From the Stone Age to the Digital Age
The Evolution of Orthodontic Innovation

Program & Abstract Book
The Organising Committee is grateful to the following companies who have given their support:

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- GAC
- International Orthodontic Products
49th ABSo Meeting

10–13 August 2014
Cairns, QLD, Australia

From the Stone Age to the Digital Age
The Evolution of Orthodontic Innovation
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It gives me great pleasure to welcome all delegates, their partners and members of the orthodontic industry to the 49th Meeting of our Society. Cairns promises to be the ideal venue for a winter Meeting and we have a social program designed to take advantage of the warm tropical evenings.

In particular, I would like to extend a special welcome to all our international delegates who have travelled from as far afield as Europe, the United States, China, Singapore and New Zealand to be part of this Meeting.

The Scientific Program is always the foundation of a successful Meeting and the lecturers scheduled for this Meeting will maintain the standards, ideals and progressive thinking of our Society’s members. No Meeting is possible without great effort from our all presenters, and I would like to thank all the International, New Zealand and Australian speakers for taking the time to share their knowledge and expertise during the next three days. Additionally, there is the opportunity for all postgraduates to present their research as a lecture or alternatively as a poster or clinical tabled case presentation. I would encourage all delegates to take the time to view their displays.

The support of our sponsors and exhibitors is always greatly appreciated. Their generosity is pivotal to the continued success of our Meetings and I encourage all delegates to visit and support the sponsors and exhibitors who have made the time and effort to join us in Cairns.

The Pre- and Post-Meeting days have greatly added to our Meeting and again I would like to thank 3M Unitek, Suresmile, Dentaurum and Motionview for taking this opportunity to hold their various meetings in conjunction with ours.

Finally, this Meeting would not have been possible without the dedication of Mark Leedham, Kit Chan, and Adam Qingsong Ye as the Organising Committee as well as Aine Kimsey, Jessica Abbey and Francis Child from The Association Specialists. I would like to take this opportunity on behalf of all members of ABSO to thank them for their time, diligence, expertise and professionalism in bringing this Meeting to fruition. They have all been a pleasure to work with.

Sincerely,

Simon Freezer
President
Australasian Begg Society of Orthodontists
General Information

ABSO 2014 Meeting Secretariat
C/- The Association Specialists
PO Box 576, Crows Nest NSW 1585 Australia
+61 2 9431 8600
abso@theassociationspecialists.com.au

ABSO 2014 Venue
Pullman Cairns International
17 Abbott Street, Cairns QLD 4870 Australia
+61 7 4031 1300
www.pullmancairnsinternational.com.au

Accommodation
Pullman Cairns International
17 Abbott Street, Cairns QLD 4870 Australia
+61 7 4031 1300

Pullman Reef Hotel Casino
35-41 Wharf Street, Cairns QLD 4870 Australia
+61 7 4030 8708

Hilton
34 Esplanade, Cairns QLD 4870 Australia
+61 7 4050 2022

Car Parking
Valet parking is available at the Pullman Cairns International by way of the port cochere/Hotel driveway, conveniently available at a flat rate of $20 per vehicle/per day to guests staying in-house.

Public Transport
The Pullman Cairns International is only a short 15 minute drive from the Cairns International Airport. Airport shuttles or taxi services are available upon arrival.

Credit Cards
Credit cards accepted at the registration desk are MasterCard, Visa and American Express. All credit cards will incur a 2.5% credit card processing fee on the full amount.

Disclaimer of Liability
The Organising Committee, including the ABSO 2014 Meeting Secretariat, will not accept liability for damages of any nature sustained by participants or their accompanying persons or loss of or damage to their personal property as a result of the Meeting or related events.

Hotel Accounts
Each delegate is responsible for the payment of incidentals and room costs incurred as part of their stay.
Name Badges
Each delegate will be given a name badge at registration. This badge will be the official pass to sessions, teas, lunches and official social functions (Welcome Reception, Poolside Dinner, and Gala Dinner). It is necessary for delegates to wear their name badge at all times when onsite.

Registration Desk
The registration desk will be located on Level 1 of the Pullman Cairns International in the Meeting Foyer.

The registration desk will be open at the following times:
- Sunday, 10 August  0800-1930
- Monday, 11 August  0800-1700
- Tuesday, 12 August  0800-1715
- Wednesday, 13 August  0800-1715

Please don’t hesitate to see the staff at the registration desk should you require assistance at any time during the Meeting.

Speaker Preparation Area
Speakers are asked to check their audio visual material before presenting. There will be a speaker preparation area located near the registration desk. We ask that you check in with the audio visual team at least 2 hours prior to your scheduled presentation.

Smoking Policy
There is a “no smoking” policy inside the Pullman Cairns International. Smoking is only permitted in designated outside areas.

Wi-Fi
Wireless internet service is available in all guest rooms at the Pullman Cairns International.

CPD — Certificates of Attendance
Delegates are entitled to claim CPD hours at the ABSO 2014 Meeting. The total of CPD hours is equivalent to the total hours attended at the meeting presentations. For example, a full day would equal 6 hours.

Certificates of Attendance will be emailed to delegates after conclusion of the Meeting.
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General Information

The trade display and poster area will be open from Sunday evening during the Welcome Reception to the conclusion of sessions on Tuesday, and will be located on Level 1 of the Pullman Cairns International in the Meeting Foyer Lounge. All catering stations will be located in the trade display and poster area, including the Welcome Reception.

Opening hours:
- Sunday, 10 August 2014  1800-1930 hours
- Monday, 11 August 2014  0800-1700 hours
- Tuesday, 12 August 2014  0800-1715 hours

Rosser Room

Foyer / Pre Function Area

1  3M Unitek
15  AB Orthodontics
4   American Orthodontics
8   Carestream Dental
10  Dental Protection Limited Australia
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17  Digital Orthodontics
14  Dolphin Imaging & Management Solutions
16  GAC
18  International Orthodontic Products
11  Invisalign
6,7  Motion View Software
2   OraMetrix
12  ORMCO
9   Pacific Orthodontics
13  TP Orthodontics
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3M is a global leader in technology, innovation and research. We’ve been producing inventive products that improve people’s lives for over 100 years. 3M is the science, the exhaustive testing and the entrepreneurial spirit behind the brands you trust—like Post-it®, Scotch™, Thinsulate™, Nexcare™ and more. In the braces arena, 3M Unitek produced the first stainless steel brackets, the first adhesive pre-coated brackets, color-changing bonding adhesive and true self-ligating brackets.

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Shirley Heal
1A Rivett Road
North Ryde, NSW, Australia
1300 363 484
3MIUnitekanz@mmm.com
www.3munitek.com.au

American Orthodontics

Table #4
American Orthodontics is the world’s largest privately held manufacturer of orthodontic appliances—dedicated to the highest level of product quality, dependable delivery, and personalized service. Since 1968, we have been based in Sheboygan, Wisconsin, where we manufacture 95% of our product offering at our state of the art manufacturing and office facility. We are continuously innovating products and processes to provide the best overall value to our customers. With more than 600 employees worldwide serving customers in more than 100 countries, we are a global company with a local heart—committed to helping orthodontists give patients the smiles they deserve.

Contact:
Terri Augelli
Suite G2/63 Stead Street
South Melbourne, VIC, Australia
1300 793 283
taugelli@americanortho.com
www.americanortho.com
DentiCare

Table #3
DentiCare is an exclusive service designed specifically for Orthodontic Practices to facilitate the establishment of Orthodontic Treatment Payment Plans between your Practice and your Patients or Parents. For your Patients, DentiCare is a simple Direct Debit Payment Solution facilitating the debiting of their bank account or credit card to pay for their Orthodontic Treatment payment plan that you establish with them.

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Contact:
David Cathie
2309 Ephraim Island Parade,
Paradise Point, QLD, Australia
1300 633 472
david@denti-care.com.au
www.denti-care.com.au

Dolphin Imaging & Management Solutions

Table #14
Dolphin Imaging & Management Solutions provides high-quality 2D/3D imaging, diagnostic, practice management, case presentation, and patient education software for dental specialty professionals worldwide.

Dolphin products tightly integrate with digital x-ray units, CBCT systems, telephonic solutions and Web-enabled applications, and are compatible with the latest operating systems and computers including Intel-based Macintosh computers.

The company currently supports thousands of specialty practices worldwide, and has an active academic program whereby selected products are donated to selected educational programs. Presently, hundreds of dental schools and specialty departments such as orthodontics, maxillofacial surgery, pediatric dentistry and radiology are utilizing Dolphin Imaging & Management Solutions software on a daily basis.

Contact:
Roger Wills
PO Box 573
Sutherland, NSW, Australia
1300 227 856
rogerwills@dolphinimaging.com
www.dolphinimaging.com/company.html
OraMetrix

Established in 1998, OraMetrix developed the suresmile® system, a revolutionary digital technology that empowers orthodontists with a powerful diagnostic, planning and treatment system, delivering the most precise, customized orthodontic care available. suresmile has been shown to reduce treatment time by an average 30%. Since 2004, suresmile has been used on 180,000 patients by orthodontists in the United States, Canada, Europe, Japan, Australia and New Zealand. Australia/New Zealand headquarters are located in Sydney.

Contact:
Jacqueline Doon
Suite 9, Level 6, 10 Help Street
Chatswood, NSW, Australia
+61 2 8035 5400
anzinfo@orametrix.com
www.suresmile.com

ORMCO

Ormco builds trusted relationships with the orthodontists we serve, providing a breadth of innovative products and solutions to enhance their professional lives. Ormco is committed to helping orthodontists achieve their clinical and practice management objectives.

Contact:
Colin Matheson
10/112-118 Talavera Road
North Ryde, NSW, Australia
+61 2 8875 8100
colin.matheson@ormco.com
www.ormco.com
TP Orthodontics

Table #13
For seven decades, TP Orthodontics, Inc. has partnered with orthodontists to achieve optimal results for their practices. Orthodontists around the globe select TPO brands for unsurpassed beauty and performance. TPO is a trusted, global provider of orthodontic services and premier, aesthetic products, including an exclusive Personalized Color-Matching Technology®.

Contact:
Frances White
6, 369 Royal Parade
Parkville, VIC, Australia
+61 3 93423200
frances.white@tportho.com
www.tportho.com

A8 Orthodontics
Table #15
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+61 3 9650 2526
secretary@ortho.com.au
www.ortho.com.au

Carestream Dental
Table #8
Shane Gibson
Suite 403, Level 4 18-20 Orion Road
Lane Cove, NSW, Australia
+61 2 9919 4500
shane.gibson@carestream.com
www.carestreamdental.com

Dental Protection Limited Australia
Table #10
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+61 7 3831 6800
vicki.biddle@dpla.com.au
www.dentalprotection.org/australia

Dentaurum
Table #5
Dee Macpherson
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Mortlake, NSW, Australia
+61 2 9743 4811
dmacpherson@dentaurum.com.au
www.dentaurum.com.au
Sponsor & Exhibitor Information

Digital Orthodontics
Table #17
Ari Sciacca
Suite 4 875 Glenhuntly Road
Caulfield South VIC, Australia
+61 3 95324266
lab@archform.com.au
www.digitalortho.com.au

GAC
Table #16
Guy Kurzmann
PO BOX 156
Burwood, VIC, Australia
+61 3 9936 8900
guy@gacaustralia.com.au

International Orthodontic Products
Table #18
Wayne Hickory
2132 R Street
Washington, D.C., USA
+1 202 518 5910
waynehickory@gmail.com
www.drhickory.com

Invisalign
Table #11
Dimitri Tops
37/6-8 Herbert Street
St Leonards, NSW, Australia
+61 2 8920 1011
cs-australia@aligntech.com
www.invisalign.com.au

Motion View Software
Table #6/7
Sylvia Knoch
2730 Kanasita Drive
Hixson TN, United States
00 11 423 475 6914
sylvia@motionview3d.com
www.motionview3d.com

Pacific Orthodontics
Table #9
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Kenmore QLD, Australia
+61 7 3378 1796
sgrant@pacificortho.com.au
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**Social Functions**

**ABSO ‘Meet and Greet’ Optional Dinner**

Saturday 9 August  
1900–2200 hours  
Dundee’s Restaurant on the Waterfront  
Shop 3, 1 Marlin Parade, Cairns QLD, Australia  
(Meet at Reception at 1830 for 1845 departure —five minute walk)  
**Cost:** $120 *Please note this dinner is not included in your registration*  
**Dress:** Smart Casual  

We welcome all delegates and their partners to join us on the eve of the Meeting for a casual dinner at Dundee’s Restaurant on the Waterfront, one of Cairns’ most picturesque dining experiences.

**Poolside Dinner**

Monday 11 August  
1930–2200 hours  
Pullman Cairns International  
Daintree’s Pool Deck  
**Cost:** Included in all registration types  
—additional tickets $90 per person  
**Dress:** Smart Casual  

Cairns’ tropical climate is perfect for outdoor events and Daintree’s Pool Deck has established itself as Cairns’ premium outdoor function venue. Located on Level 3, the venue has a beautiful view of the hinterland. The evening will be filled with live music, delicious food, and great company.

**Welcome Reception**

Sunday 10 August  
1800–1930 hours  
Pullman Cairns International  
Level 1 Foyer—Trade Display & Poster Area  
**Cost:** Included in all registration types  
—additional tickets $60 per person  
**Dress:** Smart Casual  

The Welcome Reception is to be held in the trade display and poster area located on the Level 1 foyer of the Pullman Cairns International. This is a fantastic opportunity to get to know fellow delegates over canapés and drinks, mingle with sponsors and exhibitors, and view the poster presentations.

**Gala Dinner**

Tuesday 12 August  
1930–2300 hours  
Pullman Cairns International  
Ground Level, Mossman Ballroom  
**Cost:** Included in all registration types  
—additional tickets $100 per person  
**Dress:** Smart Casual  

An exciting evening of fine dining and wine is planned for the Gala Dinner. We hope all delegates and their partners will join us on this occasion to make it an unforgettable evening.
Keynote Speakers

**Professor Birte Melsen**  
Aarhus University, Denmark

Since 1975 Professor Melsen has held the title of Professor and Head of the Department of Orthodontics at The School of Dentistry, Aarhus University, Denmark. Since 1986, she has also been working part-time in a private practice in Lübeck, Germany where she treats adult patients only. Professor Melsen has authored more than 350 publications in the fields of growth and development based on research of human autopsy material, bone biology and clinical implant studies. In recent years her professional interests have focused primarily on the fields of skeletal anchorage, virtual imaging and adult orthodontic treatment. Professor Melsen has educated and challenged orthodontic audiences world-wide and we are privileged to have her included in our program.

**Professor Liselotte Sonnesen**  
University of Copenhagen, Denmark

Professor Sonnesen received her PhD in 1997 and became an Honoured Doctor of Odontology in 2009. She holds a number of academic positions including Head of Section for Oral Surgery, Orthodontics and Oral Radiology, at the University of Copenhagen. During the last 15 years Professor Sonnesen has undertaken research in a broad range of areas including craniofacial growth and development, orofacial function and respiration, obstructive sleep apnoea and 3D imaging. With more than 40 international scientific peer reviewed articles and book chapters published, we are delighted Professor Sonnesen will be presenting her work on cranial imaging and muscle and joint disorders at our Meeting.
Professor Eric Liou
Chang Gung Memorial Hospital, Taiwan

Professor Eric Liou is from the Department of Craniofacial Dentistry and Orthodontics, Chang Gung Memorial Hospital, Taipei, Taiwan. His areas of interest include the timing of surgery for orthognathic treatment and improving outcomes of non-surgical palatal expansion using alternative palatal expansion routines. With over 50 peer reviewed publications, 8 book chapters and nearly 200 scientific abstracts and presentations, Professor Liou’s presentations are certain to expand clinical horizons and stimulate thought and discussion as to the best techniques to manage a variety of orthodontic cases.

Professor Birte Melsen

Monday, 1100–1145
Can We Widen the Indications for Skeletal Anchorage?

Tuesday, 0830–0915
Arch Development: How When & Where?

Wednesday, 1400–1445
Long Term Results of the Orthodontic Treatment of Degenerating Dentitions

Professor Liselotte Sonnesen

Monday, 1400–1445
Diagnostics in Orthodontics with Focus on 2D Lateral Cephalograms and 3D Imaging of the Cranium and Related Bony Structures. What Have We Learned?

Wednesday, 0830–0915
Muscle and Joint Disorders, Jaw-Muscle Pain and Stress in Patients with Severe Malocclusion Traits. Where Are We Now?
We’re going to change the way you look at your final occlusions.
Sponsored & Invited Speakers

Sponsored Speakers
We are pleased to have the following speakers contribute to the program, and thank the organisations sponsoring them for their support of the Meeting.

Dr Sebastian Baumgaertel
Dr Gerhard Gschladt
Dr Dan Knoch

Mr Jeff Miller
Dr Mike Stewart & Dr Melisa Rathburn
Dr Annalene Weston

Invited Speakers
Dr Joe Antoun
Dr Paul Buchholz
Professor Mehmet Ali Darendeliler
A/Professor Craig Dreyer
Professor Mauro Farella
Dr Pat Hannan

Dr Robert James
Dr Paul Lee
Dr Peter Miles
Dr Morris Rapaport
A/Professor Paul Schneider
Dr Anthony Weir
A/Professor Adam Qingsong Ye
# Pre and Post Meeting Events

## Saturday, 9 August 2014

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<th>Time</th>
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<tr>
<td>1130–1730</td>
<td><strong>suresmile Users Meeting</strong></td>
<td>Pullman Cairns International, Level 1, Bluewater 2</td>
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<tr>
<td>1400–1700</td>
<td><strong>3M Recent Graduates Meeting</strong></td>
<td>Pullman Cairns International, Level 2, Boardroom 2</td>
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</table>
| 1900–2200 | **ABSO 'Meet And Greet' Optional Dinner**  | Dundee's Restaurant on the Waterfront  
*Meet at Reception at 1830 for 1845 departure—five minute walk*

## Sunday, 10 August 2014

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>0800–1930</td>
<td><strong>Registration Open</strong></td>
<td>Pullman Cairns International, Level 1 Foyer</td>
</tr>
<tr>
<td>0830–1300</td>
<td><strong>3M Recent Graduates Meeting</strong></td>
<td>Pullman Cairns International, Level 2, Boardroom 2</td>
</tr>
<tr>
<td>0830–1730</td>
<td><strong>suresmile Users Meeting</strong></td>
<td>Pullman Cairns International, Level 1, Bluewater 2</td>
</tr>
<tr>
<td>0900–1700</td>
<td><strong>Enhancing Your TAD Experience—A Multi-faceted Approach</strong></td>
<td>Pullman Reef Hotel Casino, Level 4, Coral Lounge</td>
</tr>
<tr>
<td>1200–1730</td>
<td><strong>suresmile Introduction Meeting</strong></td>
<td>Pullman Cairns International, Level 1, Bluewater 2</td>
</tr>
<tr>
<td>1800–1930</td>
<td><strong>Welcome Reception</strong></td>
<td>Pullman Cairns International, Level 1 Foyer, Trade Display and Poster Area</td>
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## Thursday, 14 August 2014

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<thead>
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<tbody>
<tr>
<td>0800–1700</td>
<td><strong>Motion View User's Meeting</strong></td>
<td>Pullman Cairns International, Level 1, Rosser Room</td>
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### Monday, 11 August 2014

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Details</th>
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<tbody>
<tr>
<td>0800-1700</td>
<td>Registration Open—Pullman Cairns International, Level 1 Foyer, Trade Display &amp; Poster Area</td>
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<tr>
<td>Room: Pullman Cairns International, Level 1, Bluewater Rooms 1 &amp; 2</td>
<td><strong>Session Chair:</strong> Dr Simon Freezer</td>
</tr>
<tr>
<td>0815-0830</td>
<td>Welcome and Introduction</td>
</tr>
</tbody>
</table>
| 0830-0915 | **Milton Sims Lecture—Accelerated Orthodontic Tooth Movement**  
**Professor Eric Liou** |
| 0915-0945 | **There and Back Again—A Sceptic's Tale**  
**Dr Peter Miles** |
| 0945-1030 | **Revisiting Facial Growth Modification in the Digital Age**  
**Professor Mauro Farella** |
| 1030-1100 | **Morning Tea in Trade Display & Poster Area** |
| 1100-1145 | **Can We Widen the Indications for Skeletal Anchorage?**  
**Professor Birte Melsen** |
| 1145-1230 | **Use of Vibration in Orthodontics**  
**Professor Mehmet Ali Darendeliler** |
| 1230-1300 | **A New Approach to Intrusion of Single Overerupted Maxillary Molars Using Palatal Tomas Pins**  
**Dr Sebastian Baumgaertel** |
| 1300-1400 | **Lunch in Trade Display & Poster Area** |
| Room: Pullman Cairns International, Level 1, Bluewater Rooms 1 & 2 | **Session Chair:** Dr Jeff Swann |
| 1400-1445 | **Diagnostics in Orthodontics with Focus on 2D Lateral Cephalograms and 3D Imaging of the Cranium and Related Bony Structures. What Have We Learned?**  
**Professor Liselotte Sonnesen** |
| 1445-1515 | **What I Know, Which Beggs the Question**  
**Dr Patrick Hannan** |
| 1515-1530 | **Postgraduate Presentation—A Comparative Histomorphological and Micro CT Study of the Primary Stability and the Osseointegration of the Sydney Mini-Screw; An Animal Study using New Zealand Rabbits**  
**Dr Anastacia Bacopulos** |
| 1530-1600 | **Afternoon Tea in Trade Display & Poster Area** |
| 1600-1630 | **Orthodontic Risk Under the Magnifying Glass**  
**Dr Annalene Weston** |
| 1630-1700 | **The Convergence of Digital Technology and Clinical Practice**  
**Dr Mike Stewart and Dr Melisa Rathburn** |
| 1930-2200 | **Poolside Dinner**  
Pullman Cairns International, Daintree’s Pool Deck |
### Program

**Tuesday, 12 August 2014**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Chair</th>
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<tbody>
<tr>
<td>0800-1715</td>
<td>Registration Open—Pullman Cairns International, Level 1 Foyer, Trade Display &amp; Poster Area</td>
<td>Pullman Cairns International, Level 1, Bluewater Rooms 1 &amp; 2</td>
<td></td>
</tr>
<tr>
<td>0830-0915</td>
<td>Arch Development: How When &amp; Where?</td>
<td>Room: Pullman Cairns International, Level 1, Bluewater Rooms 1 &amp; 2</td>
<td><em>Professor Birte Melsen</em></td>
</tr>
<tr>
<td>0915-1000</td>
<td>Have Digital Sucking Habits Changed from the Stone Age?</td>
<td>Room: Pullman Cairns International, Level 1, Bluewater Rooms 1 &amp; 2</td>
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<td>3D Scanning to Create the Virtual Patient</td>
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<td>Noncompliant Auxiliary Appliances for 3D Control of the Occlusal Plane</td>
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<td>Why the Long Face? Searching the Genetic Code for Answers</td>
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<td><em>Dr Mohamad Al-Dujaili</em></td>
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<td>Early Treatment? Why? Is Early Treatment a Preventative Measure Based on Evidence?</td>
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<td>Microchip Drives Patient Compliance—State of the art Technology Accelerates Treatment Success in Modern Orthodontics</td>
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<td>Awards and Close</td>
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1. Upper Airway Dimensions and the Associations with Age, Gender, Occlusion and Craniofacial Morphology in Pre-Orthodontic Children
   Dr Seerone Anandarajah

2. The Impact of Socio-Environmental and Psychological Factors on Orthodontic Treatment
   Dr Mark Blandy

3. Prediction of the Efficacy of a Mandibular Advancement Splint in the Treatment of Obstructive Sleep Apnoea using Various Diagnostic Methods
   Dr Anel Blignaut

4. The Role of Sclerostin in the Formation and Repair of a Thermally Induced Ankylosis in the Lesion
   Dr Shelley Coburn

5. Classical Mechanics Revisited in the Non-Extraction Management of Moderate to Severe Dental Class
   Dr Donald Gilchrist

6. Root Morphology and Development of Labial Inversely Impacted Maxillary Central Incisors in Mixed Dentition: A Retrospective Cone-beam Computed Tomography Study
   Prof Rongdang Hu

7. Prevention Of Enamel Demineralisation Using CPP-ACP: Is It Effective In Vivo?
   Dr Li Mei

8. Orthodontic Root Resorption Following Heavy Transverse and Vertical Jiggling Forces
   Dr Carolyn Ng

9. Correlation Between Surface Roughness of Orthodontic Mini Screw Implants and Biofilm Formation
   Dr Shaneel Shastri

10. Towards Improved Diagnostics for Orthodontic Root Loss
    Dr Edwin Tan

11. Predictability of Increasing Tooth Velocity using Invisalign® Aligners in a Group of Teenage Subjects
    Dr Margaret Wang
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ACCELERATED ORTHODONTIC TOOTH MOVEMENT

Eric Liou
Professor, Chang Gung Memorial Hospital, Taipei, Taiwan

Platelet rich plasma (PRP) has been used extensively for a long time in dental implantology for its enhancement of new bone formation and bone to implant osseointegration, but it was not until 2005 that the concept of application of PRP for orthodontic tooth movement became clearly non-invasive for the orthodontic purposes. PRP is prepared freshly without mixing with calcium chloride and thrombin, and then injected submucosally, just like the local anesthesia, in the labial and lingual aspects of the orthodontically moved teeth. Unlike its conventional osteogenic effects, the PRP was first assumed to accelerate orthodontic tooth movement through regional acceleratory phenomenon which induces massive alveolar bone resorption rather than bone formation. This assumption has been partially proved clinically and experimentally after several years of investigation. The submucosal injection of PRP changes the bone physiology by decreasing the alveolar bone density and increasing local bone metabolism so that the rate of orthodontic alignment could be accelerated 1.7 times faster. The PRP injection has a dose-dependent effect in a certain range of PRP folds, and the optimal PRP fold for accelerating 2 times faster orthodontic tooth alignment ranges from 9.5 to 12.5. Interestingly, it also has been revealed clinically and experimentally that the submucosal injection of PRP decreases the alveolar bone loss and enhances alveolar bone repair during en masse retraction of the anterior teeth. The submucosal injection of PRP not only accelerates orthodontic alignment but also preserves the alveolar bone on the pressure side of orthodontic tooth movement, possibly due to its ostegenic effects. This presentation aims to illustrate the rationales of submucosal injection of PRP for orthodontic tooth movement, and to update the techniques both for accelerating orthodontic tooth alignment and preserving alveolar bone of the orthodontically moved teeth.

THERE AND BACK AGAIN—A SCEPTIC’S TALE

Peter Miles
NewWave Orthodontics, Caloundra, QLD, Australia

Follow one small man’s journey through the labyrinth of advertising claims and ploys that conspire to capture our interest and free our purse strings. Controversies still abound in our evidence-based orthodontic middle-earth. Some are banished into the nether realm by the sword of science while others arise from the ashes with relentless vigour. This presentation will endow close scrutiny to the claims of success by proponents of very early myofunctional treatment.
REVISITING FACIAL GROWTH MODIFICATION IN THE DIGITAL AGE
Mauro Farella
Professor, Orthodontics, University of Otago, Dunedin, New Zealand

The current evidence supporting the efficacy of functional appliances, including that arising from randomized controlled trials, is generally of low to moderate quality. The lack of high quality evidence on this topic contributes to the debate, with individual orthodontists having different attitudes towards the use of growth modification. Technology advancements in the digital age offer a great opportunity to provide new insights into this controversial area. The aim of this presentation is to critically appraise some of the fundamental concepts regarding growth modification appliances with an attempt to describe clinical guidelines and new directions for future research.

CAN WE WIDEN THE INDICATIONS FOR SKELETAL ANCHORAGE?
Birte Melsen
Professor Dr. Odont., Section of Orthodontics, School of Dentistry, Aarhus University, Aarhus, Denmark

It is often in the situation of despair that new inventions are done. This was the situation in 1983 when the first skeletal anchorage, a surgical screw, was inserted below the anterior nasal spine and used as anchorage for intrusion of upper incisors. After a period where osseointegrated implants and buttons were used, the more common use of “screws” as anchorage entered the orthodontic scene around the turn of the century. Whereas the screws were mostly used as direct anchorage the osseointegrated orthodontic implants were always used indirectly. Both types of devices are still on the market today and practically all the manufactures have their “best” device. “Screws” not only serve as anchorage for dental but also for skeletal alterations and as scapegoats for the side effects generated by intermaxillary devices. A critical analysis of factors of importance for the success or failure should, however be performed before using the skeletal devices.

Recently it has been shown that not only can the skeletal anchorage serve as a reactive unit for an orthodontic appliance removing the iatrogenic side effects but the “screws” can also help in maintaining bone and indirectly generate bone. In the future we will see an increased use of “screws” applied for prosthodontic reasons hopefully also improving the collaboration between orthodontists and the prognosis for prosthodontic reconstructions.
Oral Abstracts

Monday, 11 August 2014 • Bluewater Rooms 1 & 2 • 1145–1230 hours

USE OF VIBRATION IN ORTHODONTICS
Mehemet Ali Darendeliler
Professor, Head of Discipline of Orthodontics, University of Sydney, Sydney, NSW, Australia

Acceleration of tooth movement has always been a focus in basic and clinical research. However there has been a recent surge in the interest of applying different external stimuli to accelerate dental and orthopaedic response. One of such external stimuli is mechanical vibration. Lecture will report evidence on the effects of mechanical vibration on orthodontic tooth movement, condylar and epiphyseal growth and on root resorption.

Monday, 11 August 2014 • Bluewater Rooms 1 & 2 • 1230–1300 hours

A NEW APPROACH TO INTRUSION OF SINGLE OVERERUPTED MAXILLARY MOLARS USING PALATAL TOMAS PINS
Sebastian Baumgaertel
Professor, Case Western Reserve University, Cleveland, OH, United States

Summary: In orthodontics many things work, but only very few approaches work best. Single overerupted maxillary molars are a common problem in orthodontics and difficult to correct by conventional means. Miniscrew supported intrusion appears to be the solution. However clinically, the results can be frustrating due to failing miniscrews. Let Dr. Baumgaertel explain to you why palatal miniscrews don’t fail and how to biomechanically design an intrusion system that capitalizes on that fact, leading to successful single molar intrusions, time and time again.
Monday, 11 August 2014 • Bluewater Rooms 1 & 2 • 1400-1445 hours

DIAGNOSTICS IN ORTHODONTICS WITH FOCUS ON 2D LATERAL CEPHALOGRAMS AND 3D IMAGING OF THE CRANIUM AND RELATED BONY STRUCTURES. WHAT HAVE WE LEARNED?

Liselotte Sonnesen
Specialist in Orthodontics, PhD, Dr. Odont, Head of Section for Oral Surgery, Orthodontics and Oral Radiology, Department of Odontology, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark

Worldwide, cephalometric measurements on 2D lateral cephalograms play an important role as a diagnostic tool in the description of the craniofacial morphology in orthodontic treatment planning. First the face was described in triangles, rectangles and polygons. Then it was possible to analyse the vertical and horizontal relationships of the jaws to the cranial base and the interrelationship between the jaws. In the fifties, Björk conducted the first human growth study using implants, which resulted in the discovery of the true rotation of the jaws. In the following years, the cephalometric analyses were further developed to include analyses of growth and treatment changes and to some extent prediction of the growth. Recently, the traditional cephalometric analyses were combined with analyses of structures in the craniofacial skeleton first on 2D lateral cephalograms and later on 3D cone beam computed tomography (CBCT). The presentation will give a historical overview of cephalometric analyses on 2D lateral cephalograms and CBCTs and discuss how the analyses may improve diagnostics in orthodontic patients.
WHAT I KNOW, WHICH BEGGS THE QUESTION

Patrick Hannan
Orthodontist, Ocean Orthodontics, Buddina, QLD, Australia

This lecture is about what I think I have learned (what I know) in general terms about orthodontics in the last 25 years mostly from other people. It is aimed at younger graduates, but will represent my journey to contemporaries. I hope to cast light on what might be... which is “What Beggs the Question”.

A COMPARATIVE HISTOMORPHOLOGICAL AND MICRO CT STUDY OF THE PRIMARY STABILITY AND THE OSSEOINTEGRATION OF THE SYDNEY MINI-SCREW; AN ANIMAL STUDY USING NEW ZEALAND RABBITS

Anastacia Bacopulos Marangu1, Peter Hoang1, Ali Fathi2, Oyku Dalci1, Ali Darendeliler1

1. Orthodontics, The University of Sydney, Sydney, NSW, Australia
2. Chemical and Biomolecular Engineering, The University of Sydney, Sydney, NSW, Australia

Anchorage is crucial in controlling tooth movement when applying orthodontic mechanics. Recently, miniscrews were introduced for this purpose; however, issues exist with primary stability (PS). Immediate and delayed failure rates are reported to be around 7% to 50%. New ways to reduce failure was considered and a new miniscrew was designed to increase PS. The aim of this animal study was to describe the dispersion of injectable bone graft substitutes (IBGS) through the cortical and trabecular bone surrounding the newly designed (Patent number: PCT2009014) Sydney Mini-Screw (SMS) over time. This is part of a larger study looking at the histological integration of the SMS aiming to improve the success rates and PS of the orthodontic Mini-Screw, via the use of IBGS.

Method: 24 miniscrews were placed in each proximal tibia and femur of 6 New Zealand rabbits. Rabbits were randomly divided equally into 2 groups according to the time period and surgery site. One group (0W) was sacrificed the same day of surgery, while the other group (8W) was sacrificed after 8 weeks. Three different site preparations were randomly assigned involving 4 SMS with IBGS (SMS-BGS), 4 SMS without IBGS (SMS), and 4 Aarhus miniscrews (AC). Aarhus implants were inserted to serve as control. All bone sections were prepared for MicroCT.

IBGS were successfully injected to the SMS and thereafter, cured in situ to fill the bone void. After 8 weeks, micro CT (µCT) results revealed that IBGS were resorbed and bone tissue was formed around the screw and within the lateral exit holes. Results of this pilot animal study showed the high potential of SMS and our developed technique to promote the PS of miniscrews. The histochemical analysis on the surrounding tissue will provide better understanding over the effect of addition of IBGS on the bone healing rate.
ORTHODONTIC RISK UNDER THE MAGNIFYING GLASS

Annalene Weston
Orthodontics, Dental Protection, Camp Hill, QLD, Australia

The practice of all disciplines of dentistry carry with them inherent risks. Orthodontics occupies a very interesting position within this medicolegal landscape, raising some issues specific to the specialty, and others which are simply manifestations of the broader implications of dental treatment. At one end of the spectrum orthodontics shares many of the medicolegal complications of treating children (relating to consent and the limitation of commencement of legal proceedings), while at the other it shares some of the risks that are associated with elective, cosmetic procedures carried out for adults.

This lecture will highlight the key risks associated with orthodontic practice, and explore what we as practitioners can do to manage our own complaints profile.

THE CONVERGENCE OF DIGITAL TECHNOLOGY AND CLINICAL PRACTICE

Michael Stewart, Melisa Rathburn
DDS, Atlanta Orthodontic Specialists, Atlanta, GA, United States

The digital age of orthodontics has ceased to evolve, but rather, is now literally exploding with innovation. Digital information management, communications, radiography, imaging, 3D imaging and 3D scanning have replaced the film based x-rays, photography and plaster models in progressive practices. Although many of these technologies were originally developed as alternatives to traditional diagnostic media, they now form the foundation of therapeutic modalities that are changing the face of clinical orthodontics as well as the orthodontic patient.

The digitization of diagnostic media enhances the processing of information in the diagnostic process and its presentation and distribution to patient and professional colleagues. Likewise, virtual treatment (simulations) in 2D and 3D environments facilitate an even higher level of interdisciplinary planning, collaboration and communication.

Most recently, these 3D diagnostic media have become the platforms for prescriptive tooth movement. The orthodontist now has the ability to design and construct custom appliances, aligners, and arch wires on the personal computer. This prescriptive customization yields superior outcomes while, at the same time, reducing treatment duration.

Mastery of the digital treatment tools allows the clinician to accurately plan outcomes and avoid the “trial and error” frustrations of the reactive care cycle. This results in an extremely “civilized” treatment environment and patient experience.
ARCH DEVELOPMENT: HOW WHEN & WHERE?

Birte Melsen
Professor Dr. Odont., Section of Orthodontics, School of Dentistry, Aarhus University, Aarhus, Denmark

A precondition for the interference with the transverse development of the dental arches is a thorough understanding of the normal postgraduate development and factors of importance in the individual patient. It is only on that basis it can be determined whether the non-extraction tendency that has dominated the orthodontic field recently is feasible. The result of a series of studies will attempt to answer the following questions:

• What determines whether an expansion will be primarily sagittal or transversal?
• How do we determine whether to procline the incisors or to widen the arch?
• Can we move teeth “with” bone?
• How does the periodontium react?
• Is expansion maintainable?

The generation of sufficient space to accommodate all teeth and avoid extraction has been based on transversal expansion done with conventional orthodontic appliances, surgical assisted expansions or surgical displacements of the lateral segments. Over the last decennium an approach based on enlargements of the arches with self-ligation brackets combined with special arch wires has gained significant impact, however without the necessary scientific evidence.

The object of the lecture will be to:

• Describe the normal transversal development of the maxillary complex
• Understand the tooth movement occurring when arches are widened with different systems
• Describe the post-treatment changes
HAVE DIGITAL SUCKING HABITS CHANGED FROM THE STONE AGE?

Paul Schneider  
Associate Professor, Convenor of Orthodontics, University of Melbourne, VIC, Australia

To effectively treat our patients we need to understand the capabilities of each patient, and what strategies for communicating with them and achieving the desired behavior are likely to be successful. Many skills need to be employed by the orthodontist and auxiliary staff to achieve the wide range of activities we need our patients to experience, and perform.

Helping a child stop a digit sucking habit is one task that is frequently asked of orthodontists, but there are many other ways we need to impact on our patients’ behavior. These range from acceptance of clinical procedures new to them like photos, Xrays and impressions, to hygiene and diet control. Correct use of appliances such as elastics, headgear and removable appliances will affect the outcome of our treatment.

Orthodontics is therefore the dental specialty most in need of skill and knowledge in behavior modification. This presentation will provide some clinical hints to help the orthodontist with some aspects of patient management.

INVISALIGN AND NATURAL SELECTION: A DARWINIAN VIEW

Anthony Weir  
Orthodontist, Tony Weir Orthodontics, Corinda, QLD, Australia

Invisalign appliances are becoming a relatively common feature in orthodontic treatment. The lecture will address this appliance in Darwinian terms, with particular reference to the suitability of the appliance as a competitor for traditional fixed appliances and the potential of Invisalign for further “descent with modification” as it evolves in the new Digital Age.
Oral Abstracts

Tuesday, 12 August 2014 • Bluewater Rooms 1 & 2 • 1100-1130 hours

BACK TO THE FUTURE

Morris Rapaport
Orthodontist, Myorthodontist, Sydney, NSW, Australia

Over the last three decades we have seen many advances in clinical orthodontics with bonding replacing banding, introduction of nickel titanium wires, self-etching primer, indirect bonding on plaster models replaced by virtual brackets fitted to digital 3D models, robots bending arch wires, self-ligating brackets, scanners replacing impressions, diagnostic philosophy moving from an emphasis on hard tissues to soft tissues, etc.

Some changes are not so new. For instance, Damon’s claim of being a frictionless bracket is an example of “Back to the Future” because those who remember Begg brackets know it was a frictionless bracket that has been around for more than half a century.

Another “Back to the Future” issue is the problem of teeth tipping in extraction cases. Begg encountered and overcame this with uprighting springs, when he introduced his light wire technique. Recently, the editor of the JCO rated TADs and sequential plastic aligners as the most profound orthodontic innovations of recent times. In extraction cases, sequential aligners such as Invisalign, are likely to tip teeth. In this lecture I will show a number of strategies to minimise teeth tipping in Invisalign extraction cases.

Tuesday, 12 August 2014 • Bluewater Rooms 1 & 2 • 1130-1200 hours

STONE AGE TO THE DIGITAL AGE: A MODEL STORY

Paul Buchholz
Orthodontist, Braces N Faces Orthodontics, Newtown, VIC, Australia

Study models have always been invaluable in Orthodontics for diagnosis, treatment planning and treatment mechanics but the drawbacks have the handling and storage of such.

Several attempts have been made to overcome the storage problems with Hollagrams and more recently digital models are now part of everyday practice. The method of acquiring these models has changed with the introduction of intra oral scanners and the storage of study models overcome by the production of digital models either from Model scanning or scanning of impressions to produce the digital images.

How we interpret this data has now turned into production of treatment modalities. We plan to address these issues with this presentation.
3D SCANNING TO CREATE THE VIRTUAL PATIENT

Dan Knoch
CEO, Motion View Software LLC, Chattanooga, TN, United States

The increased use of impression scanning, intraoral scanning, and facial scanning allows for changes in diagnosis and treatment planning methods. The combining of multiple types of digital records and images opens the way for increased accuracy of analysis and improved communication with patients and other doctors. In this presentation we discuss the following concepts: some of the various types of digital records in orthodontics, how to combine the different elements of visual records, evaluation of the combined records in the virtual patient, and presentation of that information to the patient and associated doctors.

NONCOMPLIANT AUXILIARY APPLIANCES FOR 3D CONTROL OF THE OCCLUSAL PLANE

Eric Liou
Professor, Chang Gung Memorial Hospital, Taipei, Taiwan

The correction of occlusal cant, posterior buccal or lingual cross bite, transverse control of the intermolar width and torque, smile arc, or anterior open bite is a challenge in orthodontics. Temporary anchorage devices and intermaxillary elastics are the most common treatment options. This presentation will address on the non-compliant approaches for the correction of these problems by using reciprocal, auxiliary orthodontic mechanics and appliances. These appliances include a TMA transpalatal arch/lingual holding arch or more user friendly a NiTi arch wire for the correction of posterior buccal/lingual cross bite, a pair of extruding or intruding TMA cantilever arms for smile arc control, extruding cantilever arms with/without NiTi bite aligners for the correction of Class II/III anterior open bite. For the correction of occlusal cant, two sets of innovative orthodontic devices have been developed for the correction of occlusal cant without TADs. The first set is a pair of segmental cross arch cantilever arms for the correction of anterior occlusal cant, and a lingual holding arch (LHA) or transpalatal arch (TPA) with opposite torque to the posterior occlusal cant for the correction of posterior occlusal cant. The second device is a wavy continuous archwire called Yin-Yan archwire.
**WHY THE LONG FACE? SEARCHING THE GENETIC CODE FOR ANSWERS**

**Jospeh Antoun**  
Senior Lecturer, Department of Oral Sciences, University of Otago, Dunedin, New Zealand

Several important anthropological features have been documented in the Stone Age man, including tooth wear and facial morphology. These findings have led some to suggest a causal relationship between environmental factors and the so-called “long face morphology.” Despite the large amount of work carried out so far, the exact etiology of this condition remains unclear.

The enormous technological advances occurring in the field of genetics have opened new doors for exploring the etiology of dentofacial anomalies. In this presentation, we will explore the role of genetics in vertical craniofacial development as we travel from the Stone Age, through to the Genomic Era. The different approaches used to study craniofacial genetics will be discussed, including some of their unique challenges and limitations. The final part of the presentation will focus on the potential applications that may become available as we move towards the next era of “translational” genetics.

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**EFFECT OF TENSILE STRAIN ON PERLECAN EXPRESSION OF HUMAN PERIODONTAL LIGAMENT CELLS**

**Yi Wang, Rongdang Hu**  
Orthodontic Department, Stomatology School, Wenzhou Medical University, Wenzhou, Zhejiang, China

**Purpose:** The study was to investigate the perlecan expression of human periodontal ligament cells (hPDLCs) under cyclic tensile strain in vitro, so as to learn the molecular mechanism of periodontal remoulding during tooth movement.

**Methods:** hPDLCs isolated by enzyme digestion, were loaded with 12% elongation & 1Hz of uniaxial tensile strain for 12h, 24h and 48h. The unloaded cells were used as control. Real-Time PCR and ELISA were applied to analyse the mRNA and protein expression of perlecan in each sample respectively.

**Results:** mRNA expression was transiently elevated, but no significant difference was detected compared with control. After 12h, the mRNA expression was significantly decreased. Specifically, it was decreased to $0.28 \pm 0.049$ of control at 48h ($P < 0.05$) The protein expression of perlecan was time-dependently decreased. Specifically, it was downregulated from $14.03 \pm 0.71$ pg/ml (control) to $11.06 \pm 0.15$ pg/ml at lowest level at 48h ($P < 0.05$).

**Conclusions:** Tensile strain downregulated perlecan expression, indicating perlecan may be involved in the process of mechanical-induced periodontal remoulding in vitro.
CLINICAL MANAGEMENT OF IMPACTED CANINES—
CASE SERIES AND A REVIEW OF THE LITERATURE

Mohamad Al-Dujaili, Joseph Antoun, Mauro Farella
University of Otago, Dunedin, New Zealand

Impacted canines present a challenging situation in everyday clinical practice. They may often involve more complex biomechanic techniques and extended treatment times with added risks and complications. Previous research has highlighted a wide range of treatment modalities and differing biomechanic techniques to manage impacted canines. The objective of this presentation is to provide a review of the literature on the clinical management of impacted canines. Surgical procedures and extraction of over-retained deciduous canines will be discussed. A series of clinical cases will also be presented to highlight the advantages and disadvantages of each clinical technique available.

A conclusion can be drawn that no perfect technique exists, however, some techniques offer advantages over others, and the use of certain hardware has advantages that should be considered in the treatment of these cases.

EVOLUTION IN FINANCE FOR THE MODERN DAY ORTHODONTIST

Jeff Miller
Financial Specialist, Medical and Dental Finance, Investec Specialist Bank, Sydney NSW, Australia

Modern finance has evolved, especially for dentists. Understand how you can benefit professionally and personally. When it comes to borrowing money, dentists can be treated very differently to other professions and the general public. While some dentists may realise this, many others may not fully appreciate the power of your degree when it comes to dealing with the banks.
**Oral Abstracts**

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**Tuesday, 12 August 2014 • Bluewater Rooms 1 & 2 • 1645-1715 hours**

**EARLY TREATMENT? WHY? IS EARLY TREATMENT A PREVENTATIVE MEASURE BASED ON EVIDENCE?**

Paul Lee  
*K Paul Lee, South Perth, WA, Australia*

Cases of children showing crowded incisors, large diastema between upper central incisors, delayed eruption, open-bite due to thumb sucking, deep overbite will be shown. Various treatment modalities and their rationale will be discussed. Evidence will be produced showing that most ‘abnormal’ dental conditions in young children are self correcting and so raises the question whether the diagnosis of ‘abnormal’ condition in growing children is correct. Since most ‘abnormal’ conditions found in growing children are self correcting as the growth/development progresses, one has to question the rationale of early treatment. Up to date, it appears that early treatment is not evidence based.

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**Wednesday, 13 August 2014 • Tully Rooms 2 & 3 • 0830–0915 hours**

**MUSCLE AND JOINT DISORDERS, JAW-MUSCLE PAIN AND STRESS IN PATIENTS WITH SEVERE MALOCCLUSION TRAITS. WHERE ARE WE NOW?**

Liselotte Sonnesen  
*Specialist in Orthodontics, PhD, Dr. Odont, Head of Section for Oral Surgery, Orthodontics and Oral Radiology, Department of Odontology, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark*

From a clinical point of view it is important to understand the relationship between occlusal variables and craniofacial pain, which have been studied and discussed for decades with varied results. The etiology and pathophysiology of temporomandibular disorders (TMD) are still unknown, but several risk factors have been suggested. In particular, occlusal parameters continue to attract attention and are discussed in relation to their importance for TMD. Many studies have found no associations between TMD and malocclusion traits. However, some studies have shown an association between TMD and malocclusion. Whereas diagnostic tools for TMD and pain have developed through the years, studies of jaw-muscle pain and stress in patients with severe malocclusion traits have been reported recently.

The presentation will give an overview of associations between malocclusion traits and factors related to masticatory muscle function and pain and discuss current status.
THE FIRST AUSTRALASIAN BEGG COURSE
Craig Dreyer
Associate Professor, School of Dentistry, University of Adelaide, Tusmore, SA, Australia

It was a seminal time in the early 1960’s after Attritional Occlusion and the Light-Wire Technique had been launched on the orthodontic world. Such was the interest in the technique, that there was pressure to provide dedicated courses of instruction for Australian clinicians. This talk will explore the background, development and programme associated with the first Australian Begg Course.

OUR DIGITAL ORTHODONTIC JOURNEY
Michael Stewart, Melisa Rathburn
DDS, Atlanta Orthodontic Specialists, Atlanta, GA, United States

Migration to a digital platform, whether it be a practice management, diagnostic or therapeutic system can be a painful experience. Choosing the ‘right’ program, motivating and training the staff and data input or conversion can each present obstacles to success. The digital transformation of orthodontic practice has occurred in stages over the past thirty years and will continue indefinitely.

The first phase of this transformation began in the 1980s with the introduction of practice management systems. These programs competed for the hearts and minds of the orthodontic community. There were winners, there were losers, and some just died on the vine. Improvements in hardware, operating systems and networking and remote access capabilities keep the market alive with change. Many have switched management programs once but after enduring the pain, few have done it twice, choosing to “stay in the bad marriage.”
THE PRINCIPALS AND STRATEGIES FOR SURGERY FIRST ORTHOGNATHIC SURGERY

Eric Liou
Professor, Chang Gung Memorial Hospital, Taipei, Taiwan

The surgery-first accelerated orthognathic surgery treats the facial esthetics first then the malocclusion so that patient’s chief complaint, dental function, and facial esthetics are fulfilled and improved in the beginning of the treatment. It is best indicated in patients who do not need pre-surgical orthodontic decompensation, such as cases with no/mild anterior crowding, flat/mild curve of spee, no/mild proclined/retruded anterior teeth, and no facial asymmetry. However the approach of surgery-first accelerated orthognathic surgery becomes more difficult and complex when the dental problems are complicated and need sagittal, coronal, and transverse decompensation, such as cases with severe anterior crowding, protrusion, retrusion, posterior cross bite, deep curve of spee, and facial asymmetry. The general strategy is to use osteotomy, such as multiple segmental osteotomy, to correct both the skeletal deformities and dental problems so that an orthodontically “treatable malocclusion” could be achieved postoperatively. Specific guidelines for surgical model setup, and orthodontic alignment, vertical, sagittal, and transverse decompensation in Class II, III, and facial asymmetry cases also have been setup for the challenging cases in surgery-first accelerated orthognathic surgery.
ROOT STRUCTURE CHANGES FOLLOWING BUCCAL ORTHODONTIC MOVEMENT WITH OR WITHOUT CORTICOTOMY

Nida Khan, Wayne Sampson, Ian Parkinson, Craig Dreyer
The University of Adelaide, North Adelaide, SA, Australia

Corticotomy is believed to induce a catabolic condition within bone and results in a transient state of osteopenia. A decrease in bone density and increase in turnover collectively affects the rate of orthodontic tooth movement, the degree of which is directly related to the intensity and proximity of the surgical insult. The exact biological mechanism behind corticotomy assisted tooth movement has not been fully elucidated. The objective of this study was to evaluate the root changes in untreated and buccal orthodontic tooth movement groups, with or without adjunctive flap surgery or corticotomy.

Thirty-six male Sprague-Dawley rats, six to eight weeks old, were randomly assigned to three control (no surgery; flap surgery; corticotomy) and three tooth movement groups (appliance only; flap and appliance; corticotomy and appliance). The corticotomy cuts were carried out by making vertical incisions on the mesial aspect of the maxillary first molar that extended between the first and second maxillary molars. A constant buccal force of 0.1N was delivered to the upper right first molar over the 7 days of the experiment. The animals were euthanized, their maxillae dissected and resin embedded before microcomputed tomography scans were performed. From these, the region of interest (CEJ to root apex) was outlined for each root of the first molar, on both experimental and control sides.

Early observations suggest that corticotomy in conjunction with buccal tooth movement shows decreased mineral root density when compared to corticotomy alone, and contralateral control side. Further details to follow statistical analysis.
THERAPEUTICS FOR CLEFT PALATE: FROM BONE SEEKING TO BONE SEEDING

Adam Qingsong Ye
Associate Professor, Coordinator of Orthodontics, James Cook University, Cairns, QLD Australia

Cleft lip and palate is the most common congenital craniofacial defects, which can affect the normal development of a child’s appearance and speech. Conventional treatments for cleft palate involve bone grafting with patient’s own bone or artificial bone substitute. This can cause an inflammatory response known as foreign body reaction (FBR), resulting in degradation of bone grafts. In order to prevent the FBR and the multi-surgical procedures on the cleft patient, a novel strategy to repair bony defects through stem cells and tissue engineering has been studied. The strategy consists of two stages: the first stage is the discovery of the signalling pathways for the proliferation and renewal of adult stem cells and Notch 1 signalling has been identified; the second stage is design of double layer microsphere to be used as vehicle of the two groups of growth factors: primary factors–stem cell homing and proliferation inducers and secondary factors–bone regeneration inducers. Two-step electrospray method was used to fabricated the double release core-shell microsphere system. This method avoids organic solvents and effectively preserves the biological activity of the growth factors towards stem cells, as such provides a novel therapeutic modality for bone regeneration in treating clefts patients. In trend for the future therapy of cleft palates will move from bone seeking to bone seeding.
Wednesday, 13 August 2014 • Tully Rooms 2 & 3 • 1245-1300 hours

DENTAL AND CERVICAL VERTEBRAE MATURATION OF ISOLATED UNILATERAL CLEFT LIP AND PALATE (UCLP) IN AUSTRALIAN CHILDREN: A LONGITUDINAL STUDY

Sarah Ting¹, Wendy Nicholls², John C Winters², W K Seow¹

1. School of Dentistry, University of Queensland, Brisbane, Queensland, Australia
2. Dental Department, Princess Margaret Hospital for Children, Perth, WA, Australia

To investigate the dental and skeletal development of isolated unilateral cleft lip and palate (UCLP) children of an Australian population. This was a retrospective longitudinal cohort study of 86 UCLP children that were seen and treated at the Cleft and Craniofacial Department of Princess Margaret Hospital for Children, Western Australia. Orthopanthogram (OPG) and lateral cephalogram (LC) radiographs were exposed at 3-year intervals between the ages of 6 to 15 years old. Children with significant medical history and diagnosed syndromes were excluded. The non-cleft control samples consisted of 306 age- and gender-matched healthy children from the University of Queensland School of Dentistry and 4 private orthodontic practices in Brisbane. The dental age was determined from the OPG using the method of Demirjian et al (1973). Skeletal maturity was assessed from the morphology of the cervical vertebrae seen on the LC as described by Baccetti et al (2005). Differences between UCLP and control children were tested using paired t-test and Chi square test with a significance level of p<0.05.

Both the study and control groups were dentally advanced. There was no significant difference in skeletal and dental maturity between UCLP and control girls. UCLP boys had significant dental delay at 9 years of age with a mean delay of 0.5 ± 1.2 years (P<0.05) and a delay of skeletal growth at 12 years of age (P<0.05) in comparison to controls. However, by the age of 15 years, this difference between UCLP boys and controls ceased to be significant.

UCLP boys show significant dental and skeletal delay at 9 years old but catch up with their non-cleft counterparts by 15 years.
LONG TERM RESULTS OF THE ORTHODONTIC TREATMENT OF DEGENERATING DENTITITIONS

Birte Melsen
Professor Dr. Odont., Section of Orthodontics, School of Dentistry, Aarhus University, Aarhus, Denmark

Malocclusions presented by elderly patients are either malocclusions that have aggravated in the normal aging process, or secondary malocclusions developed by loss of teeth and periodontal breakdown leading to spontaneous tooth migration with frequent dysfunction that deteriorates the situation even further. The lecture will illustrate the role of orthodontic treatment, in the team-work with other specialties such as periodontology and prosthodontics. The team work is the key stone in the treatment of these patients and all aspects of the chewing system has to be taken into consideration when the treatment goal is defined and the possibilities and limitations are discussed.

The focus will be on:
1. Improving the attachment level
2. Distributing the available teeth optimally for a reconstruction
3. Moving teeth “with” bone: generating bone for implants in an edentulous area
4. Improving the periodontal status quantitatively and qualitatively
5. The factors of importance for maintenance of the results and the responsibility will be in the focus of the lecture as will the long term results
Wednesday, 13 August 2014 • Tully Rooms 2 & 3 • 1445-1530 hours

44 YEARS IN ORTHODONTICS—WHAT HAS IT TAUGHT ME?

Robert James
Acting Lead of Discipline, Orthodontics, University of QLD Dental School, Chapel Hill, QLD, Australia

One person’s journey through Orthodontics, from acceptance to study the specialty of choice, to near (second) retirement from the profession, has been marked by remarkable changes and similarities over this long period. This journey and what I might have learned during it, for the basis of this presentation.

A number of particular mentors have influenced me greatly, perhaps more often even philosophically than practically. Some have been the obvious ones, such as Clyde Winzar and Terry Freer who taught me directly during the formal course of study, and some have been people I barely know or have never even met, but whose articles, lectures, and general influence on the profession have permeated my thinking throughout my career. At the end of my time in orthodontics, I have been privileged to teach some of the people now entering this specialty, and their intelligence and professional enthusiasm leave me assured the profession is in good hands. There is mentoring to be gained by working with these people who are learning and challenging our concepts—it is not a one way street.

The periodic appearance of appliances or techniques which, we are told, will revolutionise what we can achieve, and how quickly we can achieve it, have never greatly influenced my thinking, as I have been taught and influenced by people who know there is no magic solution to most of the difficulties faced in orthodontic treatment. Sound diagnosis, treatment planning, and treatment mechanics—based always on rationally derived information—are now, and will probably remain always, the cornerstone of efforts to achieve the best results we can individually achieve.

The continued efforts of many to espouse treatment philosophies which run counter to the best scientific evidence will be part of what orthodontists always have to face. The only real and effective way to counter this is by good education at the undergraduate and continuing education levels, as well as maintaining the dissemination of high quality material at meetings such as this.

Our best defence against inroads by the ‘tele-evangelists’ of orthodontics is to continue to strive to do the best each of us can do, and to display that approach at every opportunity.

My orthodontic career started as a Begg practitioner, and that thinking has pervaded my approach despite spending most of my practising life on the ‘other side’. For me, it is fitting to end that career philosophising at this ABSO Meeting.

This presentation will seek to trace one person’s experiences throughout a long career, and perhaps it might bring others to review and re-think their own course through this great specialty.
Oral Abstracts

Wednesday, 13 August 2014 • Tully Rooms 2 & 3 • 1600-1630 hours

MICROCHIP DRIVES PATIENT COMPLIANCE
—STATE OF THE ART TECHNOLOGY ACCELERATES
TREATMENT SUCCESS IN MODERN ORTHODONTICS

Gerhard Gschladt
Handelsagentur Gschladt, Hargelsberg, Austria

Orthodontic treatment success with removable appliances is directly related to sufficient wearing discipline of young patients. Sufficient use of retention splints after removal of fixed appliances protect from relapse. In dental sleep medicine protrusion splints (snoring splints) are an excellent alternative to CPAP especially for patients suffering from mild to moderate sleep apnoea. Over the last decades for physicians it was very difficult to evaluate, if non satisfying orthodontic treatment progress or relapses after successful treatments were caused by insufficient patient compliance or other reasons. TheraMon® is an electronic system, which enables the documentation of real wearing time of removable dental appliances by making use of highly integrated microelectronics and state-of-the-art-technology. Gapless objective wearing time documentation leads to much better patient motivation and may lead to shortened overall treatment time being required. Known objective patient compliance of protrusion splints protects patients suffering from sleep apnoea from legal issues or restrictions in their profession (truck drivers). The presentation leaves a detailed overview on the product system and its benefit for physicians and patients.

Wednesday, 13 August 2014 • Tully Rooms 2 & 3 • 1630–1700 hours

MANUFACTURING CUSTOM APPLIANCES IN-HOUSE: A PATH TO THE FUTURE

Dan Knoch
CEO, Motion View Software LLC, Chattanooga, TN, United States

The complexity of designing orthodontic tooth movement in complex cases is made easier with an in-depth understanding of the patient’s original condition in combination with expected results of different treatment modalities. A method for quantification of tooth movement required and pretreatment appliance design in 3 dimensions is presented. Design of brackets and especially bracket positions can be produced in the physical world with 3D technology at the beginning of treatment, so that treatment will finish with an expected result. Accuracy in designing removable or fixed appliances can be achieved with orthodontic-specific CAD/CAM technology.
UPPER AIRWAY DIMENSIONS AND THE ASSOCIATIONS WITH AGE, GENDER, OCCLUSION AND CRANIOFACIAL MORPHOLOGY IN PRE-ORTHODONTIC CHILDREN

Seerone Anandarajah, Raahib Dudhia, Andrew Sandham, Liselotte Sonnesen

1. James Cook University, Smithfield, QLD, Australia
2. Department of odontology, University of Copenhagen, Copenhagen, Denmark

Aim: The aim of this study was to utilise 3-dimensional cone beam computed tomography (CBCT) to assess the associations between upper airway dimensions and age, gender, occlusion and craniofacial morphology in preorthodontic children.

Methods: 79 CBCT scans of healthy pre-orthodontic children (mean age, 11 ± 2.5 year of age; 33 boys, 45 girls) were examined. Age, sex and molar occlusion was obtained for each patient. The airway volume, minimal cross-sectional area and various cephalometric measurements were assessed on CBCTs. Associations of the various factors being investigated were evaluated by Spearman correlation analysis. Linear regression analysis was used to test significant associations for the effect of age and gender. Furthermore, linear regression analysis with backwards elimination was used to identify parameters with the greatest influence on upper airway dimensions.

Results: Age was positively associated with airway volume and the minimal cross-sectional area (p = 0.0001 and p=0.023 respectively). Gender and molar occlusion were not associated with either airway volume or minimal cross-sectional area. A number of associations between craniofacial morphology and upper airway dimensions were found but only few associations remained statistically significant when tested for the effect of age and gender: n-ans was positively associated with airway volume (p=0.0001) and the minimal cross-sectional area was positively associated with n-ans (p=0.015) and negatively associated with ANB and anpg (p=0.009 and p=0.001, respectively). The most important factors for a small airway volume were younger age and smaller n-ans distance. The most important factors for a small minimal cross-sectional area were larger anpg angle and smaller n-ans distance.

Conclusion/Discussion: Based on the results, predisposing factors for small upper airway dimensions in preorthodontic children include younger age, smaller n-ans distance and larger sagittal jaw relationship (anpg). This information is important for the diagnosis and treatment of children with sleep disordered breathing.
Poster Abstracts

Poster 2

THE IMPACT OF SOCIO-ENVIRONMENTAL AND PSYCHOLOGICAL FACTORS ON ORTHODONTIC TREATMENT

Mark Blandy, Adam Qingsong Ye
Department of Orthodontics, James Cook University, Cairns, Australia

Introduction: Many socio-environmental factors contribute to people’s perception on orthodontic treatment need and why they demand and pursue treatment. Each patient is psychologically unique and this may impact greatly on the planning of orthodontic treatment and the level of cooperation from each patient. Both socio-environmental and psychological factors have the potential to impact orthodontic aims, objectives and final outcomes.

Aims and Objectives: To review the evidence to determine the impact that socio-environmental and psychological factors have on orthodontic treatment.

Methodology: The literature was extensively searched using key words socio-environmental, socio-economic, psychosocial, self-perception, quality of life, oral-health, malocclusion, and orthodontics in Pubmed. No language or time restrictions were set.

Results and Discussion: Statistics show that people from higher income groups are more likely to have orthodontic treatment as they can afford it. It may also be assumed that people from higher socio-economic backgrounds are more concerned with facial appearance and want to resolve discrepancies in dental and facial aesthetics. People from lower socio-economic backgrounds may simply not be able to afford orthodontics or do not prioritise orthodontics highly in overall health. Similar trends were identified between urban dwellers and people living in rural and remote locations due to accessibility to oral health facilities. Trends were identified between different racial groups with those with the most severe malocclusion least likely to have had treatment. This may also reflect that some racial group are not as concerned with dento-facial aesthetics and don’t pursue treatment.

The decision making process to undertake orthodontic treatment is multifactorial. An individual’s attitude towards their own appearance is multifactorial and may simply relate to family values or to deeper thoughts of self-perception and changes they want to make to themselves. Treatment may support positive psychological development and improve self-perception. However all psychological issues are multifactorial and there appears to be no direct link between malocclusion and low self-esteem. There is potential for psychological improvement in patients needing facial change due to extremes in skeletal disproportions or genetic disfigurement.

Conclusion: Many socio-environmental factors contribute to people’s perception of orthodontic treatment need and why they demand and pursue treatment.

Patient’s demands and expectations from orthodontics may vary depending on their perception of malocclusion and self-concept levels.

As part of overall orthodontic management a patient’s socio-environmental background and psychological desire for treatment must be acknowledged to ensure a successful outcome for both the patient and practitioner.
A Mandibular Advancement Splint (MAS) for the treatment of Obstructive Sleep Apnoea (OSA) is often used as an alternative for patients who are unable to tolerate continuous positive airway pressure (CPAP) therapy. Unfortunately MAS treatment is not successful on all patients and 35% of patients have less than 50% reduction in their Apnoea-Hypopnea-Index (AHI) with their AHI remaining above five episodes per hour.

This study will aim to identify reliable, clinically applicable predictors that will allow the clinician to identify those patients who will respond favourably to MAS treatment in order to save time and cost and thereby increase patient satisfaction. A total of 51 patients were recruited with newly diagnosed OSA (AHI>10/hr) as demonstrated by a recent diagnostic nocturnal polysomnograph (PSG).

Demographic information, medical history, anthropometric data, clinical dento-facial records and a CBCT image of the head and upper airway in a supine position were obtained. Prior to the commencement of the MAS wear, the Velopharyngeal patency was assessed by means of nasendoscopy with mandible advancement, during tidal breathing and Muller manoeuvre.

After successful acclimatization and titration of the MAS, patients underwent a repeat sleep study to determine treatment outcome and group them as responders, indicating >50% reduction in AHI and non-responders, as <50% reduction in AHI.

Results are currently pending statistical analysis. The focus will be on finding correlations between the reconstructed 3D images of the CBCT airway shape using Dolphin 3D Imaging and the anatomical shape of the airway as seen during the nasendoscopy examination. The area of collapse will be compared to the smallest cross-sectional area on the CBCT to determine if there is a correlation between the two anatomical positions. Quantitative analyses will be used to assess differences in the results between MAS treatment response groups and non-responders.
THE ROLE OF SCLEROSTIN IN THE FORMATION AND REPAIR OF A THERMALLY INDUCED ANKYLOTIC LESION

Shelley Coburn1, Anak Dharmapatni2, Craig Dreyer1, Wayne Sampson1

1. Department of Orthodontics, University of Adelaide Dental School, Adelaide, SA, Australia
2. Department of Anatomy and Pathology, University of Adelaide Medical School, Adelaide, SA, Australia

Dental ankylosis can occur as a healing process after injury to a tooth whereby fragile root progenitor cells lose their ability to differentiate into fibroblasts. Subsequently, osteogenesis and osteoclasis predominate and the formation of bony ankylosis is favoured over repair of the periodontal ligament (PDL). Sclerostin is a protein secreted by osteocytes that inhibits bone formation by blocking the Wnt signalling pathway (activation of Wnt signalling stimulates osteoblastic activity). Postulated mechanisms of sclerostin include roles in bone modelling where it may keep bone lining cells in a quiescent state preventing osteoblast activation. In bone remodelling it provides negative feedback signalling to prevent osteoblasts overfilling the basic multicellular unit. Osteoblast inhibition can be demonstrated when sclerostin is added to osteogenic cultures.

The aims of this study are to further knowledge related to the formation and repair of tooth ankylosis and investigate if the production and expression of sclerostin is altered during this process.

The right upper first molars of 18 eight week old male Sprague-Dawley rats were subjected to a single 10 minute application of dry ice in order to produce aseptic necrosis and ankylosis within the PDL. The contralateral first molar served as an untreated control. Following tissue preparation the expression of sclerostin was examined via immunohistochemistry and histomorphometry on days 0, 4, 7, 14, and 28 post-insult and in a group of untreated external controls. The development of ankylosis in the PDL of experimental teeth was confirmed by examining the percentage of bone infiltrating the PDL. The percentage of bone increased with the number of days post-insult and was maximal at day 14, with a slight reduction at day 28 indicating the possible establishment of a healing response to resolve the ankylosis. Time-related sclerostin distribution is consistent with the reported negative bone regulating role.
Modern orthodontics is awash with people pushing gizmos, gadgets and the “next big thing” that you must have to be at the cutting edge. The classical skills of bracket placement, anchorage control, wire bending and diagnosis and treatment planning have much to offer in the routine management of moderate to severe dental class 2 cases without resorting to extractions.

This presentation demonstrates a synthesis of classical Begg mechanics for bulk tooth movement and routine straight wire for finishing, utilising modern arch wire metallurgy, bracket design and stuff that’s already in your bottom drawer, thus avoiding expensive and time consuming contraptions that will add nothing to the final result.
Poster Abstracts

Poster 6

ROOT MORPHOLOGY AND DEVELOPMENT OF LABIAL INVERSELY IMPACTED MAXILLARY CENTRAL INCISORS IN MIXED DENTITION: A RETROSPECTIVE CONE-BEAM COMPUTED TOMOGRAPHY STUDY

Rongdang Hu, Yi Wang

Stomatology School, Wenzhou Medical University, Wenzhou, Zhejiang, China

Aim: The purpose of this study was to analyse 3-dimensional data of root morphology and development, in labial inversely impacted maxillary central incisors.

Methods: Cone-beam Computed Tomography (CBCT) images from 41 patients with impacted incisors were divided into early and later groups according to the dental age. Sagittal slices were evaluated where the tooth was widest labio-lingually in the axial view. The amount of inverse angle, dilacerations angle, and length of both impacted homonym tooth were evaluated by Simplant 13.0 software.

Results: Student’s T-test indicated that the lengths of impacted teeth were significantly shorter than that of homonym teeth (P<0.05) and the root length of early group was significantly shorter than that of the late group. The results from chi-square tests indicated that the incidence of dilacerations is significantly higher in later period group when compared with the early group. Multiple regression analyses indicated that the independent variables for root length of impacted teeth were: dental age(β=0.64, P<0.001), length of the non-dilacerated part of the root (β=0.44, P<0.001).

Conclusions: The dilacerations is more often seen in late period group. And the roots of labial, inversely impacted maxillary central incisors continue growing, but with limitation.
The purpose of this study was to assess the long-term (>3 months) preventive effect of casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) on enamel demineralization in vivo. PubMed, Web of Science, Embase, Cochrane-Central, Science Direct, CBM, and CNKI were searched up to April 2013. Only articles in English and Chinese were included. Grey literature was also searched. Randomized or quasi-randomized clinical trials in which CPP-ACP was delivered by any method were considered. All relevant studies underwent two independent reviews.

Of the 738 studies screened, 83 studies were reviewed and eight selected for inclusion in the final sample. The follow-up period of the studies included varied from 3 to 24 months. The long-term preventive effect of CPP-ACP in vivo was demonstrated in comparison with placebo in randomized controlled trial. However, there is conflicting evidence regarding the clinical efficacy of CPP-ACP when used in conjunction with fluoride toothpastes. No specific side effect related to CPP-ACP usage was found.

CPP-ACP has a long-term preventive effect on enamel demineralization in comparison with placebo, although this does not appear to be significantly different from that of fluorides. The advantage of using CPP-ACP as a supplement to fluoride-containing products is still unclear. CPP-ACP is a promising remineralizing agent with a significant remineralizing effect that has been demonstrated in both in vivo and in vitro studies. The evidence to support its synergistic effect with fluoride is insufficient based on the current existing long-term human randomized controlled trials.
**ORTHODONTIC ROOT RESORPTION FOLLOWING HEAVY TRANSVERSE AND VERTICAL JIGGLING FORCES**

Carolyn Ng1, Peter Petocz2, Tamar Turk3, Selma Elekdag-Turk3, M. Ali Darendeliler4, Oyku Dalci1

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2. Department of Statistics, Macquarie University, Sydney, NSW, Australia
3. Faculty of Orthodontics, Ondokuz Mayis University, Samsun, Turkey

Jiggling tooth movements may be responsible for root resorption in the absence of overt root displacement. This study aims to quantify and compare the effects of controlled heavy transverse buccal and palatal, and vertical extrusive and intrusive jiggling forces applied over a 12 week period on root resorption, and to localize the sites of prevalence in premolars.

Ten patients who required bilateral maxillary first premolar extractions as part of their orthodontic treatment participated in this study. The total sample consisted of 20 maxillary first premolars. Heavy (225g) forces were applied to the right or left first premolar with the direction of force alternating along either the transverse or vertical plane every 4 weeks over a 12 week period. After the experimental period, the teeth were extracted without root damage and analysed with micro computed tomography. Each specimen was studied in 3 dimensions with specifically designed software to measure the volume of each crater.

There was a significant difference in the total root resorption caused by heavy vertical and transverse forces (p = 0.032). There was also a significant difference in the total root resorption on each root surface caused by heavy vertical and transverse forces (p<0.001), and this was greatest on the distal root surface of premolars undergoing heavy vertical jigging forces. The cervical, middle or apical thirds of the root for both heavy vertical and transverse jiggling forces did not show any significant difference in root resorption.

**Conclusion:** Heavy vertical jiggling forces produced more root resorption than heavy transverse jiggling forces. Clinically, it may be prudent to avoid mechanics that involve heavy vertical jiggling forces as they appear to contribute more to root resorption.
CORRELATION BETWEEN SURFACE ROUGHNESS OF ORTHODONTIC MINI SCREW IMPLANTS AND BIOFILM FORMATION

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Introduction: Orthodontic mini-screw implants (OMSIs) have become largely popular in contemporary orthodontics to attain anchorage. However, a high rate of failure of these devices has been one of the disadvantages. One of the potential areas for failure that have been identified may be the aggregation of biofilm of these devices leading to peri-implant inflammation. To date, the investigation into the various surface characteristics of various OMSI systems has been limited. Surface roughness has been identified as a factor involved in biofilm aggregation.

Aim: This study aims to compare surface roughness of OMSIs used in orthodontic practice and its association to the biofilm growth.

Method and materials: Four OMSIs with various surface finishes available in the Australian market were selected for the present study. They are: Ormco (V) – Anodised titanium alloy, TOMAS (T) – machined titanium alloy, Leone (L) – Stainless steel, and Arhaus (A) – Anodised titanium alloy. Five implants from each group were selected and tested under atomic force microscopy (NT-MDT NTEGRA) and scanning electron microscopy (Jeol JSM5410LV) around the head and neck region. Each implant measured at three random sites. Qualitative and quantitative data were collected for statistical analyses. Furthermore, biofilm was cultured around each implant group. Flow cytometry was used to determine bacterial counts to determine which implant groups were more conducive to biofilm growth.

Results and Discussion: The Vector group was shown to have the roughest surface out of the four groups (Mean surface roughness of $239.4 \pm 71$ nm ($p < 0.00$). The roughness of the other groups showed no statistical significance. These findings were reflected in the SEM and bacterial studies which showed the Vector group to have a higher surface roughness as well as leading to increased biofilm growth. Conclusion: Our study show the correlation of surface roughness with increased biofilm growth. This may be a factor in the operator choosing an appropriate OMSI system for use in their patients to limit the amount of biofilm growth.
Poster Abstracts

Poster 10

**TOWARDS IMPROVED DIAGNOSTICS FOR ORTHODONTIC ROOT LOSS**

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**Background:** An adverse effect of orthodontic treatment is shortening of tooth roots, termed orthodontic root loss (ORL). In around 1 to 5% of patients, ORL is severe, jeopardizing the survival of the affected dentition. Currently, diagnosis is by radiography and is limited by radiation exposure. Thus, there is a need for more sensitive and safer diagnostic methods.

Physiological root loss (PRL) is a similar but normal event that occurs on primary tooth roots during eruption of permanent teeth. It could serve as a model for developing diagnostic biomarkers of ORL.

**Hypothesis:** We hypothesized that dentine phosphoprotein (DPP, a potential biomarker of ORL) is excreted in urine during root resorption. We aimed to develop a method for detecting trace amounts of DPP in urine during PRL. First, we characterized the proteome of primary and permanent dentine to determine comparability. Second, we developed an approach to sensitively detect DPP in urine.

**Methods:** Deciduous (N=10) and permanent (N=10) teeth were collected with ethics approval. Dentine proteins (DPs) from primary and permanent dentine were extracted using an optimized protein preparation procedure. The protein profiles were then characterized using sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) and several staining methods. A proprietary “affinity capture kit” (AC) was used to selectively enrich and capture these biomarkers from defined pure-component solutions and urine.

**Principal Findings:** Primary and permanent dentine displayed near-identical protein profiles. Densitometry revealed that the assay captured around 30-40% of the DPs. The AC was able to detect ~0.1ng/mL of DP from a pure-component solution, providing requisite sensitivity for ORL (estimated ~10 ng/ml).

**Discussion:** The similar protein profiles enable the use of the PRL model as a proxy for ORL. The AC appears to be in the range for detection of trace urinary biomarkers of ORL. Application of the AC to urine is underway.
Current orthodontic treatment using fixed appliances can achieve (on average) 1mm of tooth movement per month. Invisalign® aligners are programmed to move teeth at half that rate. The evidence supporting this rate of tooth movement is scarce. The purpose of this study was to investigate the clinical accuracy of the Invisalign® orthodontic system (IOS) in a group of teenage subjects. Computer-proposed tooth movements will be compared with clinical tooth movement achieved, following an increase in the linear velocity from the default 0.25mm per set of aligners per fortnight to 0.33mm per fortnight.

Convenient sample of 20 teenagers seeking treatment with the IOS was selected from a private orthodontic practice. Subjects were randomly allocated to a control group (tooth movement at a rate of 0.25 mm per set of aligners per fortnight) or a test group (tooth movement at a rate of 0.33 mm per set of aligners per fortnight). Anterior teeth were used as stable reference points, while the premolars and molars were programmed for 2mm of expansion in each quadrant. iTero intraoral scans were taken pre-expansion (T0) and post-expansion (T1), and the data compared to the computer-proposal (Tp) using GeomagicTM computer modelling software.

Early results show that both groups had less expansion towards the posterior segments of the arch, with the first premolars achieving the highest percentage of predicted expansion. There was no significant difference in the amount of predicted versus actual expansion achieved between the two groups (p>0.05). The test group was able to achieve similar amounts of tooth expansion to the control group in a shorter time frame.

Within the limitations of this study, the Invisalign orthodontic system can achieve equivalent amounts of programmed expansion at a linear velocity of 0.33mm per aligner per fortnight, compared to the current default velocity (0.25mm per aligner per fortnight).
The Australasian Begg Society of Orthodontists celebrates the ideals and the progressive thinking of Dr P Raymond Begg and encompasses orthodontists of all treatment philosophies and techniques. The thesis of the group is to maintain the consideration, discussion and debate required to progress the theory and application of the contemporary orthodontics, in much the same manner as the namesake of this Society would have wished the constant development and review of orthodontics to be continued. The Society perpetuates the name and status of arguably Australia’s most pre-eminent and innovative orthodontist.

Currently meetings of the Society are held biennially, generally at locations where delegates can explore the best that Australia has to offer. Numerous members maintain their affiliation with European colleagues by attending the meetings of the European Begg Society of Orthodontists.