, although some recent results suggest that allergies to titanium may occur. The grayish color of titanium could be compromising in esthetically demanding regions. Based on these considerations ceramic would be an option for implants. At present, zirconia is the only potential ceramic, which provides sufficient mechanical strength, biocompatibility and esthetics.
Yttria-stabilized zirconia (Y-TZP) is progressively used in reconstructive dentistry. The clinical long-term results with single crowns and fixed dental prostheses are encouraging.
The mechanical strength of zirconia implants is proven in several laboratory tests. However, in a recent clinical study 3.25mm diameter implants showed a significantly higher failure rate than 4.0mm diameter implants, suggesting that the diameter of zirconia implants should not range below 4.0mm.
To create an osseoconductive implant surface is a challenge with zirconia implants. Three steps have to be performed to get a surface with a roughness and topography, which is close to the surfaces known to be successful in titanium implants. In contrast to only sandblasting with alumina, an additional etching and annealing process provides a surface, where the spreading of osteoblasts is pronounced compared to only sandblasted surfaces.

Jens Fischer, DDS, PhD

1981 Graduation in Dentistry, University of Freiburg, Germany

1982-1984 Assistant Professor, Department of Prosthodontics, University of Freiburg, Germany

1986 Graduation in Material Sciences, University of Freiburg, Germany

1987-1990 Associate Professor, Department of Prosthodontics, University of Freiburg, Germany

1991-1998 Head of Research and Development, Cendres & Métaux SA, Biel, Switzerland

1998-2005 Associate Professor, Head of Dental Materials Science, Department of Prosthodontics, University of Bern, Switzerland

2006-2008 Head of Dental Materials Science, Clinic for Fixed and Removable Prosthodontics, University of Zurich, Switzerland

2008-present Business Unit Director vitaclinical, Vita Zahnfabrik, Bad Säckingen, Germany

2010-present Head of Institute for Dental Materials and Engineering, University Hospital of Dental Medicine, University of Basel, Switzerland

Wolfgang Rauh, PhD

Wolfgang Rauh received his Diploma as an engineer from the University of Karlsruhe in 1984. From 1984 to 1989 he worked as a researcher at the University of Stuttgart where he completed his doctor thesis in the field of optoelectronics and image analysis. From 1989 to 2002 he worked as research manager for the Fraunhofer Society, the most important institution for applied research in Europe. After this period he joined a high-tech company where he developed optical metrology systems and CT-scanners as the director of research and development. Since 2008 he is director for dental equipment at VITA Zahnfabrik where, besides other topics, he is responsible for shades and digital shade measurement.

Oral Presentations

Friday, October 4
1:00-1:25

Advances in dental shade measurement and shade selection

Wolfgang Rauh, PhD

Relevant results of scientific studies regarding visual and digital shade determination in dentistry will be presented. An overview of technical concepts will be given and the advantages of the different approaches will be discussed. New solutions for dental shade selection and their integration into shade measurement devices will be explained and discussed in detail.

Objectives:

- To compare technical characteristics of different shade matching technologies in dentistry.
- To provide an update on new solutions for dental shade selection.

Oral Presentations

Friday, October 4
1:25-1:50

From Physical Properties to Material Identification – What One Needs to Know before Considering Color Appearance in Dentistry

Francisco H. Imai, PhD

Brief description - Before considering the color appearance of dental materials and even before talking about colorimetry it is necessary to build a framework that considers the identification of bio-material properties. This presentation is going to summarize the latest work in material identification that could be extended to dental materials. This presentation will also introduce the latest efforts by CIE to build a skin database and the FDA/ICC efforts on medical imaging color management

Objectives

- Summarize the latest research in material identification presented at AIC 2013 in Newcastle, UK last July.
- Introduce the new technical committee (TC1-92) from CIE Division 1 on Skin Color Databases
- Inform about the new working group by FDA and ICC on color management and impact for dentistry

Francisco H. Imai, PhD

Dr. Francisco Imai is Senior Manager of Computational Imaging Research at Canon U.S.A. Inc. Innovation Center in San Jose, CA. Dr. Imai became a fellow of the Society for Imaging Science and Technology in 2013 for significant contributions to the advancement of color reproduction and multi-spectral imaging. He has in the past collaborated with the University of Texas School of Dentistry in Houston and he is avid for finding applications of state-of-art imaging technology to the advancement of dentistry.

So Ran Kwon

Dr. So Ran Kwon is currently Associate Professor at the Department of Operative Dentistry, University of Iowa, College of Dentistry, Iowa City, Iowa. Dr. Kwon is the Founder and President of the Korean Bleaching Society, presenting lectures on new concepts of tooth whitening to dentists and dental teams, worldwide. Her research focuses on tooth whitening and esthetic dentistry. She has written over 40 articles and is the author of Tooth Whitening in Esthetic Dentistry published by Quintessence Publishing Company. Dr. Kwon was the first recipient of the SCAD/VITA Award for excellence in research related to color and appearance in esthetic dentistry, in 2012.

Oral Presentations

Friday, October 4
1:50-2:15

Scope and Mechanism of Tooth Whitening

So Ran Kwon

Tooth whitening is an effective and very popular way to lighten discolored teeth. The high demand is reflected by the wide variety of whitening methods and products available leading to a new classification of whitening methods and techniques. This presentation will cover the new scope and discuss the mechanism of tooth whitening based on materials used.

Objectives

- Provide information on the new scope of tooth whitening and materials on the market.
- Describe the mechanism of tooth whitening and the role of activating sources in enhancing whitening efficacy.
- Provide tips for successful whitening results based on the etiology of discoloration.

Oral Presentations

Friday, October 4
2:15-2:40

Uniting Morphology, Color, Cervical Contour, Surface Smoothness, and Marginal Fit for Optimal Esthetics and Biologic Health

Charles J. Goodacre, DDS, MSD

The importance of uniting natural morphology with good color cannot be overstated. This presentation will demonstrate the benefits of this union in meeting the needs of esthetically demanding patients with its attendant professional satisfaction as well as show how these two characteristics can be combined with cervical contour, surface smoothness, and marginal fit to improve abnormal gingival responses around existing crowns.

Objectives

Following this presentation, attendees should be able to:

- Summarize the synergistic benefits of good form and good color.
- Describe how good form and color can help mask negative esthetic conditions.
- Design crowns that help resolve abnormal gingival responses.

Charles J. Goodacre, DDS, MSD

Dr. Goodacre received his DDS degree from Loma Linda University School of Dentistry in 1971 and completed a three year combined program in Prosthodontics and Dental Materials at Indiana University School of Dentistry and in 1974 earned his MSD degree. He served as Dean of the Loma Linda University School of Dentistry from 1994 to 2013. He is a Diplomate of the American Board of Prosthodontics and Past-President of that Board. He is a Past-President of the American College of Prosthodontists and Academy of Prosthodontics.

Marcos Vargas, DDS, MS

Dr. Marcos Vargas received his DDS in 1985 from Cayetano Heredia University School of Dentistry in Lima, Peru. 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 Masters Degree in Operative Dentistry in 1994 at the University of Iowa where he is currently a Professor in the Department of Family Dentistry.

Oral Presentations

Friday, October 4
3:20-3:45

To Layer or Not to layer, that is the Question

Marcos Vargas, DDS, MS

The dental practitioner is often confronted with choosing the appropriate layering technique to functionally and esthetically restore natural dentition using resin composites. Several layering techniques have been advocated, but little is known about the thought process involved in this decision. This presentation will provide the clinician with a guide to select when to deliver polychromatic vs. monochromatic restorations.

Objectives

- To contrast layering techniques with resin composites
- To provide clinical comparison between polychromatic vs. monochromatic restorations

Oral Presentations

Friday, October 4
3:45-4:25

Clinical Challenges for Esthetic Restorations: Defying the Optical Properties of Current Esthetic BioMaterials

Sillas Duarte Jr, DDS, MS, PhD

Novel biomaterials color scheme must account for the different areas of a tooth. A thoughtful analysis and replication of translucency, opalescence, fluorescence, value, and chroma is crucial to achieve a lifelike esthetic outcome. These optical properties are intimately correlated and susceptible to numerous factors that can affect the restoration in challenging ways. This presentation provides a systematic and scientific approach for enhancing direct and indirect esthetic restorations based on original research data with special emphasis on techniques, material design and selection.

Objectives

- Understand how optical properties influence the esthetic outcome of the restorations.
- Selection of composites for direct restorations.
- Understand the benefits and limitations of novel ceramic-reinforced polymers.

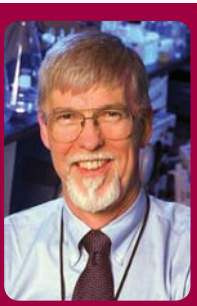
Sillas Duarte Jr, DDS, MS, PhD

Dr. Duarte is Associate Professor and Chair, Division of Restorative Sciences, Ostrow School of Dentistry of University of Southern California. Dr. Duarte is also Director of the Advanced Program in Operative Dentistry of USC. He is the editor-in-chief of Quintessence of Dental Technology (QDT), served on the editorial boards of other journals, and has lectured and published nationally and internationally on esthetic dentistry and adhesion. He has been involved in teaching cutting edge clinical techniques and technologies related to esthetic and adhesive dentistry. Dr. Duarte's scientific work has been supported by governmental and commercial grants and he serves as a consultant for several manufacturers. His researches focus on esthetic properties of and bonding to dental structures, composites, and ceramics..

Oral Presentations

Saturday, October 5
8:00-8:25

Tooth Enamel Decussation: Role in Esthetics and Mechanical Response



Van P. Thompson, DDS, PhD

Van P Thompson, DDS, PhD, is currently, Professor of Biomaterials, Biomimetics and Biophotonics at King's College London Dental Institute and was previously Chair, Biomaterials and Biomimetics, at NYU. Known for his work on adhesion and bonded bridges at the University of Maryland he has published many articles and made numerous presentations on dental biomaterials in the U.S. and internationally. His current research areas include dentin caries activity, all-ceramic crown fatigue and fracture, dentin modification for bonding, engineering tissue response via scaffold architecture and practice based research (PEARL Network).

Van P. Thompson, DDS, PhD

Enamel is nature's response to the challenge of making a hard and wear resistant structure by cells. Enamel structure and in particular rod decussation plays a critical role in the damage resistance of this "brittle" structure. In addition the decussation influences the visual appearance of the tooth. The presentation will highlight the esthetic role of enamel decussation and the unique crack propagation and deflection properties related to aspects of this structure as well as the role of the DEJ in providing a graded system to limit flexural cracks. The DEJ structure provides a basis for upgrading all-ceramic crown performance.

Objectives

- Provide details of enamel mico and macro structure and their contribution to the visual appearance of the tooth.
- Create awareness of the crack propagation response of enamel in various orientations.
- Create awareness of the critical role of the DEJ in initiation of enamel cracks and in prevention of cracks across this interface.

Oral Presentations

Saturday, October 5
8:25-8:50

DENTSCAPE™: Shade Communication through Photography

Naoki Aiba, CDT, Oral Design

Dental photography can be used as a means of communication between the dentist and the technician. Ideally, the technician who is going to fabricate the restoration should see the patient and make the appropriate shade selection. However, the great majority of restorations are fabricated by offsite technicians who do not have access to the patients. Photography provides a means to bridge the "gap" between the patient and the technician regarding shade and surface character.

Objectives

- How to take *Shade View* photographs to communicate shade accurately.
- Tips and hints for calibrating and coding shade guide.
- Hue and value analysis with *Shade View* photographs utilizing Photoshop for ceramic fabrication.

Naoki Aiba, CDT, Oral Design

Naoki Aiba, CDT, ceramist and professional photographer, graduated from the Dental Technology Program at the Dental School of Aichi Gakuin University in Nagoya, Japan, in 1982. He completed the post-graduate ceramics course at the Tokai Dental Technicians School in 1986. He received the "Young Speaker of the Year Award," presented by Dr. John McLean, OBE, of the ISDC in 1989. In 1992, Mr. Willi Geller selected Mr. Aiba to be a member of Oral Design. He has lectured, conducted hands-on courses, and published in more than thirty countries on ceramics, dental photography, and dentist-laboratory communications. As a professional photographer, he has published and exhibited his photographs around the world. He currently serves as a member of Editorial Board for QDT and JCD, and as a Technical Advisory Board Member of the Monterey-Bay Salinas Study Club. While he maintains his laboratory, Science Art, Inc. in Monterey, California, USA, and offers two-year advanced ceramic program, DENTSCAPE Continuum, at his teaching facility, Oral Design Center Monterey.

Thomas Singh, MDT

In 2003, after completing a dental technology apprenticeship in Augsburg, Germany, Mr. Singh worked for four years as a certified dental technician at Langerspacher & Christ dental laboratory in Munich, Germany. In 2008, Mr. Singh graduated from the Master School for Dental Technology in Munich, Germany. After enjoying private lessons by Mr. Thilo Vock, Mr. Willi Geller, Mr. Uli Werder, Mr. Walter Gebhard and working for two years with Mr. Joachim Maier at oral design Bodensee, Mr. Singh went to Boston, working with Kenneth Malament, DDS (Tufts University), Dan Nathanson (Boston University), and Hans-Peter Weber, DMD (Harvard University) while teaching as a visiting lecturer in the postdoctoral program for prosthodontics at Tufts University School of Dental Medicine.

Oral Presentations

Saturday, October 5
8:50-9:15

Layers of Creation – The Art behind the Smile

Thomas Singh, MDT

Producing esthetic and functional ceramic solutions requires inspiration, motivation, emotion and passion. In this presentation Mr. Singh will share his unique perspective on mastering the essential facets of both ceramic art and technology.

Objectives
Attendees will learn:
- How to handle the single anterior restoration.
- A systematic approach to complex cases.
- Why some cases fail and other succeed.
- A rational approach to ceramic layering.

Oral Presentations

Saturday, October 5
9:15-9:40

The Latest Technology & Solutions with Restorative and Implant Esthetics

Pinhas Adar, MDT, CDT

Effective communication is a primary skill in any business endeavor, and never more important than in the practice of esthetic dentistry. This presentation will address more effective methods of communicating esthetic smile design solutions through Trial Smiles and temporary restorations. In addition, the follow-up process of selecting the best all-ceramic system for that individual patient in your chair will be discussed in detail. Patient management for esthetic therapy will also be outlined along practice management pearls to enhance your effectiveness and profit.

Objectives

- All Ceramic Crown Systems – Assessing and simplifying the mysteries.
- Communication – Laboratory, clinician and patient confusion unscrambled for predictable results.
- Combined cases – crowns, veneers and implants.
- How to increase esthetic dentistry services and products.
- How to isolate, identify and manage your #1 asset - Your "Little Voice" and build powerful and lasting confidence in developing your esthetic practice.

Pinhas Adar, MDT, CDT

Master Ceramist Pinhas Adar studied initially in Tel Aviv, Israel at Ort Yad Shapiro and then completed his internship with Mr. Willi Geller in Zurich, Switzerland. He returned to Israel to complete his Master degree in Dental Technology. He has over 36 years of experience in all phases of dental laboratory technology and has spent these years studying the secrets and principles of Smile Design and the impact of the psychological effects on consumers and has applied this knowledge in his own practice with extraordinary results. He specializes in the many facets of porcelain esthetic restorations on both natural teeth and osseointegrated implants. For over 20 years he operated his own private dental laboratory within the multidisciplinary practice of (Team Atlanta) Ronald Goldstein, David Garber and Maurice and Henry Salama. He now has a private practice where he practices, teaches and does research also in Atlanta, Georgia USA.

Dan Grauer

Dr. Dan Grauer is an Assistant Professor at the University of Southern California, an Adjunct Professor at the University of North Carolina, and an associate editor for the American Journal of Orthodontics and Dentofacial Orthopedics. He maintains a private practice in Century City, Los Angeles. He is trained in dentistry and orthodontics both in Europe and in the US. He holds a PhD degree in Oral Biology by the University of North Carolina. His research interests are applications of CBCT in orthodontics and orthognathic surgery, outcomes assessment in lingual orthodontics and interdisciplinary treatment planning.

Oral Presentations

Saturday, October 5
10:20-10:45

Brace-Face No More

Dan Grauer

With the increasing demand for orthodontic treatment among adult patients, new esthetic approaches are gaining popularity. Appearance during treatment is often overlooked by orthodontists, but not by their patients. Treatment accuracy is enhanced by the use of customized appliances and treatment times are getting shorter without compromising the occlusal outcome. In spite of that, appearance during orthodontic treatment is crucial for improving treatment acceptance and restorative results. In this presentation a review of accuracy and appearance of orthodontic appliances will be presented.

Objectives

- Learn the latest technological applications to enhance orthodontic treatment accuracy.
- Learn the reasons behind esthetic appliance selection.
- Evaluate the accuracy / precision of customized lingual orthodontic appliances.

Oral Presentations

Saturday, October 5
10:45-11:10

Meeting the Challenge of High Esthetic Expectations

Jacinthe M. Paquette, DDS

There are many fundamental elements in achieving successful results in esthetic rehabilitative dentistry. Meeting expectations is one such element which can sometimes be more elusive to grasp. This is especially so in the esthetically motivated patient often requiring expertise in the management of the psychological undertones associated with this type of care. Close communication and clearly defined treatment objectives are key to creating successful outcomes. This presentation will highlight these factors uniquely associated with esthetic rehabilitative dentistry and provide guidelines to assist in the management of these cases.

Objectives

- The complete esthetic analysis before the commencement of treatment.
- How to control the psychological aspects to caring for the esthetically motivated patient.
- Share communication tools that empower the entire esthetic team.About Presenter

Jacinthe M. Paquette, DDS

Dr. Jacinthe M. Paquette is recognized nationally and internationally as a leader and educator in Esthetic Dentistry, Prosthodontics, and Implant Dentistry. She is a Diplomate of the American Board of Prosthodontics and a Fellow of the American College of Prosthodontists. Dr. Paquette serves on numerous editorial boards, advisory boards, and peer-reviewed journals and is on the Editorial Council for the Journal of Prosthetic Dentistry. Dr. Paquette currently serves as a Vice President of the Pacific Coast Society for Prosthodontics and serves on the Executive Council for the American Academy of Esthetic Dentistry. Among her professional affiliations, she holds fellowships in the International College of Dentists, the American College of Dentists, and the Pierre Fauchard Academy. She is also a member of the American Academy of Restorative Dentistry and the Academy of Osseointegration. Dr. Paquette has authored over 40 research and clinical articles on her areas of expertise and co-authored several textbook chapters. She is Co-Executive Director of the Newport Coast Oral Facial Institute, a non-profit international teaching facility for dentists and dental technicians located in Newport Beach, California.

Ernesto Lee

Dr. Ernesto A. Lee is a Clinical Professor and Director of the Postgraduate Periodontics-Prosthodontics Program, and the Postdoctoral Implant Fellowship at the University of Pennsylvania School of Dental Medicine. Dr. Lee is a summa cum laude graduate from the University of Panama, in his native country. He completed dual specialty training in Periodontics and Fixed Prosthodontics at the University of Pennsylvania. Dr. Lee is the author of multiple publications and a member of several editorial boards. He has dictated over 100 lectures, including presentations before the American Academy of Periodontology, Academy of Osseointegration, American Association of Oral and Maxillofacial Surgeons, American Academy of Cosmetic Dentistry, American Academy of Esthetic Dentistry, European Academy of Esthetic Dentistry, International Symposium in Periodontics and Restorative Dentistry, FDI World Dental Federation, and the Greater New York Academy of Prosthodontics. His active schedule includes appearances throughout the United States, Europe, Asia and Latin America.

Dr. Lee's practice is located in Bryn Mawr, Pennsylvania; a suburb of Philadelphia, and is limited to Prosthodontics and Implant Dentistry, with an emphasis in Esthetic Dentistry.

Oral Presentations

Saturday, October 5
11:10-11:35

Pink and White Zirconia Restorations for the Treatment of the Compromised Dentition

Ernesto Lee

Restoration of the compromised dento-gingival-alveolar complex is one of the most challenging aspects in esthetic dentistry. Zirconia based restorations may be an alternative to satisfy the increased functional and esthetic demands of the advanced case. They may also be utilized in providing potential restorative solutions to compromised dental implant outcomes. This presentation will demonstrate the use of Zirconia restorations for the treatment of complex conditions on natural teeth and implants. Contemporary Periodontic-Prosthodontic approaches, incorporating the use of CAD/CAM technology, will be discussed.

Objectives
The following topics will be discussed and illustrated during the presentation:

- Rationale for the use of Zirconia restorations.
- Layered vs Monolithic applications.
- Use of Zirconia to restore the natural dentition.
- Use of Zirconia for implant supported prostheses.
- Incorporation of CAD/CAM technology in interdisciplinary therapy.

Oral Presentations

Saturday, October 5
11:35-12:00

CAD-CAM Based Provisional Restorations - Advantages, Limitations, and Applications

Tal Morr, DMD, MSD

Users of traditional cold cure Methyl Methacrylate Resin for provisional restorations embraced the material due to its many advantages in terms of manipulation and handling. Unfortunately there were a few esthetic disadvantages that came along with it as well. Bis-Acryl Resins were developed to improve the esthetic pitfalls of cold cure acrylic although theses materials have their own disadvantages. If we could combine the esthetic quality of one material with the handling of the other that would be ideal scenario. The advent of CADCAM technology and milled acrylic provisionals has afforded us the ability to do that although there are still some limitations.

Objectives

- To discuss the different types of provisional materials and describe advantages, disadvantage, and applications of each including color and esthetics.
- The focus specifically on CAD-CAM provisionals and describe in what applications this technology can be useful.
- To discuss new techniques to manipulate the material to achieve a more esthetic result.

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 went on to study at the University of Washington Prosthodontic program where he received a certificate in Prosthodontics and a Masters in the Science of Dentistry degree. Dr. Morr is an internationally recognized speaker on various topics such as aesthetics, implants, and full mouth rehabilitation. He is also a published author on aesthetically related dental topics such as laminate veneers, implants, and complex prosthetic rehabilitation. 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 study clubs.

Herbert Scheller DMD, PhD

Professor Scheller is the medical director of the Department of Prosthodontics at the University Medical Center of the Johannes Gutenberg-University of Mainz. He received his doctorate in 1986 at Hannover Medical School and became a lecturer there in 1992. In 1996 he was awarded the title "Extraordinary Professor" and in 1998 he was appointed to the Chair of the Department of Prosthodontics at the University Medical Center of the Johannes Gutenberg-University of Mainz (Germany). Among others, he is a member of the German Society for Dental Oral and Craniomandibular Society, International Association for Dental Research and the Society for Color and Appearance in Dentistry.

Oral Presentations

Saturday, October 5
1:00-1:25

Aspects of Esthetics in Dentures in the Anterior Maxilla

Herbert Scheller DMD, PhD

Successful esthetic results of dental prosthesis in the esthetic zone require knowledge of various parameters and techniques. Careful treatment planning, knowledge of scientific backgrounds, and attention to the details of diverse prosthetic strategies are areas that must be addressed when treating the anterior maxilla. This lecture will address the considerations related to the white and pink esthetics of fixed and removable dental prosthesis in the esthetic zone, using both theory and case examples.

Objectives

- Color measurement, Communication and Reproduction of color information.
- Soft tissue management: standards and a new research approach.
- Prosthetic restoration.

Oral Presentations

Saturday, October 5
1:25-1:50

Mucosal Discoloration - Do Reconstructions Influence the "Pink Esthetics"?

Irena Sailer, DMD, PhD

Grayish discoloration of the buccal gingiva at tooth- or implant-borne reconstructions is a clinical problem that significantly compromises the final esthetic result, particularly in the anterior region. It was assumed that the grayish discoloration of the soft tissues is influenced by restorative material. Implant-borne reconstruction studies demonstrate a correlation between the use of metallic abutments and reconstructions, and the grayish discoloration of the peri-implant mucosa. To prevent this, zirconia abutments and all-ceramic reconstructions are recommended in the esthetic area. Do these bright white abutments really have a positive effect? The lecture will display the effect of different kinds of restorative options on the esthetic outcome of the soft tissues, shown by means of spectrophotometric color measurements.

Objectives

- To understand the effect of the tooth-borne reconstructions (posts etc.) on the color of the soft tissues.
- To understand the effect of the implant-borne reconstructions (abutments etc.) on the color of the soft tissues.
- To learn today's recommendations for the different indications.

Irena Sailer, DMD, PhD

Dr. Irena Sailer received her dental education and Dr. med. dent. degree from the Faculty of Medicine, University of Tübingen, Germany in 1998. In 2003 Dr. Sailer received an Assistant Professorship at the Clinic for Fixed and Removable Prosthodontics and Dental Material Sciences in Zurich. Since 2010 she is an Associate Professor at the same clinic. In 2007 Dr. Sailer was a Visiting Scholar at the Department of Biomaterials and Biomimetics, Dental College, New York University, USA. Additionally, since 2009 she holds an Adjunct Associate Professorship at the Department of Preventive and Restorative Sciences, Robert Schattner Center, School of Dental Medicine, University of Pennsylvania. Philadelphia, USA.

Dr. Sailer is a member of various scientific organizations. Presently, she is a Fellow of the International Team for Implantology (ITI). She has published numerous scientific and clinical articles and is a member of the editorial boards of the Clinical Oral Implants Research and the European Journal of Esthetic Dentistry. Additionally, she serves on the review boards of several scientific journals in the field, such as the International Journal of Oral and Maxillofacial Implants, Dental Materials, European Journal of Oral Sciences or Quintessence International.

Krikor Derbabian, DDS

Dr. Krikor Derbabian is currently a clinical Associate Professor of Restorative Dentistry at the Ostrow School of Dentistry of the University of Southern California

He received his Doctor of Dental Surgery degree from USC School of Dentistry in 1991, and was elected to the OKU Honor Society that same year. He completed his specialty training in prosthodontics also from USC, in 1997. He is the principal of the Center for Prosthetic Dentistry, a prosthodontic group practice in Glendale, California.

Dr. Derbabian has published numerous articles in peer reviewed scientific journals on the topics of esthetic and implant dentistry. He has been a guest editor for the Journal of California Dental Association, and has presented at various national and international dental association meetings and study groups.

Oral Presentations

Saturday, October 5
1:50-2:15

Applying Removable Prosthodontic Principles with Current Day Materials and Technologies

Krikor Derbabian, DDS

Patients requiring extensive rehabilitation of both hard and soft tissues present with a set of unique challenges. While extensive surgical procedures may be successful in correcting some of these deficiencies, there are alternative restorative options that are less invasive and may be more beneficial and acceptable to patients in certain situations.
Many contemporary principles of esthetics dentistry used today were developed by clinicians providing complete denture prostheses. By combining newer dental materials and contemporary technologies with the traditional principles of esthetic dentistry used in removable prosthodontics, we can rehabilitate patients of all ages using fixed restorations with proper color, esthetics and function.

Objectives

- Review of basic esthetic principles of removable prosthodontics.
- Provide alternative treatment options to extensive bone grafting and reconstructive procedures.
- Illustrate with patient examples age specific restorations with proper color, esthetics and function.

Oral Presentations

Saturday, October 5
2:55-3:20

The Important Role of Cements in Esthetic Dentistry

Dan Nathanson, DMD

Meeting the esthetic expectations of the dental patient mandates the delivery of restorations that are indistinguishable from natural teeth. All indirect restorations – veneers, inlays, onlays, crowns and bridges are held in the mouth by cements. The cement may have an effect on the appearance and longevity of the restoration. Contemporary cements come in various formulations and have different attributes. The presentation, using clinical cases, reviews dental cements highlighting selection criteria, indications for use, and manipulation of contemporary cements used in esthetic dentistry.

Objectives

- To provide an update on the current state of modern dental cements.
- To review cements impact on esthetic restorations and long term appearance.
- To review task specific cementing as well as correct handling and application.

Dan Nathanson, DMD

Dr. Nathanson is Professor and Chairman of the Department of Restorative Sciences and Biomaterials at Boston University. He received his dental degree from the Hebrew University in Jerusalem, Israel and completed post-doctoral training in restorative dentistry and dental materials at Harvard School of Dental Medicine and Forsyth Dental Center in Boston. He also received a specialty certificate in prosthodontics and a Master's degree in public health from Boston University School of Graduate Dentistry. In addition to his academic position he also maintains a part time practice limited to prosthodontics in Boston. Organizational affiliations include Fellowships in the Academy of Prosthodontics, American Academy of Esthetic Dentistry, and the Academy of Dental Materials; Memberships in the ADA, American College of Prosthodontists, Greater NY Academy of prosthodontics, International association for Dental Research (Past President, Boston Chapter), and other organizations. He is President-Elect of the International Federation of Esthetic Dentistry. With a primary research interest in restorative and prosthetic materials, Dr. Nathanson has published numerous articles, research abstracts and textbook chapters. His current research involves new materials and technology for fixed prosthodontics, resin restoratives, restoration of pulpless teeth.

Luiz Narciso Baratieri, DDS, MS, PhD

Professor and Chair, Department of Operative Dentistry, Federal University of Santa Catarina

Certified in periodontics

Post-doctorate degree, University of Sheffield, England

Coordinator, certification program, operative dentistry, Federal University of Santa Catarina

Coordinator, graduate program, master of science, operative dentistry, Federal University of Santa Catarina

International lecturer, more than 600 lectures

Editor-in-Chief, Journal Clinica – International Journal of Brazilian Dentistry.

Oral Presentations

Saturday, October 5
3:20-4:00

Using Composites in Anterior Teeth – Details that Make a Difference

Luiz Narciso Baratieri, DDS, MS, PhD

A theoretical presentation showing the details of natural teeth that should be considered to achieve excellence in composite resin restorations in anterior teeth. A lecture that you will never forget.

Objectives

- To show the clinician the relevance of counter-opalescence in natural teeth and how to reproduce it in composite resin restorations.

Lunch & Learn

Friday, Oct 4
11:50-1:00

New Materials and Technologies for Predictable Esthetics

Mark Baker

Improved systems for natural tooth shade assessment and tracking of whitening regimes.

Objectives

- Understating the benefits digital shade devices and data output.
- Restorative material selection and functions considerations that best suit the aesthetic challenge.

Mark Baker

Mr. Mark Baker completed his Dental Technicians Diploma in London England graduating in 1977. He moved to Southern Germany from 1979-83, gaining extensive hands-on experience of fixed and removable prosthetics. In 1985 Mark emigrated to Sydney Australia, opening his own crown and bridge dental laboratory specializing in anterior restorations and implant borne cases.

Mark is versed with the importance of technical clinical communications and importance of case planning for predictable success. He is a keen and active supporter of local and international study groups, and has tutored extensive hands courses and lectures presentations worldwide on shade and esthetics considerations.

Mr. Mark Baker is Vident Director of New Business Development and Clinical Affairs.

Shigemi Nagai, DDS, MS, PhD

Aki Yoshida, RDT

Dr. Shigemi Nagai is an Assistant Professor, Department of Restorative Dentistry and Biomaterial Sciences, Harvard School of Dental Medicine. She has numerous publications on color science and clinical studies. Dr. Nagai's current research interests include a computer color matching system in dental ceramics, NIR fluorescence imaging for clinical dentistry, and biological approach of the soft tissue esthetics.

Aki Yoshida started his career at Tanaka Dental Clinic in Tokyo, Japan after graduating from the Dental Technician School of Nihon University in 1983. He came to the United States to accept a position at Gnathos Dental Laboratory, which the renowned prosthodontist, Lloyd L. Miller, D.M.D in 1991. In addition he serves as technical instructor at Tufts University, Dept. of Post-Graduate Prosthodontics in Boston, and instructor for Noritake Dental Supply, an fellow member of the American Academy of Esthetic Dentistry.

Lunch & Learn

Saturday, Oct 5
11:50-1:00

How to Translate and Apply Color Readings for Perfect Color Match on Ceramic Restorations

Shigemi Nagai, DDS, MS, PhD &
Aki Yoshida, RDT

Color reproduction of anterior natural teeth requires advanced laboratory techniques, talent and artistic skills. Accurate determination, interpretation, monitoring and verification of tooth color in ceramic work are important steps in achieving ideal color reproduction.
The use of instruments for color measurement has the potential to eliminate subjective variables. However, the integration of color science based on spectrophotometric measurements and actual ceramic work has not yet been established. Therefore, dentists and dental technicians still face challenges when using scientific color data to reproduce natural tooth color.
In this digital era, the development of a scientific approach to tooth color reproduction through the use of a dental spectrophotometer which will also supports artistic results has become critical.

Objectives
- Learning how to read tooth color data
- Learning how to utilize color data in fabrication of ceramics
- Learn how to monitor and verify color reproduction during the fabrication of all ceramic crowns

In this presentation you will learn stepwise procedures for fabricating the ceramic blue map, 1st bake, layering, adjusting, finishing, and verifying color reproduction for ceramic restorations. This presentation will give you new insights on the integration of color science and art.

Lunch & Learn

Saturday, Oct 5
11:50-1:00

Advances in Tooth Whitening

Joe C. Ontiveros, DDS, MS

Tooth whitening is among the most popular procedures requested in dentistry. Current advances in tooth whitening have provided the dental profession with several options from which to choose when treating patients with discolored teeth. Successful outcomes are dependent on material selection, patient expectations, and appropriate color monitoring.

Objectives

- Learn what's new with in-office bleaching
- Be able to set the proper expectation base on diagnosis
- Know the latest tools for monitoring whitening results

Joe C. Ontiveros, DDS, MS

Dr. Ontiveros received his D.D.S. degree from the University of Texas Health Science Center at San Antonio where he served as a Clinical Instructor in the Division of Esthetic Dentistry. He received his Master's in Oral Biomaterials from the University of Texas Graduate School of Biomedical Science at Houston. Dr. Ontiveros is past Scientific Editor for *Reality* Publishing and past Director of Research for *Reality* Research Lab. He is the author of numerous publications related to esthetic biomaterials and a contributor to text book, Esthetic Color Training in Dentistry–Communication of Color and Appearance. Dr. Ontiveros is currently an Associate Professor and Head of Esthetic Dentistry at the University of Texas Health Science Center School of Dentistry at Houston, and Head of the Oral Biomaterials Division for the Houston Center for Biomaterials and Biomimetic.

Sabiha S. Bunek, DDS

Dr. Bunek is Editor-in Chief of *The Dental Advisor.* She earned her DDS degree from the University of Michigan School of Dentistry and maintains a private practice in Ann Arbor, Michigan, focusing on esthetic and comprehensive restorative dentistry. Since 2002, Dr. Bunek has been actively involved with *The Dental Advisor*, as a consultant, associate editor, contributing author, and most recently, as Editor-in-Chief. Her experience as a clinician and researcher helps provide an objective, evidence-based approach to clinical dentistry. She is a published author in several dental journals.

Lunch & Learn

Saturday, Oct 5
11:50-1:00

Cement Selection for All-Ceramic Restorations

Sabiha S. Bunek, DDS

The use of all-ceramic restorations has increased in recent years due to the growing demand for esthetic, metal-free restorations. New technology in adhesive cementation has increased the performance of these restorations. In this session, the rationale behind selection of esthetic resin, adhesive resin and self-adhesive resin cements for use with silica-based and zirconia -based restorations will be discussed.

Objectives

- Discuss the different types of resin cements on the market.
- Explain the rationale for cement selection; including laboratory and long-term performance.
- Discuss proper surface treatments for all-ceramic materials, and provide laboratory-test results.
- Discuss the long-term clinical success of all-ceramic systems on the market.

Lunch & Learn

Saturday, Oct 5
11:50-1:00

Principles of Blending Effect for Color Matching within Adhesive Dentistry

Ghazal Khashayar, DDS

The process of visual shade selection can be simplified by using composite systems that make use of the principles of 'blending effect'. This can lead to fewer shade tabs with a wider range of matching abilities to its surrounding tooth structure. This Lunch and Learn session will focus on the phenomenon that the shade of a composite can be different before and after placement of the restoration, and the blending effect of different current composite systems.

Objectives
Attendees will:

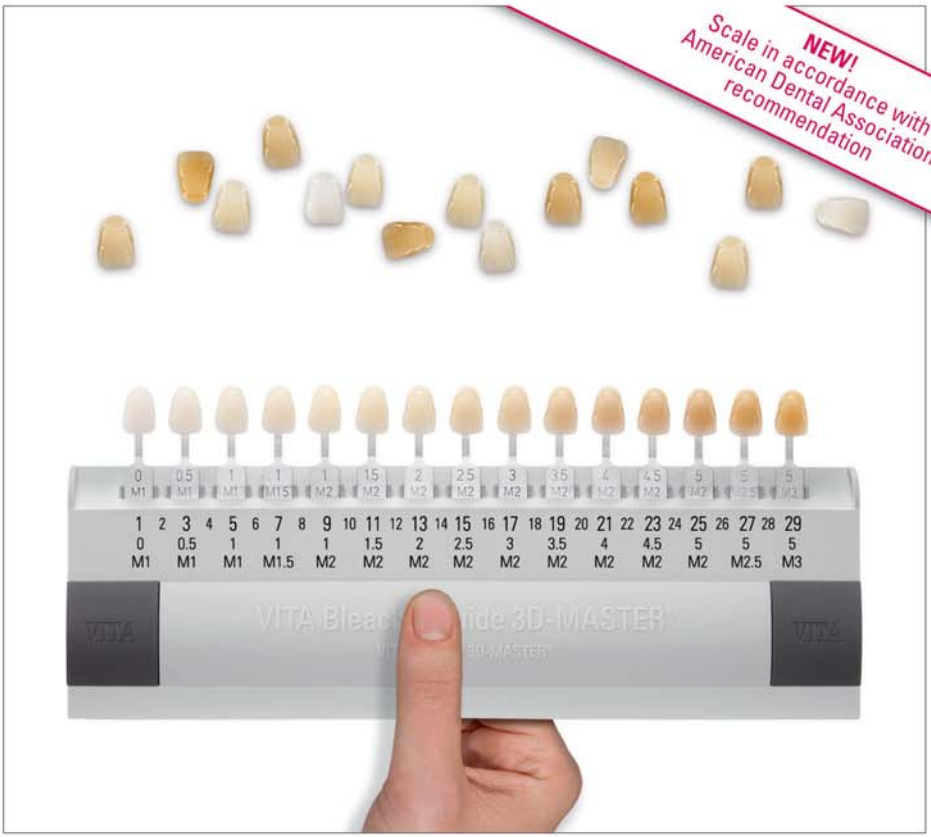
- Learn about the principles of Blending Effect
- Learn about different composite systems that are based on these principles
- Learn the results of a scientific study on the evaluation of the blending effect a new composite system using only 5 shades based on the Vita Shade Guide.

Ghazal Khashayar, DDS

Dr. Ghazal Khashayar, received her MSc degree in Dentistry from the University of Amsterdam, ACTA, in The Netherlands in 2007. Since then she has spent half her time in private practice, and the other half in academia. Dr. Khashayar has published several articles and has lectured internationally on color science in dentistry as part of her PhD on "The Science of Tooth Color". Her research experience goes beyond color science as she also lectures in the field of oral scanners and digital impressions in dentistry. She spent the last year of her PhD at Harvard School of Dental Medicine as a visiting research scholar and served as a part time clinical instructor at the department of restorative dentistry and biomaterials sciences. Dr. Khashayar has dedicated the last 9 years to the field of color research in dentistry.

At last: An easy way to track tooth whitening!

VITA Bleachedguide 3D-MASTER® – professional and easy.



VITA shade, VITA made.

VITA®

The VITA Bleachedguide 3D-MASTER is ideal for patient tooth whitening assessment and treatment planning. It's as simple as selecting the starting shade and measuring progress during the whitening regimen, whether bleaching is done in-office or at home. And once complete, the VITA Bleachedguide is a handy tool to help measure and maintain patient whitening at the optimal level. In addition, the 29 shade levels used by the American Dental Association guidelines are integrated in the VITA Bleachedguide 3D-MASTER, assuring a structured, repeatable protocol for all of your patients.

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Poster Presentations

Abstract #1 • **SCAD VITA Award Winner, Young Faculty Category**

Three Dimensional Subjective Subdivision of the Dental Chromatic Space According to VITA Classical Shades

R. Ghinea*[1,2], L.J. Herrera[3], O.E. Pecho[1], A.M. Ionescu[1], J.C. Cardona[1], R. Pulgar[4], M.M. Perez[1,2]

[1] Department of Optics, Faculty of Science, University of Granada, Granada, Spain
[2] Houston Center for Biomaterials and Biomimetics, School of Dentistry, University of Texas, Houston, TX USA
[3] Department of Computer Architecture and Computer Technology, ETSIIT, University of Granada, Spain
[4] Department of Stomatology, School of Dentistry, University of Granada, Spain

Objectives: The main objective of this study was to separate the dental chromatic space into three dimensional subdivisions corresponding to VITA Classical shades, according to visual matching performed by a panel of experienced observers.
Methods: 49 tooth shaped dental composite samples were matched to VITA Classical shades by a panel of 10 experienced observers. For each sample, the most common answer was assigned as the corresponding shade. The color of all samples was measured using a spectrorradiometer (PR 704, ColorResearch, USA), a viewing booth (CAC D60, VeriVide, UK), the D65 illuminant and the d/0˚ geometry. The geometry of the visual assessments matched the geometry of the instrumental measurements. The dental chromatic space was divided into a grid corresponding to 0.2 steps in the L* a* and b* directions. For each point of the grid, the CIELAB color difference to each of the points corresponding to the 49 studied samples was calculated, and the closest point (minimum color difference) was determined (MATLAB, Mathworks, USA). If the closest sample point was within either the perceptibility or the acceptability limits, the corresponding shade of the closest sample point was assigned to the point on the grid. If the minimum distance was higher than both the acceptability and perceptibility limits, the grid point was assigned no shade.
Results: The three dimensional subdivision of the dental chromatic space according to the perceptibility and acceptability limits are presented in Figure 1 and Figure 2, respectively.
Conclusions: The dental chromatic space was precisely separated into subdivisions corresponding to VITA Classical shades, within both perceptibility and acceptability limits. The results of this study can be very useful in future research in dentistry as well as in industrial applications, such as dental shade guides manufacturing or the development of new dental materials.
Acknowledgments: This study was partially supported by BioTic-2013-P94 research grant. Dental composites used in this study were kindly supplied by VOCO GmbH, Tokuyama Dental Corporation, 3M ESPE and Kerr Corporation.

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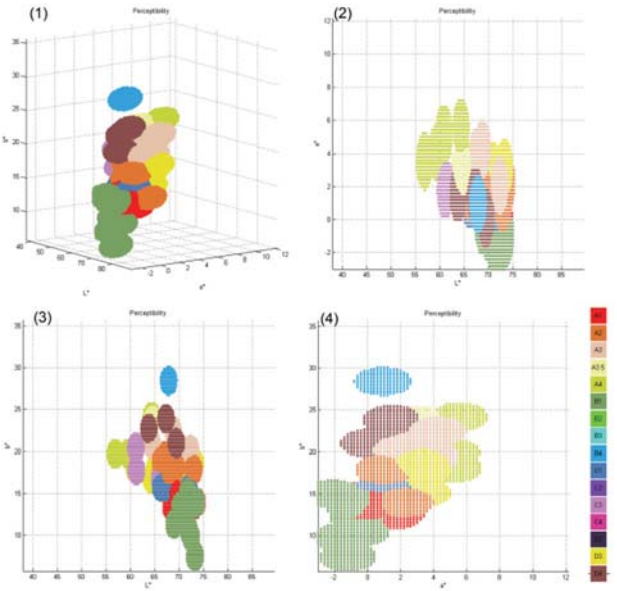

Figure 1. (1) 3D View of the subjective subdivision of the dental chromatic space within perceptibility limits; (2) projection on the L* a* plane; (3) projection on the L* b* plane; (4) projection on the a* b* plane.

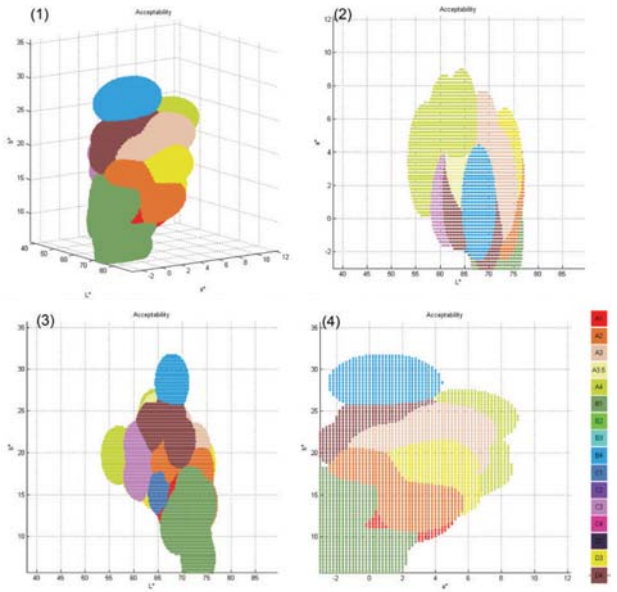

Figure 2. (1) 3D View of the subjective subdivision of the dental chromatic space within acceptibility limits; (2) projection on the L* a* plane; (3) projection on the L* b* plane; (4) projection on the a* b* plane.

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Abstract #2 • **SCAD VITA Award Winner, Undergraduate Student Category**

Development of a Low-Chroma, Color-Stable Dual-Cure UDMA-Based Restorative Resin

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Dual-cure (DC) resins are mainly used as cements due to their high initial chroma (generally yellow) and large color shift (ΔE*) as compared to light-cured (LC) resins. However, even as cements, this highΔE*is clinically unacceptable, especially with thin veneers. Recently, we developed a novel DC initiator system using allylthiourea (T) and cumenehydroperoxide (CH) as the chemical-cure (CC) initiator system, and p-octyloxy-phenyl-phenyl iodo niumhexafuoroantimonate (OPPI) as a photo-co-initiator for a commercial bis-GMA-based resin system (PermaFlo DC, PFDC, Ultradent Products, Inc.). Resins with extremely low initial chroma and ΔE* that are even lower than those of some light-cure resins were produced [Oei, et al, Dent Mater, 29:405-412, 2013]. This DC system has the potential for esthetic applications and the inherent advantages of DC, such as low shrinkage stress and increased depth of cure, may be taken advantage of. However, a disadvantage of bis-GMA-based resins is the toxicity of the xenoestrogenbis-phenol A, a precursor of bis-GMA.Thus, alternative resin monomers, such as urethane dimethacrylate (UDMA), are replacing bis-GMA in many dental products.

Objectives: To develop a novel dual-cure UDMA-based resin with low initial chroma andΔE*.

Methods: Concentrations of T (2.1 – 10.5 wt%) and CH (3.73 – 18.67 wt%) in the CC initiator system,andOPPI (0.5-1 wt%), camphor quinone (CQ; 0.5-1 wt%) and dimethylaminoethylm ethacrylate(DMAEMA; 0.75-2 wt%) in the LC initiator system were varied in a highly filled (75:25 Barium glass:Fumed Silica) UDMA-based DC resin system(64:36 UDMA: Tri-ethylene glycol dimethacrylate). Resins were assessed for initial color and ΔE*for 6 weeks under accelerated aging conditions (75˚C water bath) using digital colorimetry, degree of cure (DoC) using Rockwell$_{15T}$ hardness and Near Infrared FTIR (NIR), mechanical properties using a three-point bending test, and shrinkage stress using a Proto-Tech Polymerization Shrinkage Test instrument. Controls include a UDMA LC resin system with 1% CQ and 2% DMAEMA and a commercial DC resin PFDC.

Results: PFDC had similar hardness and NIR DoC as the UDMA LC control. Many of the experimental groups had similar hardness and NIR DoC to controls. However PFDC had very high initial color (b*=18) and ΔE* (~39 after 6 weeks of accelerated aging). The UDMA LC control also had a high initial color (b*=18) but had lower ΔE* (~11). Some of the experimental groups had lower

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initial chroma and ΔE* than controls. The 10.5% T/3.73% CH/0% OPPI/1% CQ/2% DMAEMA group and the 10.5% T/3.73% CH/1% OPPI/1% CQ/1% DMAEMA group had the lowest ΔE* (~7) but had high initial chroma(b*~21). Since initial chroma can be masked with filler, ΔE* was considered the more important characteristic. Three-point bending results showed that the presence of OPPI improved modulus and ultimate transverse strength (UTS) to comparable levels as the UDMA LC control, so the latter group was considered optimal. Finally, this optimal experimental DC group had significantly lower shrinkage stress (0.24 MPa/mm thickness) than those of the UDMA LC control (0.54 MPa/mm) and PFDC (0.73 MPa/mm).
Conclusions: The use of allylthiourea and cumenehydroperoxide as the CC initiator system and OPPI as a LC co-initiator in a highly-filled UDMA-based resin system significantly lowered ΔE* and shrinkage stress. OPPI is needed to maintain acceptable mechanical properties. This system has the potential to be used in esthetic situations and perhaps even as a bulk-cure resin.

Abstract #3 • **SCAD VITA Award Winner, Graduate Student Category**

Abutment Material Effect on Peri-implant Gingival Color and Perceived Esthetics

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Objectives: The purpose of the study is to evaluate the effect of implant abutment material on peri-implant gingival color using spectrophotometric analysis and to compare the outcomes with patient and clinician perception and satisfaction.
Methods: Thirty patients and four prosthodonticfaculty participated. Abutments consisted of zirconia, gold-hued titanium, and titanium. Peri-implant gingival color results of a single anterior implant restoration were compared to a patient's control tooth. Spectrophotometric analysis was conducted using SpectroshadeTM Micro to measure the color difference (ΔE, ΔL*, Δa*, Δb*) between the midfacialperi-implant gingiva and the marginal gingiva of the control tooth for each abutment material. Patient and clinician satisfaction survey was conducted using hand-held color-correcting light source (Rite-liteTM2).
Results: Zirconia abutments displayed significantly smaller gingival color difference (ΔE) compared to titanium and gold-hued titanium abutments (respectively, 3.98 ± 0.99; 7.22 ± 3.31; 5.65 ± 2.11; $p<0.05$). Among ΔL*, Δa* and Δb*, only Δa* showed significant difference between groups.There was no significant correlation between gingival tissue thickness (measured from patient's cast) and ΔE, but thick biotype (determined by probe test) dem-

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onstrated a smaller ΔE than thin biotype (4.82 ± 1.49; 6.41 ± 3.27; p=0.097). There was no statistical difference in patients' or clinicians' satisfaction among abutment materials. Patients' satisfaction was significantly higher than clinicians' and perceived differences were lower than clinicians' (P<0.01). Clinicians' satisfaction was higher for gingival (pink) esthetics than crown (white) esthetics (P<0.05).

Conclusion: This study attempted to relate spectrophotometically measured gingival color to patient and clinician perceived esthetic acceptability. Within the limitation of the present study, zirconia abutment had significantly lower color difference than titanium or gold-hued titanium abutments. However, no statistical difference in patients' or clinicians' satisfaction among abutment materials was demonstrated, and patients' satisfaction was significantly higher than clinicians'.

Acknowledgment: This study was funded by American Academy of Implant Dentistry.

Abstract#4

Reaction of Magnesium Ions with Tooth Enamel Apatite: How to Rejuvenate Teeth?

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Tooth enamel is a mineralized tissue made almost entirely of inorganic carbonated apatite nanocrystals arranged in a highly organized architecture that contributes to their physical properties. During the aging process, the average size of hydroxyapatite crystals in enamel increases and the enamel becomes softer, darker and less resistant to fracture. Recently, we have shown that the crystallographic ultrastructure of enamel has a major role in determining the physical and optical properties of teeth.

Objectives: This study was designed to assess the reactivity of magnesium ions with mature tooth enamel and assess whether these ions can induce changes in its crystallographic structure, thus modifying the mechanical and optical properties of teeth.

Methods: A group of one hundred and six sound anterior teeth were treated with either saturated solutions of magnesium ions or deionized-distilled water (as a control). Teeth were immersed for a period of 14 hours in each specific treatment. We assessed the elemental and crystallographic composition and the mechanical

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and optical properties before and after each specific treatment using the following techniques: x-ray diffraction, Raman spectroscopy, scanning electron, Inductively Coupled Plasma Mass Spectrometry, pycnometry, Brunauer–Emmett–Teller analysis and thermogravimetric analysis, Vickers microhardness and tooth shade measurements.
Results: Here we show that magnesium ions reacted with tooth enamel and by doing so modified its crystallographic structure. Magnesium ions decreased significantly the apatite crystallinity and crystal size in enamel ($p<0.05$), while it increased the specific surface area of enamel ($p<0.05$). This change in crystallographic structure affected the mechanical and optical properties of the enamel making it harder and whiter ($p<0.05$).
Conclusion: Crystallographic ultrastructure plays a key role in defining the properties of the tooth enamel, which can be tailored through ionic substitution for improvement of mechanical and optical properties.

Abstract #5

Color Differences between Composite-Resin Shade-Guides and Correlation to Vita-Ceramic Shades

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Objectives: To measure color differences between commercial composite-resin shade-guides and correlate their shades to Vita-ceramic shades.
Methods: Three commercial composite-resin shade-guides were used (Tetric EvoCeram-Ivoclar Vivadent, Grandio-Voco and Premise-Kerr). Ten shades were selected (A1,A2,A3,A3.5,A4,B2,B3,C2,C3 and D3). Vita-EasyShade-spectrophotometer (Vita-Zahnfabrik) was used to measure the color parameters of composite-resin shade-guide tabs and correlate their shades to Vita-Classical and Vita-3D-Master shades, using "tooth single mode". The color difference (ΔE) between the same shades among the different shade-guides was calculated according to the following equation: $\Delta E=[(\Delta L^*)^2+(\Delta a^*)^2+(\Delta b^*)^2]^{1/2}$. According to Douglas RD et al (2007), the color perceptibility threshold was ΔE=2.6, while color acceptability threshold was ΔE=5.5.
Results: The color differences (ΔE) between "*Tetric-Voco*" were as follows for the various shades: A1:10.6±0.1, A2:11.9±0.2, A3:13.4±0.5, A3.5:25.8±0.6, A4:19.2±0.3, B2:3.9±1.2, B3:20.6±0.4, C2:7.7±0.2, C3:6.8±0.2, D3:4.4±0.7. While ΔE for "*Tetric-Premise*": A1:23.8±0.2, A2:19.2±0.1, A3: 17.7±0.7, A3.5: 31.2±0.6, A4: 29 ±0.3, B2: 9.1±1.1, B3: 22.4±0.4, C2:12.9±0.7, C3:13.5±0.9, D3:11.6±0.5. ΔE between "*Premise-Voco*": A1:14.7±0.4, A2:8±0.4, A3:4.9±0.6, A3.5:7.8±0.6, A4:10.4±0.5, B2:6.7±1.4, B3:4.3±0.5, C2:5.3±0.5, C3:6.8±0.7, D3:11.2±0.7.

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Conclusions: The color differences between the same shades among the various shade-guides were above the perceptibility threshold and in some cases above the acceptability threshold. Most composite-resin tabs of the same shade from the different shade-guides varied in their correlation to the Vita-ceramic shades.

Abstract #6

Assessing the Correlation of Dentin Color to the Color of a Tooth as a Whole

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Objectives: The color of teeth is a complex phenomenon. Natural tooth is composed of different structures with different optical properties. Few studies have been conducted to relate the color of the tooth as a whole to the color of composing structures (enamel and dentin). The aim of this observational study is to investigate the correlation of dentin color with the tooth color as a whole.
Methods: Specimens were selected from sound natural extracted maxillary anterior teeth were selected. Selected teeth were, free from surface surface stains, cracks and had no or minimal wear (no incisal dentin exposure). Teeth were cleaned and mounted on a dentoform with a bite registration material (Regisil, DENTSPLY). The color of the teeth was measured with an image based spectrophotometer (Spectroshade Micro, MHT Optic Research) based on the CIE LAB color space in the incisal, middle and cervical thirds of the tooth. The location of the measurement was determined using a clear grid that was placed on the screen of the device. The thickness of enamel for each tooth was determined with a radiograph. After depth grooves were cut into enamel, it was ground to expose the facial dentin with a diamond bur. Then the color of dentin was measured again in the incisal, middle and cervical third at the same points of measurement using the clear grid placed on the screen as a reference. Color difference between the whole tooth color measurement and the corresponding dentin color measurement was calculated for each tooth.
Results: 82 maxillary extracted anterior teeth were included (25 central incisors, 18 lateral incisors, 39 canines).
The pilot data showed that there was no significant difference in mean L value between the dentin and the tooth at the incisal, middle and cervical third ($p=0.0950$, 0.5967, 0.2885 respectively). There was a significant difference in mean b value between the dentin and the tooth at the incisal third ($p=0.0091$). However, there was no significant difference in mean b value between the

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dentin and the tooth at the middle and cervical third (p=0.0600, 0.6834 respectively). There was no significant difference in mean a value between the dentin and the tooth at the incisal, middle and cervical third (p=0.9352, 0.7174, 0.4592 respectively). There was a significant difference in mean Δa value between the dentin and the tooth at the incisal, middle, cervical third (p=0.0004, 0.0213, 0.0058) respectively.
Conclusion: The results of this study suggest that the color of the dentin is strongly correlated with the overall tooth color. The color of the dentin can be matched more precisely at the cervical and middle third than the incisal third.

Abstract #7

Assessment of Optical Effect Using Ceramic Modifiers on Color Reproduction

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Objectives: The objective of this study was to assess the optical effect of ceramic modifiers on the lightness and chroma depending on modifier concentrations and base shades.
Methods: Dental ceramic Cerabian CZR (Noritake Co.), body shades NW0 and B1, and Pink and Light Orange modifiers were used to create sample disks. The modifier concentrations were set at 0.5%, 1.0%, 1.5%, 2.0%, 4.0% and 6.0% for Pink(P), Light Orange(LO), and mixture of Pink + Light Orange(PLO). Three samples of each concentration were made. Ceramic powder of base shade and modifier were weighed by electric scale, mixed and shaped using silicon molds, then fired. Each sample was adjusted and polished into a disk (10mm diameter and 1mm thickness) using a polishing machine (Vector Power Head, Buhler) and emery paper #1200. Each disk was placed on a cover glass slide and the dental spectrophotometer was used to measure CIELAB color coordinates. ΔE, ΔL*, Δa*, and Δb* were calculated for each disk, comparing with and without modifier, and Pearson Correlation Coefficients R were analyzed.
Results: For all modifiers and base shades, there was a strong correlation between decreasing lightness (ΔL*) and increasing modifier concentration (R= -0.89~-0.99). P changed a* with R=0.99, LO changed b* with R=0.98, and PLO changed both a* and b* with R=0.97~0.99. All modifiers changed the chroma (Δa* and Δb*) accordingly – they increased or did not change the chroma based on the modifier color. All modifiers did not have a significant effect below 1.5% concentration. ΔE had a very strong positive correlation to concentrations of modifiers (R>0.97). To make a clinically noticeable color change (ΔE>2.6), the concentration of modifier must be >4%.

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Conclusions: This study provides scientific evidence that lightness always decreases with adding modifier, while adjusting chroma. Therefore, for color reproduction, a use of lighter base shade is essential to achieve better color matching.

Abstract #8

Color Shifting Induced by Try-In Pastes and Pressed Ceramic Disks

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Objectives: Assessment of color shifting induced by different try-in pastes interposed between ceramic disks and discolored backgrounds.
Methods: Ceramic disks (Ce) (n=5) (diameter 10 mm, thickness 0.3, 0.6, 0.9, 1.2, 1.5mm, ±0.05mm) were fabricated using IPS e.max® Press MO 0 (Ivoclar Vivadent). Light cured composite disks (Co) simulating the shade of prepared teeth (IPS Natural Die Material Kit, Ivoclar Vivadent) (diameter 10mm, thickness 5mm) were fabricated in the 9 existing shades (ND1-ND9). Saturated sucrose solution (S) (refractive index n=1.5) and Variolink® II Try-In pastes (Ivoclar Vivadent) (T) in the 6 existing colors were interposed between each Ce and Co.
Color parameters were recorded for the Co, for each ceramic disk–try-in paste–composite disk complex (CeTCo) and for each ceramic disk–sucrose–composite disk complex (CeSCo). The colour parameters CIE L*, a*, b* were recorded using a dental spectrophotometer (VITA Easyshade® Advance, VITA Bad Säckingen, Germany) in a viewing booth (JUST LED Color Viewing Light, JUST Normlicht, Weilheim/Teck, Germany). ΔE colour differences were calculated between Co-CeTCo and Co-CeSCo. Color difference by the change in thickness was analyzed by one-way ANOVA at a significance level of α=0.05. The correlation among ΔE values and the different thicknesses was evaluated with a regression analysis.
Results: For the ND1 group, no correlation was found between the thickness of ceramics and the variation of ΔE, except CeSCo, where a fair correlation was proven ($R^2 = 0.58$). For the ND2, ND3, ND4, ND5, ND7, ND8, ND9 groups, a strong correlation could be demonstrated ($R^2 = 0.93$-0.99). For the ND6 group, no data could be recorded because the color parameters of the Co were outside the color range recordable by the VITA Easyshade®.

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Conclusions: Try-in pastes and different thicknesses of pressed ceramics can lead to important color shifting, more significant in highly discolored backgrounds.
Acknowledgement: External funding: PN-II-PT-PCCA-2011-3-2-1275.

Abstract #9

Clinical Evaluation of New Software for Shade Matching

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Objective: the clinical evaluation of a new computer software aimed to evaluate dental color parameters, from digital images taken in general practice working conditions.
Material and Methods: 200 teeth from 45 patients were measured for this study, in order to compare the software color parameters results with spectrophotometric (Vita Easyshade®, Vita) results. Digital images were taken using a regular dental set-up system: body Nikon D7000, 100mm lenses, and R1C1 bilateral flash; a hollowed transparent rubber was placed on the buccal area of the teeth to be measured, in order to reproduce the measurement area of the Vita Easyshade.
The computer analysis of the digital images was performed using the developed shade matching software (TooDent v1.0). The software allows the image color calibration, automatic contour area selection and photographic reflection exclusion; color analysis was performed further in the selected area and the result was expressed in Vitapan 3D Master shades and in CIE L*, a*, b* values.
The instrumental values registered with Vita EasyShade in the same dental area were used as reference. ΔE* was calculated using L* a* b* values obtained from the mages and spectrophotometer, for the same tooth.
Results: 84.77% of ΔE* values were below the 2.7 acceptability threshold value. A very strong correlation was obtained, Spearman's rank correlation = 0.964 ($p<0.001$), between the results expressed in 3D Master shades obtained by the program calculations, when compared with Vita EasyShade measurements.
Conclusions: The easy to use program, allows for a good image calibration and provide accurate results in color selection, when compared to Vita Easy Shade.
The program can be used as a helpful tool for routine clinical color selection in every day dental practice.
Acknowledgement: Research supported by UMF internal Grant nr. 27020/18/2011.

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Abstract #10

Influence of Background Color and Light Source on Color Matching

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Objective: To evaluate role of background color and light on the accuracy of shade selection

Methods: Four participants with average and superior color discrimination competency according to ISO TR 28642:2011 were asked to match 48 samples represented by the shade tabs of three Vita Classical shade guides. Original tab designations of two shade guides were covered and replaced by numbers from 1 to 32. Original tab designations of the third shade guide remained uncovered. Two correspondent tabs from the covered group were aimed to be assigned for each of the uncovered tabs. Color matching was performed in a viewing booth, two light sources were used alternatively: D65 and D50, using 0°/45° viewing geometry, at a distance of 35 cm. Background colors were: gray, white, black red and blue. In order to differentiate the role played by each of the backgrounds, gray was considered as reference. The number of correct matches was evaluated for each observer. Results were analyzed by descriptive statistics, Chi Square Test and Fisher`s Exact Test (significance level at α=0.05)

Results: The background proved to influence the overall results of shade matching (p=0.000) and for each of the two light sources considered separately (D50 p=0.000, D65 p=0.000). The results of shade matching on black, red and blue backgrounds indicated significant differences in comparison with neutral background (gray) (p=0.01, p=0.007 and p=0.000 respectively). However, white background didn't prove to influence the results, as compared to neutral background (p=0.078). The quality of the light didn`t influence the overall results of the shade-matching (p=0.243). The highest mismatching rates were found for B4 (50%), B3 (38.75%), A3.5 (36.25%)

Conclusion: Within the limitations of our study, background influenced the results of color matching, with blue background generating the highest mismatching rate. The light didn`t influence the shade matching process.

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Abstract #11

Treatment Plan of Discolored Single Central Incisor. Understanding the Decision-Making-Process

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Objective: To compare clinical decision-making of NSU dental school faculty, postgraduate, and undergraduate when presented with a discolored single central incisor scenario and reasons of making their choices.
Material and Methods: A survey with clinical scenario of discolored single central incisor was randomlypresented to NSU dental school members. Participants were given four clinical pictures, periapical X-Ray and complete description of clinical scenarioof female patient with high esthetic expectations and no financial limitations.Participants were asked to choose and/or suggest treatment-plan options and reasonswhy they based their treatment-plan. Groups were stratified by gender, year of graduation and specialty. Answers were analyzed using ChiSquare and Likelihood Ratio (SPSS version 13.0), p value .05.
Results: 165 responses were generated (51 faculty, 62 postgraduate and 52 undergraduate). 60.7% facultyreported more than 15 years of clinical experience and 51.6% postgraduate less than 5 years. Eleventreatment-plan options were suggested: Porcelain veneer #8 (26.06%), porcelain crown #8 (21.81%), porcelain veneers #8 and 9 (18.18%), whitening and direct composite (16.36%), porcelain veneers #6, 7, 8, 9, 10 and 11 (9.69%); porcelain crowns #8 and 9 (6.06%), other (1.84%). No statistical difference was found, chi-square test. (Likelihood-ratio chi2(8) =9.1048 Pr = 0.334).The two most important factors taken into consideration during the decision-making process were: patient high esthetic expectations (51.5%), conservative dentistry approach (37.5%), other (11%). No statistical difference was found between groups (Likelihood-ratio chi2(4) =8.5198 Pr = 0.074). Level of difficulty was inversely proportional of number of years of clinical experience and was statistically significant (Likelihood-ratio chi2(8) = 29.8070 Pr = 0.000.).
Conclusions: Variation amongst treatment recommendations of discolored single tooth demonstrated lack of consistency in regards to treatment-planning. For all groups, the more aggressive treatment plan options were attributed to patient high aesthetic expectations and recommended by less experienced professionals.

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Abstract #12

Reproducibility of the VITA Easyshade Advance System Compared Visual Shade Identification

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Objectives: The aim of this study was to evaluate the reproducibility of two different shade selection methods. The electronic color measurement was compared to the visual shade identification performed by 30 different observers.
Methods: 30 participants were recruited for the study to measure 10 different colored all ceramic FDP (fix partial denture) (Vita Mark II). For the visual measurement two Vita shade guides (Vita Linearguide 3D- Master; Vita classical) were used. The spectrophotometric measurements were performed with the Vita Easyshade Advance System and to guarantee an optimal repositioning a splint guide was fabricated. All the measurements took place in a phantom mouth to imitate the oral cavity under standardized laboratory conditions. The measurements were repeated 3 times, 2 and 4 weeks after the first measurement. For the statistical analysis crosstables were calculated and the general agreement was estimated.
Results:

FPD	Shade Guide	Agreement instrumental	Agreement visual
0M1	VC	100%	54,8%
1M1	VC	100%	92,9%
1M2	VC	100%	86,9%
2M1	VC	100%	83,3%
2M2	VC	91,70%	35,7%
2M3	VC	69%	36,9%
3M1	VC	100%	54,8%
3M2	VC	98,80%	26,2%
3M3	VC	48,80%	38,1%
4M2	VC	100%	57,1%
0M1	3D	100,0%	83,3%
1M1	3D	78,3%	83,3%
1M2	3D	100,0%	47,6%
2M1	3D	69,0%	40,5%
2M2	3D	98,8%	32,1%
2M3	3D	94,0%	28,6%
3M1	3D	100,0%	35,7%
3M2	3D	98,8%	27,4%
3M3	3D	91,7%	20,2%
4M2	3D	100,0%	25,0%

VC= Vita classical, 3D= Vita Linearguide 3 D- Master, FPD=Color

Poster Presentations

Conclusions: Within the limitation of this study the following conclusions can be drawn:
The reproducibility of the VITA Easyshade Advance system was in general higher than the visual color identification. The intraexaminer agreement with the Linearguide 3D-Master was higher for the lighter than the darker colored all ceramic restorations.

Abstract #13

Clinical Effect of TT in Color Matching

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Introduction: Tooth color differentiation has been playing an increasingly important role in the age of esthetic dentistry. Apart from electronic devices such as the Easy Shade, the awareness of the correctly chosen color presents an essential basis of understanding this challenge.
Objectives: On the basis of these considerations, the teaching and learning curriculum Toothguide Trainer (TT) has been developed and introduced by Professor Jakstat. Currently, TT is performed at dental courses of universities as well as at facilities training dental assistants and at colleges for master dental technicians.
In the following, the results of scientific studies in Berlin resp. under participation of the Berlin team will be presented.
Method: All investigations were carried out under the same standards. The participants were pre-clinical students without any skills nor experience in tooth color differentiation. After an introducing lecture on color, the Ishihara Test was performed in order to identify color-deficient students. Prior to randomization, the student group performed an initial test, followed by the training program TT as well as the Toothguide Training Box (TTB). After a short break, there was the final test. The control group passed both the initial as well as the final test, however, without any training on TT nor TTB.
Results: Different issues were examined this way and presented after statistical evaluation in the following publications: "First experience with a new training program for color differentiation"; "Can the ability to identify tooth color difference be learned?"; "Do tinted glasses influence the tooth color differentiation?"; "Test – and re-test of color differentiation capabilities of dental students"; "Does Gender and Experience Influence Shade Matching Quality"; "Are TT and TTB Effective in Color Matching?".
Conclusion: TT presents an effective teaching and learning method for tooth color differentiation, independently of the color scale used.
Acknowledgement: The studies were supported by VITA Zahnfabrik

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Abstract #14

Principal Component Analysis for Color of Dental Shades

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Objectives: Conventional 3-dimensional color spaces such as L*a*b* or L*C*h have a limitation in that colors of materials can only be separated on the same hyperplane. Therefore, it would be useful to find appropriate axes for dental color analysis by analyzing spectral data itself, rather than conventional 3-dimentional color spaces.
Methods: Hyperspectral data are detailed color spectra with narrow spectral bands over a continuous spectral range. We acquired hyperspectral data of the shade guides of Beautifill 2 (B2; Shofu Co.) and Estelite Shiguma (ES; Tokuyama Dental Co.) acquired with a spectroradiometer (CS-2000, Konica Minolta) by white and black background without specular reflection, and standardized them as reflectance data. Then, reflectance data were weighed by luminous efficiency function, and used in principal component analysis (PCA). Principal components (PCs) and their contribution, and values of respective shades to PCs were calculated as PC scores. Values of L*a*b*, L*C*h, translucency parameter and opacity of shades were also calculated.
Results: Cumulate contribution rate of 1st to 3rd PCs were approximately 100%, which meant shade colors were very similer to each other. Respective PCs showed specific figures, and values of shades showed sequences unique to each PC, which were independent each other; values to the 1st PC showed general features of shades for series of B2 and ES shade guides, values to the 2nd PC showed higher score in ES compared to B2, values to the 3rd PC showed difference between B2 and ES, especially in black background, values to the 4th PC showed higher scores in higher number shades.
Conclusion: Using PCA, we could find axes independent of the conventional 3-dimensional color spaces. These axes reflected certain changes that are not detected on conventional color spaces. Our method would help to diagnose color differences of dental materials.

Poster Presentations

Abstract #15

Comparison between In Vivo Visual and Instrumental Tooth Color Determination

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Objectives: The characterization and reproduction of tooth color is a great challenge in aesthetic and restorative dentistry. Therefore, the perfect agreement of the tooth color between the natural dentition and the restoration is the central criteria of quality for the patient and the key to a successful incorporation. Tooth color matching in dentistry is commonly performed using tooth formed shade tabs. Instrumental shade selection devices have the potential to improve the accuracy and reliability of shade selection. The aim of this study was to compare the agreement of visual and instrumental shade selection between four different dental color measurement devices and two human observers.
Methods: The color of all maxillary anterior teeth (6-11) of 49 dental students without any restorations, fillings or irregular surface morphology was evaluated. Two investigators determined the closest tooth color match to the Vitapan classical shade system in each other's agreement with no time limit for the middle tooth third. Then each tooth was measured five times at the central region with each device (DeguDent Shade Pilot/SP, Olympus CrystalEye/CE, VITA Easyshade compact, X-Rite Shade Vision/SV) under standardized conditions. The color data were generated as VITA Classical shade tab information and CIE L*a*b* values. The data was compiled and analyzed statistically using the Wilcoxon-Test (α=.05). Color differences (ΔE) between visual determined shade tab and instrumental measurement (visual-instrumental) as well as instrumental determined shade tab and instrumental measurement (instrumental-instrumental) were calculated.
Results: The SP has an agreement of 56.3% with the visual shade determination using VC shade, this score was significant higher ($p<.05$) than CE (49.0%) and ES (45.2%). No significant difference ($p>.05$) was recorded between SP and SV (51.3%). The mean color difference for the VC visual-instrumental agreement was 3.62 ΔE (SV), 4.37 ΔE (SP), 4.54 ΔE (CE) and 5.44 ΔE (ES). Compared to the visual-instrumental the instrumental-instrumental agreement was at any time better, for the SV 3.25 ΔE, SP 3.85 ΔE, CE 4.52 ΔE and 4.71 ΔE for ES.
Conclusions: Due to the nature of color the "true color" of the in vivo tested teeth could not be determined with certainty because there is no gold standard for correct evaluation. Within the limitation of this study we can conclude that neither the visual nor the instrumental selected VITA classical shade tabs performed, in the majority of the cases, a clinically acceptable color difference to the measured CIE L*a*b*- values of the teeth.

Poster Presentations

Abstract #16

Staining and Bleaching Depedent Changes in Color of Resin Composites

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Objectives: To evaluate staining and bleaching dependent changes in of resin composites.
Methods: 3 shades (A1, A3, Bleach Shade) of two different composites (Tetric EvoFlow (TEF) and Tetric EvoCeram (TEC), [Ivoclar Vivadent] were used for preparation of disc shaped specimens (D=10mm, 2-mm thick, n=60). Specimens were finished using 400-grit SiC paper and polished with a one-step polisher (PoGo, Dentsply/Caulk) for 40 seconds. The specimens were then divided into 2 groups and immersed in 2 staining solutions (coffee or red wine) for 7 days. After 7 days, all of the specimens were rinsed, then bleaching agent (Opalescence PF 20% [Ultradent]) was applied on the top surface of each specimen.
The color of specimens was measured with a Color-Eye 7000 spectrophotometer (GretagMacbeth) according to the CIE L*a*b* system at baseline (after 24 hour-storage in distilled water at 37°C) after 7 days of staining and after bleaching. Means and standard deviations were calculated. The data were analyzed by analysis of variance. Fisher's PLSD intervals at 0.05 level of significance were determined for mean Lab and ΔE values.
Results: Color difference for 7 days minus baseline ranged from ΔE* = 4.1 to 6.0, and from ΔE* = 2.2 to 4.7, for red wine and coffee, respectively. Wine exhibited significantly higher ΔE* values compared to coffee. TEF showed significantly better color stability compared to TEC. After bleaching, the color of both TEF and TEC specimens returned to the baseline: color difference for bleaching minus baseline ranged from ΔE* = 0.9 to 1.2, and from ΔE* = 0.9 to 1.6, for red wine and coffee, respectively.
Conclusions: Both coffee and red wine affected color of tested composite resins. After bleaching, composite color did not differ significantly compared to baseline color.
Acknowledgement: Products supplied by Ivoclar Vivadent.

Poster Presentations

Abstract #17

Computerbased Method for Reproduction of Individual Colors Using Dentin Ceramics – A Feasability Study

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Objectives: The aim of this study was to develop a computer-based method for reproduction of dentin ceramics targeting the color of ceramic specimens with individual colors using commercially available dentin ceramics.
Methods: Ten disc-shaped ceramic specimens of each of specific colors (0M1, 1M1, 2M1 and 5M1) of the Vita Linearguide 3D-Master System were produced. L*a*b* coordinates of these specimens were evaluated using a spectrophotometer (Evolution 600, Thermo Scientific, Germany). In a first step the color 1M1 should be reproduced using the other colors. Starting point of the methodological approach is a linear equation system containing the L*a*b*-encodings of the base-colors, as well as the L*a*b*-encoding of the target-color. The goal is to find a suitable linear combination of the base-colors, which fits the target-color as close as possible. Hereby, however, the following aspects must be considered.
First, it is assumed, that the equation system is possibly over-determined. Second, the L*a*b*-encoding of the target-color might not be covered exactly by the base-colors. Third, all cofficients must be positive. Fourth, the sum of all coefficients must be equal to 1.
In order to meet these conditions and contraints, it was computed a non-negative least squares (NNLS) solution.
Results: Using this method, the expected colors difference ΔE between the specimens made of mixed dentin ceramics and the specimens of the color 1M1 should be on average < 2. Experiments indicate that using additional weighting coefficients for L*, a* and b* in particular, the overall error can further be reduced.
Conclusion: Within the limitations of this study first experiments indicate that this approach is suited to find well-fitting mixing ratios of commercially aavailable dentin ceramics to reproduce individual colors.

Poster Presentations

Abstract #18

Effect of Silane-Treated Filler Particles on the Degree of Conversion and the Optical Properties of Experimental Dental Composite Resins

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The knowledge of the factors that influence on color stability of dental composite resins improve new studies development and induce updates in the composition hence the longevity of the esthetic restorations.
Objectives: The aim of this study was to evaluate the effect of silane-treated filler particles on the degree of conversion (DC) and the optical properties (OP) of experimental dental composite resins.
Material and Methods: Four different composites were produced with the same organic matrix (29 wt% Bis-GMA, 32.5 wt% UDMA, 32.5 wt% Bis-EMA, 6 wt% TEGDMA) and different filler components. Composite 1 (C1): No filler (control), Composite 2 (C2): 13 wt% 0.04 μm SiO_2, Composite 3 (C3): 52 wt% 0.7 μm $BaAlSiO_2$ and Composite 4 (C4): 13 wt% 0.04 μm SiO_2 and 52 wt% 0.7 μm $BaAlSiO_2$. To assess DC, a FT-IR spectrometer was used to measure the non-polymerized and post-polymerized blends. The OP was evaluated by a spectrophotometer (Vita EasyShade Advanced) according to the CIE Lab parameters. The experimental samples were artificial aged for 300 hours (ranging cycles of 4 hours of UV-B light exposure at 50°C and 4 hours of condensation at 50°C) to induce color change. Data were submitted to one-way ANOVA and Tukey's test (α=0.05).
Results: The outcomes showed that the inorganic matrix content of composite resins is indirectly proportional to the DC and also to the color stability hence the yellowing and bright loss effects (C1: DC=72.78, ΔE=1.66, Δb*=1.18, ΔL*=0; C2: DC=60.92, ΔE=2.31, Δb*=1.31, ΔL*=-1.55; C3: DC=64.25, ΔE=5.48, Δb*=2.81, ΔL*=-0.1; C4: DC=60.92, ΔE=7.75, Δb*=4.94, ΔL*=-2.48).
Conclusions: The increase of inorganic matrix content directly affects the DC thence the OP of dental composite resins. Clinical significant color change (ΔE>3.3) was observed when the content of silane-treated filler particles was upper 52 wt%.
Acknowledgment: This study was supported by the FAPESP (grants # 2013/04241-2).

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Abstract #19

Colorimetric evaluation of Custom Shade Guide for New Dental Composite Systems

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Objectives: The purpose of this study was to evaluate the colorimetric values of two dental composites systems using the bilaminar layering technique and to compare with VITA Classical shade guide values.
Methods: Two composites: a micro-hybrid -A- (Amaris® VOCO; Cuxhaven, Germany) and a supra nano-filled -EO- (Estelite Ωmega® Tokuyama Dental Corp.; Tokyo, Japan) based on dentin/enamel technique were packed into tooth shaped silicone mold (Smile line, www.styleitaliano.org), which enables the condensation of the composite resin first for the enamel layer and finally for the dentin layer. Unique shade samples (8 for A and 7 for EO) and a combination of all dentin and enamel composites (15 for A and 12 for EO) were prepared (n=3). Enamel effects shades were discharged in both systems. All samples underwent photopolymerization during 40s on both lingual and buccal surfaces. Smooth finishing with brushes and paste was applied on buccal surfaces. The colorimetric values of all samples were measured using a previously calibrated dental spectrophotometer (VITA Easyshade® Advance, VITA Zahnfabrik) inside a viewing booth (CAC D60, VeriVide, UK) under D65 standard illuminant. Flexipalette Color Match (Smile line, www.styleitaliano.org), a grey background, was used and three measurements were made over a circular area on the middle of labial surface of each sample. Tabs of VITA Classical shade guide were also analyzed.
Results: All colorimetric values (L*, a*, b*, C* and h°) of both dental composites systems are listed in Table 1. Distribution of L*, a* and b* values are shown in Figure 2. Chroma (C*) and hue (h°) of all samples prepared using bilaminar layering technique of each system are shown in Figure 3.
Conclusions: Within the limitations of this study, it can be concluded that the use of custom bilaminar shade guides for each system employed can facilitate clinical steps in dental color matching.
Acknowledgments: This study was partially supported by BioTic-2013-P94 research grant. Dental composites analyzed were kindly supplied by VOCO GmbH (Cuxhaven, Germany) and Tokuyama Dental Corp. (Tokyo, Japan).

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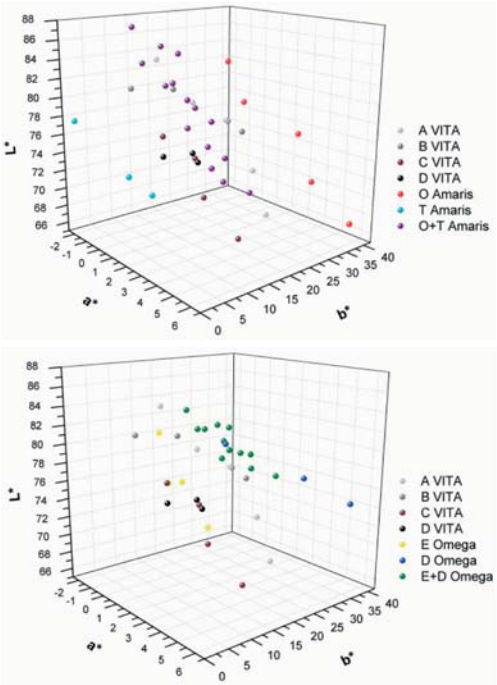

Figure 1. Comparison of colorimetric values (L*, a* and b*) of Amaris® VOCO and Estelite Omega® with VITA Classical shade guide

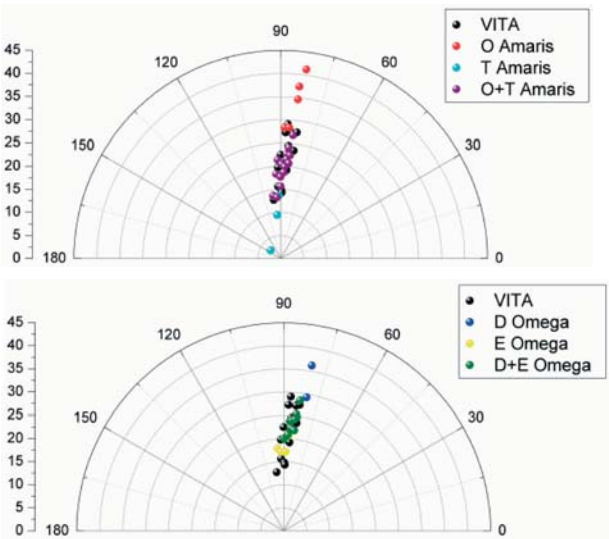

Figure 2. Comparison of colorimetric values (C* and h°) of Amaris® VOCO and Estelite Omega® with VITA Classical shade guide

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Abstract #20

Classification of Dental Shade Images through Machine Learning

W.K. Tam*, H.J. Lee
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Objectives: Dental shade matching using digital images may be promising provided that suitable color features, other than those in the La*b* color space, are selected and manipulated properly. Ideally, the shade features should be separated and classified effectively in multi-dimensional space. Traditional shade matching equation of ΔE may not satisfy the complicated task in solving multi-dimensional classification problem. We propose a content-based shade classification technique using support vector machine (SVM) which is reported as the outstanding multi-dimensional classifier recently.
Methods: Totally 520 tab images (20 captures of Vita 3D-Master® shade guide) were taken by a Canon Powershot S100 camera which was set to automatic mode with flashlight enabled. The images were shot at 30 to 50 cm varying distances. A rectangular content was cropped manually on each shade tab surface of the image. Each content was divided into 10 x 2 blocks for describing the color distribution. Twenty-six shade classes were described by the color features of RGB, HSV, La*b* and XYZ color spaces extracted from the blocks inside their contents. Twenty sets of twenty-six shade classes were underwent SVM training and prediction using leave-one-out strategy.
Results: The top one accuracy of SVM shade classification was 0.89 (σ=0.15), the top three accuracy was 0.99 (σ=0.03). Individual shade tab accuracies are depicted in Fig. 1. The shade similarities of the resulted candidates are shown in Fig. 2.

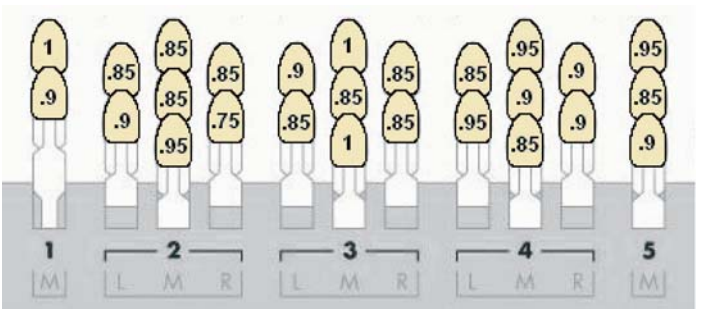

Figure 1. Accuracies of individual shade tab.

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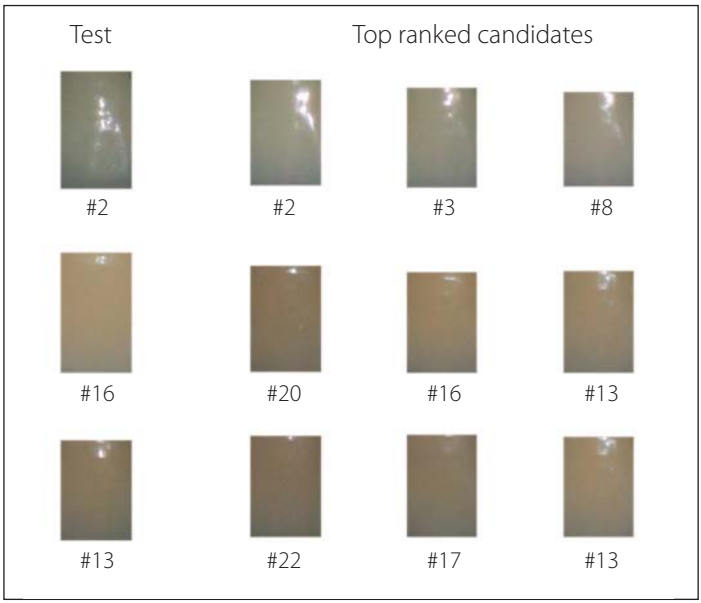

Figure 2. Shade contents of test (left column) and resulted candidates (right 3 columns). The candidates are ranked from left to right in ascending order.

Conclusions: It revealed that SVM could help classifying the twenty-six classes of dental shade. The content-based shade description was another contributing factor that provided informative color gradations for classification. This study provided a promising technique when using digital camera for dental shade matching.

Abstract #21

Effect of Mouth Rinses on Color of Resin Composites

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[2] University of Texas School of Dentistry, Department of Restorative Dentistry and Prosthodontics, USA

Objectives: The aim of this study was to evaluate the effects of 4 commercially available mouth rinses on color of 2 different resin composites.
Methods: A2 shade of Sonicfill (Kerr) and conventional nano-hybrid composite Z550 (3M ESPE) were used. Forty disc-shaped specimens (10x2 mm) were fabricated for each composite and divided into five groups (n=8) according to mouth rinses. Specimens were finished using 400-grit SiC paper and polished using pol-

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ishing discs Opti Disc (Kerr), polishing brushes Opti shine (Kerr) and rubbers HiLusterPLUS Polishing System (Kerr). After polishing and immersing in distilled water for 24h all specimens were subjected to color measurements. Color was measured using a Vita Easyshade Compact spectrophotometer with CIELAB color scale (VITA Zahnfabrik). After baseline measurement each composite group was divided into 5 groups according to mouth rinses, as follows: (1) Oral B Pro Expert Clinic Line Alcohol-free (Oral B); (2) Listerine Tooth Defense Anti-cavity Fluoride Rinse (Listerine); (3) Pharmazol Zn Mouth rinse (Çözüm ilaç); (4) Nilera Mouth rinse (Nilera); and (5) Distilled water (control). Color measurement was repeated after immersion of specimens in mouth rinses (20 ml) at 37°C for 12 hours, and color differences compared to baseline were calculated. The statistical method Two-way Anova was used used to analyze the differences among the groups.
Results: Statistical analysis indicated that Sonic Fill showed significantly higher discoloration compared to nanohybrid composite Filtek Z550 when exposed to Oral B Pro Expert Clinic Line Alcohol-free, Listerine Tooth Defense Anti-cavity Fluoride Rinse and Pharmazol Zn Mouth rinse. The color differences of two resin composites were not significant for Distilled water and Nilera Mouth rinse.
Conclusions: Within the limitations of this study, it was concluded that Sonic Fill showed higher discoloration than nanohybrid composite Filtek Z550.

Abstract #22

A Comparative Study of Color Consistency of Six CAD/CAM Dental Materials

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Color inconsistencies have been recognized among packable composite restorative materials however little research has compared the color consistency of milled restorative materials. Ten samples each of six different dental materials were milled in the E4D CAD/CAM system from the same All Ceramic Crown proposal: Empress Multi, Empress LT (leucite reinforced ceramic, Ivoclar Vivodent), e.max HT, e.max LT (lithium disilicate ceramic, Ivoclar Vivodent), Lava Ultimate (nanoresin zirconia filled polymer, 3M ESPE), and Paradigm MZ100 (nanohybrid composite, 3M ESPE) all following the same gold standard design of tooth #30. All materials were selected in the most common shade, A2, and verified using the VITA Easyshade® Compact colorimeter on a 45 degree angle to the buccal cusp. The restoration was placed on a neutral gray background during the color assessment. Colorimeter shade results were converted to numerical Munsell notation for hue, value, and chroma. The VITA Classic® shade guide was used as an industry standard constant for the A2 shade and verified by the

Poster Presentations

VITA Easyshade® Compact colorimeter. Individual materials were compared graphically to the color components for A2. Graphically all materials performed differently. No material was completely consistent for A2. The range of shades recorded for all samples of ail materials was: A1, A2, B1, B2, C1, D2. e.max LT had the most sample results for A2, as well as results for shades B2 and A1. Lava Ultimate produced the most consistent shade, B2.

Abstract #23

Color Differences (Δ E) between Eight Equivalent Dental Measurement Devices

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Objectives: The aim of this study was to evaluate the color differences between eight equivalent dental measurement devices (Vita Easy Shade Advance).
Methods: Ceramic discs (Vita VM9,VITA_Zahnfabrik,Germany) of each of the 29 colors of the VITA-3D-Master system were manufactured using a mould. Color coordinates (L*a*b* and C*, h°) of each of these discs were measured fivefold spectrophotometrically (Vita Easyshade Advance,VITA Zahnfabrik,Germany) and the color differences between the devices tested was evaluated by calculating the mean and standard deviations of the values.
Results: Δ E between all devices in /Mean/SD.

Color	Mean	SD	Color	Mean	SD
0M1	1.230	0.724	3M1	0.693	0.242
0M2	1.071	0.681	3M2	0.999	0.462
0M3	0.671	0.450	3R1.5	0.779	0.358
1M1	0.726	0.520	3R2.5	0.806	0.626
1M2	0.951	0.393	4L1.5	0.856	0.455
2L1.5	0.801	0.366	4L2.5	1.054	0.529
2L2.5	0.923	0.388	4M1	0.775	0.351
2M1	0.621	0.250	4M2	0.915	0.402
2M2	0.968	0.445	4M3	1.309	0.719
2M3	0.893	0.355	4R1.5	0.999	0.518
2R1.5	0.799	0.364	4R2.5	1.003	0.445
2R2.5	1.005	0.429	5M1	1.491	1.448
3L1,5	0.782	0.305	5M2	1.670	1.021
3L2.5	0.868	0.397	5M3	1.169	0.509

The intra-class-correlation-coefficients were: L=0.9959, a=0.9934, b=0.9993
Conclusion: Within the limitations of this in-vitro study the color differences were excellent for the devices tested. Also the Δ E never exceeds the clinical perceivable range of 3,7.

Poster Presentations

Abstract #24

Application of Kubelka-Munk Theory to the Final Color of Bonded Porcelain Veneer and Composite Resin Cement Layers

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Objectives: Purposes of this in vitro study include applying Kubelka-Munk (K-M) theory twice to include two distinct layers of translucent materials on various backings, and then evaluating color changes in combinations of feldspathic porcelain and cement resulting from varying thicknesses of porcelain and cement, and different shades of composite luting agent. Also, an objective was to evaluate translucency parameter (TP) values over clinically relevant porcelain and cement thickness values.
Methods: Porcelain discs (n=36) of shade A1(Noritake EX-3, Kizaeco, Japan) at nominal thicknesses of 0.5 and 1.0 mm were evaluated for agreement with the K-M reflectance theory, and the K-M optical absorption and scattering coefficients were determined for the porcelain. Then the porcelain was bonded to cements (Clearfil EX, Kuraray, Japan) of three shades in a factorial design (n=6 per group). By non-linear modeling, the optical K-M optical coefficients were determined for each cement shade using the expanded K-M theory. Reflectance spectra were calculated for CIE D65 Illuminant and Standard Human Observer on ideal black and white backings for varying thicknesses. Color differences (CDs) were calculated over porcelain and cement thickness values for the same cement shade and each possible pair of different cement shades for varying porcelain and cement thicknesses.
Results: The correlation between the directly measured and the theoretical reflectance values over the entire visible spectrum for all cement shades (R^2=.987; P<0.001) was found to be excellent. Variation in the thickness and shade of the resin luting cement and variation in porcelain thickness will result in CDs which are generally near or beyond clinical acceptability. A decrease in porcelain thickness did significantly increase TP when bonded to the resin cement shades studied.
Conclusions: Repeated application of K-M reflectance theory was supported for predicting final colors under a variety of conditions. Changes in porcelain and cement thickness or cement shade may adversely affect basic esthetic properties of these materials.

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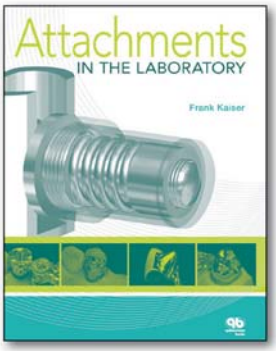

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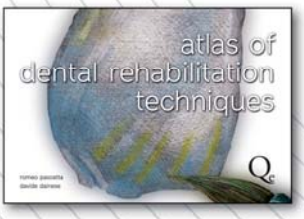

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