UiT

NORGES
ARKTISKE
UNIVERSITET

Single krone på tannimplantat & estetikk

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UiT Norges arktiske universitet

1. Evaluation of esthetic outcomes

A satisfactory esthetic outcome?

A satisfactory esthetic outcome?

High smile line A.K.A. “Gummy smile”

Low smile line

A satisfactory esthetic outcome?

Fava et al. COIR 2015

A satisfactory esthetic outcome?

Fava et al. COIR 2015

Evaluation systems to appraise the qualities of the soft tissues in patients having received a single crown

2. Evaluation of esthetic outcomes in implant dentistry

Established evaluation system

1971 USPHS / Ryge criteria - " US Public Health Service" (Cvar & Ryge)

1977 CDA criteria – "California Dental Association"

Categorical levels:
Alfa – Bravo – Charlie - Delta
Romeo – Sierra – Michigan -Tango – Victor

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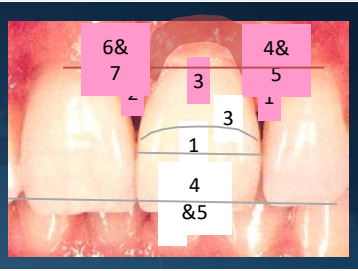
Specifically to implant-retained reconstructions in the esthetic zones

2005 ICAI - "Implant Crown Aesthetic Index" (Meijer et al. COIR)



1&2 Position of mucosa in the approximal embrasures: must be in their natural position, 3-points (deviation ≥1.5 mm- <1.5 mm- no deviation)

3 Position of the labial margin of the peri-implant mucosa: must be at the same level as the contralateral tooth and in harmony with the adjacent teeth, 3-points (deviation ≥1.5 mm- <1.5 mm- no deviation)

4&5 Contour of the labial surface of the mucosa: must be in harmony with the adjacent and contralateral tooth, **5-points** (gross - slight undercontoured - no deviation - slight - gross overcontoured)

6&7 Colour and surface of the labial mucosa: must be in harmony with the adjacent and contralateral tooth and must have a natural appearance, 3-points (gross -

1. Mesiodistal dimension of the crown: must be in harmony with the adjacent and contralateral tooth, **5-points (**gross - slight undercontour- no deviation - slight - gross overcontour)
2. Position of the incisal edge of the crown: must be in harmony with the adjacent and contralateral tooth, **5-points** (gross - slight undercontour- no deviation - slight - gross overcontour)
3. Labial convexity of the crown: must be in harmony with the adjacent and contralateral tooth, **5-points** (gross - slight undercontour- no deviation - slight - gross overcontour)
4. Colour and translucency of the crown: must be in harmony with the adjacent and contralateral tooth, 3-points (gross -slight -no mismatch)
5. Surface of the crown: characteristics of the crown such as roughness and ridges must be in harmony with the adjacent and contralateral tooth, 3-points (gross -slight -no mismatch)

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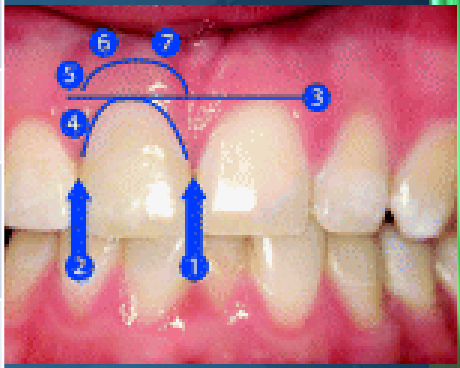
Variable		0	1	2
Mesial papilla	Shape vs. reference tooth	Absent	Incomplete	Complete
Distal papilla	Shape vs. reference tooth	Absent	Incomplete	Complete
Level of soft-tissue margin	Level vs. reference tooth	Major discrepancy >2 mm	Minor discrepancy 1–2 mm	No discrepancy <1 mm
Soft-tissue contour	Natural, matching reference tooth	Unnatural	Fairly natural	Natural
Alveolar process	Alveolar process deficiency	Obvious	Slight	None
Soft-tissue color	Color vs. reference tooth	Obvious difference	Moderate difference	No difference



From: Fürhauser et al. 2005

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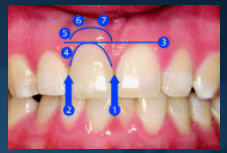
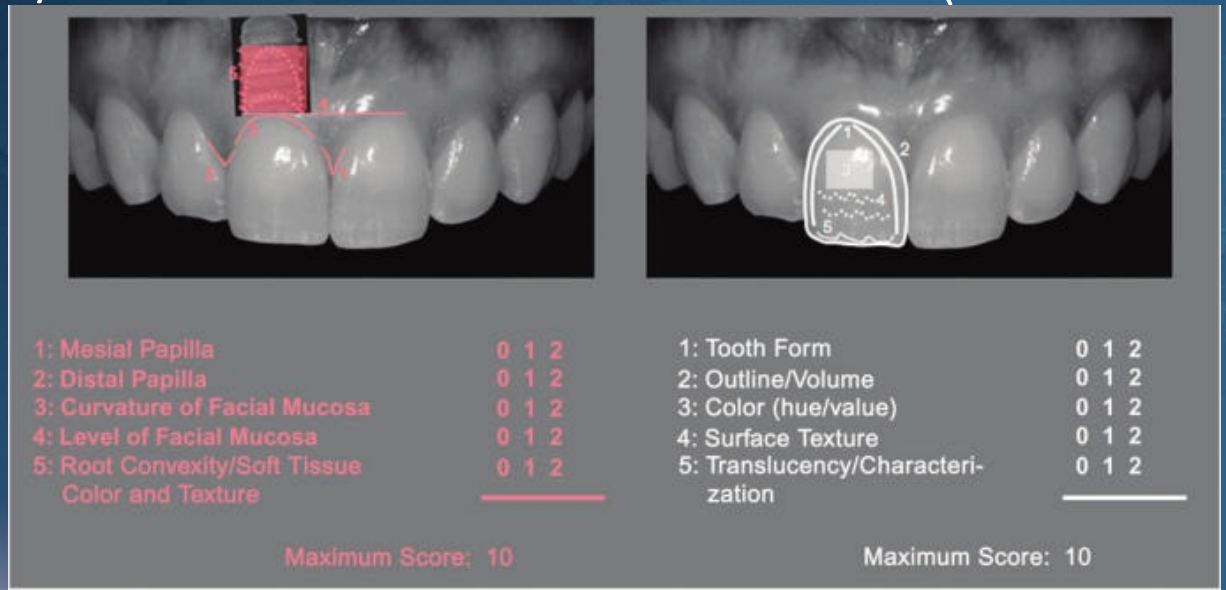
2009 PES/WES - "Pink and white esthetic score" (Belser et al. J.Perio)





From: Belser et al. 2009

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2010 CEI – "Complex esthetic index" (Juodzbalys & Wang J. Perio)

Ratings and Evaluation Grades

Index and Parameters	Rating and Evaluation Grades of Parameter Variations		
	Adequate (20%)	Compromised (10%)	Deficient (0%)
S			
1: soft tissue contour variations	No	<2 mm	≥2 mm
2: soft tissue vertical deficiency	No	1 to 2 mm	>2 mm
3: soft tissue color and texture variations	No	Moderate	Obvious
4: mesial papillae appearance	Complete fill	Partial fill	None
5: distal papillae appearance	Complete fill	Partial fill	None
General rating and evaluation grade	100%	60% to 90%	<50%
P			
1: mesial interproximal bone height	<5 mm	5 to 7 mm	>7 mm
2: distal interproximal bone height	<5 mm	5 to 7 mm	>7 mm
3: gingival tissue biotype	>2 mm	1 to 2 mm	<1 mm
4: implant apico-coronal position	1.5 to 3 mm	>3 to 5 mm	>5 mm
5: horizontal contour deficiency	No	1 to 3 mm	>3 mm
General rating and evaluation grade	100%	60% to 90%	<50%
R			
1: color and translucency	No	Moderate	Obvious
2: labial convexity in the abutment/implant junction	No	<1 mm	<2 mm
3: implant/crown incisal edge position	No	±1 mm	±2 mm
4: crown width/length ratio	<0.85	0.85 to 1.0	>1.0
5: surface roughness and ridges	No	Moderate	Obvious
General rating and evaluation grade	100%	60% to 90%	<50%

(S): soft tissue index
(P): predictive index ("Bone")
(R): implant-supported restoration index

Measure of degree of perfection vs. reality ?

Criteria for scoring esthetical outcome may at times create a challenge

The single implant-supported crowns “stand out positively”, but should per definition be scored “low” because they do not blend in with the remaining teeth and gingiva contours

15-20 yr old implant-crowns
Jokstad et al. IJOMI 2016 (in press)

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2010 CEI – "Complex esthetic index" (Juodzbalys & Wang J.Perio)

Specifically to implant-retained reconstructions and papillae

1997 PI – "(Jemt) Papilla Index" score (Jemt Int. J. Per. Res. Dent)

i.e., position of the soft-tissue crest relative to the apical location of the tooth:implant-crown contact area

Score: 0 (1 2) (3 4)

-/+ ≥ half the height

1. Evaluation systems to appraise the qualities of the soft tissues in patients having received a single crown
2. The effects of various clinical variables on peri-implant soft tissue appearance and cortical bone loss

2. Effects of clinical variables on peri-implant soft tissue appearance and cortical bone loss

We may today expect predictable esthetic outcomes due to refinements over the years:

- Alternative surgical and restorative treatment strategies
- Innovative implant system components and biomaterials

Alternative surgical and restorative treatment strategies

Timing of implant placement

Classification	Descriptive Terminology	Period after Tooth Extraction	Desired Clinical Situation at Implant Placement
Type 1	Immediate placement	Immediately following extraction	Post-extraction site with no healing of bone or soft tissues
Type 2	Early placement with soft-tissue healing	Typically 4 to 8 weeks	Post-extraction site with healed soft tissue but without significant bone healing
Type 3	Early placement with partial bone healing	Typically 12 to 16 weeks	Post-extraction site with healed soft tissues and with significant bone healing
Type 4	Late placement	Typically 6 months or longer	Fully healed post-extraction site

Loading protocol alternatives

Loading Protocol	Definition
Immediate restoration	A restoration is inserted within 48 hours of implant placement, but not in occlusion with the opposing dentition
Immediate loading	A restoration is placed in occlusion with the opposing dentition within 48 hours of implant placement
Conventional loading	The prosthesis is attached after a healing period of 3 to 6 months
Early loading	A restoration in contact with the opposing dentition is placed at least 48 hours after implant placement but not later than 3 months afterwards
Delayed Loading	The prosthesis is attached in a procedure that takes place some time later than the conventional healing period of 3 to 6 months

+/-
Socket preservation

+/-
Site enhancement
- Bone
- Soft-tissues
- Keratinized gingiva

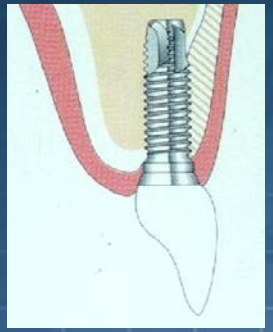
Alternative surgical and restorative treatment strategies for healed sites / missing teeth

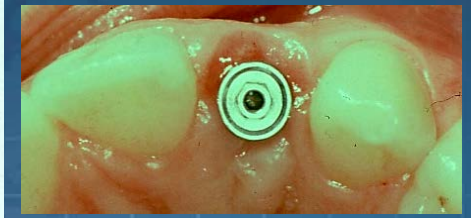
1. Implant placed +/- augment → Heal +/-4 mths → Load Temp./permanent prosthesis
2. Implant placed +/- augment → Heal +/-4 mths → Recovery surgery for esthetics* → Soft-tissue building → Load Temp./permanent prosthesis
3. Implant placed +/- augment & Load temporary prosthesis → Observation of esthetic outcome → Load Permanent prosthesis
4. Implant placed +/- augment & Load temporary prosthesis → Observation of esthetic outcome → Recovery surgery for esthetics* → Soft-tissue building → Load Permanent prosthesis
5. Implant placed +/- augment & Load permanent prosthesis

90ies advices for placement (in a healed site)

Place as vertically as possible (avoid non-axial loading!)

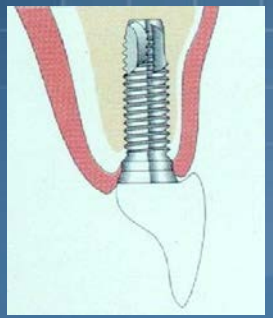
+ buccal grafting





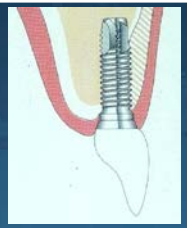
OR

place palatinally to make "ridge-lap crown"



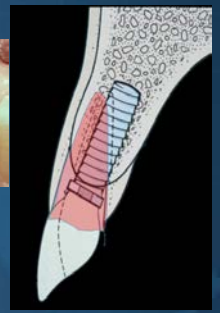
90ies advices for placement (in a healed site)

Place as vertically as possible (avoid non-axial loading!)



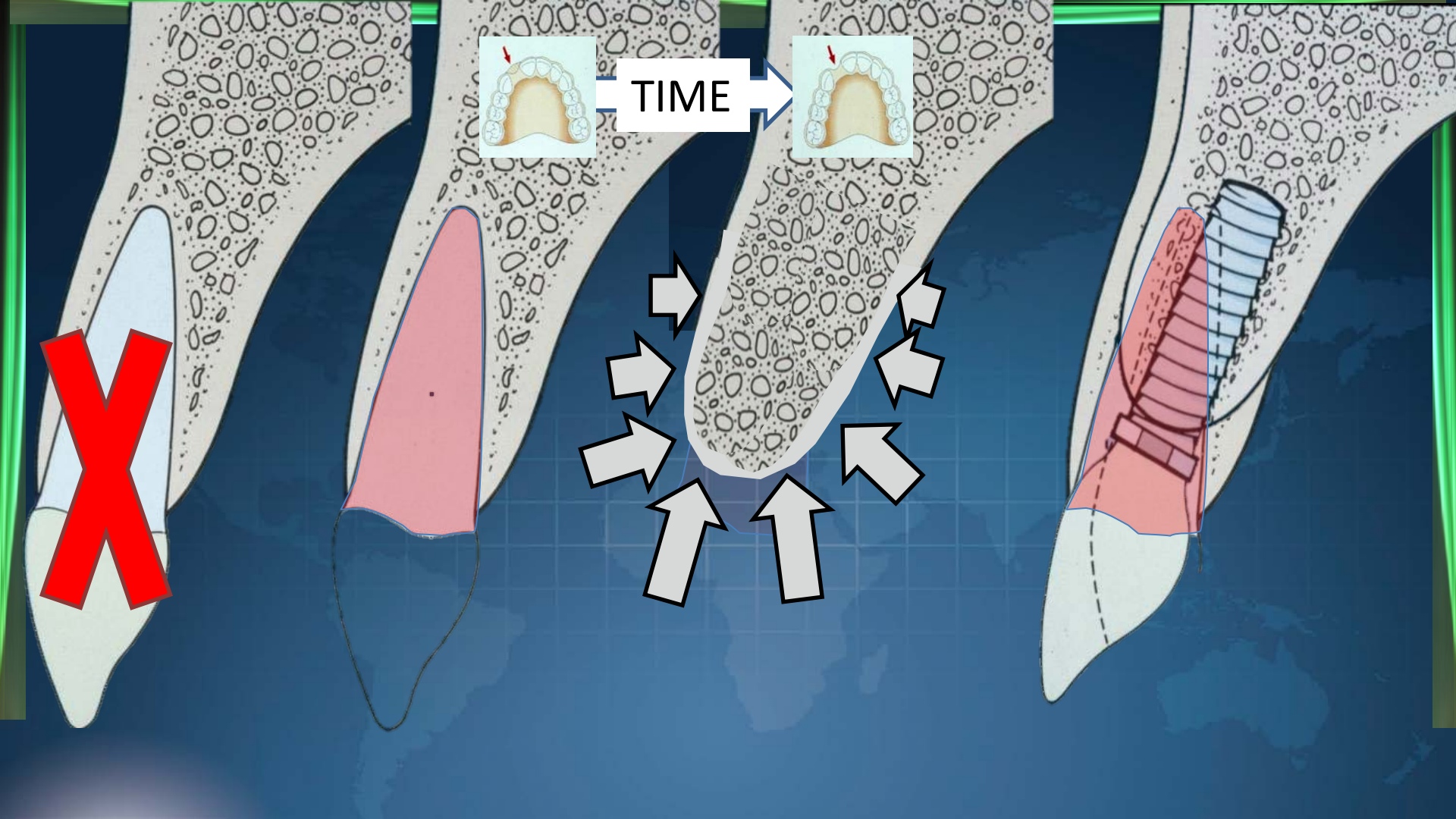
+ buccal grafting
OR
place palatinally to make “ridge-lap crown”

OR
Place in the centre axis of the remaining alveolar bone → often angulated abutment need

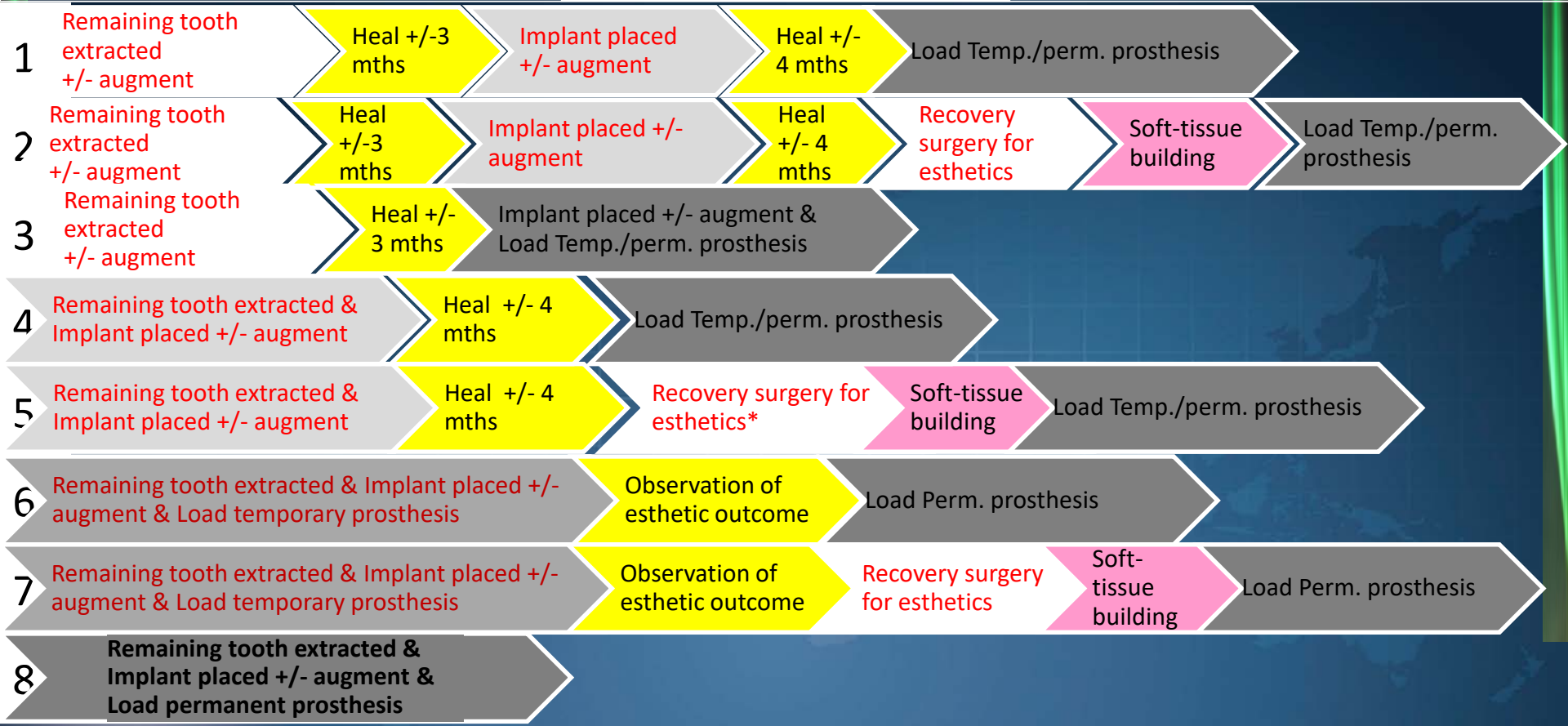


Alternative surgical and restorative treatment strategies for remaining hopeless tooth / root

1. Remaining tooth extracted +/- augment → Heal +/-3 mths → Implant placed +/- augment → Heal +/-4 mths → Load Temp./perm. prosthesis
2. tooth extracted → Heal +/-3 mths → Implant placed +/- augment → +/- 4 mth → surgery for esthetics → tissue buildin g → Load Temp./perm. prosthesis
3. Remaining tooth extracted +/- augment → Heal +/-3 mths → Implant placed +/- augment & Load Temp./perm. prosthesis


TIME

Alternative surgical and restorative treatment strategies for remaining hopeless tooth / root



2. Effects of clinical variables on peri-implant soft tissue appearance and cortical bone loss

We may today expect predictable esthetic outcomes due to refinements over the years:

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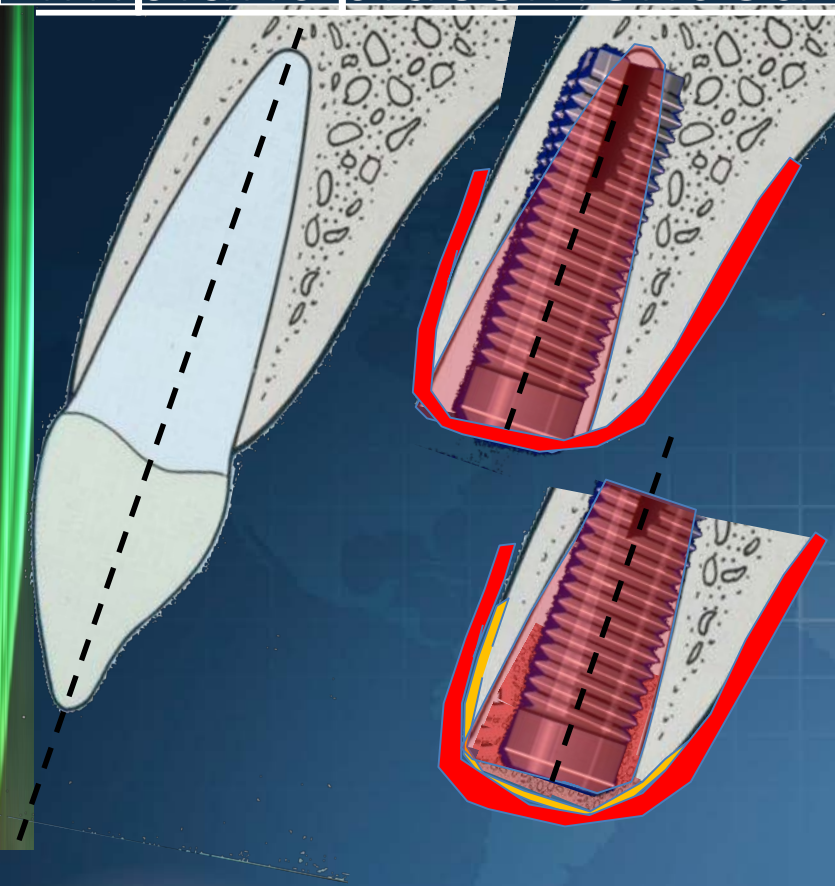
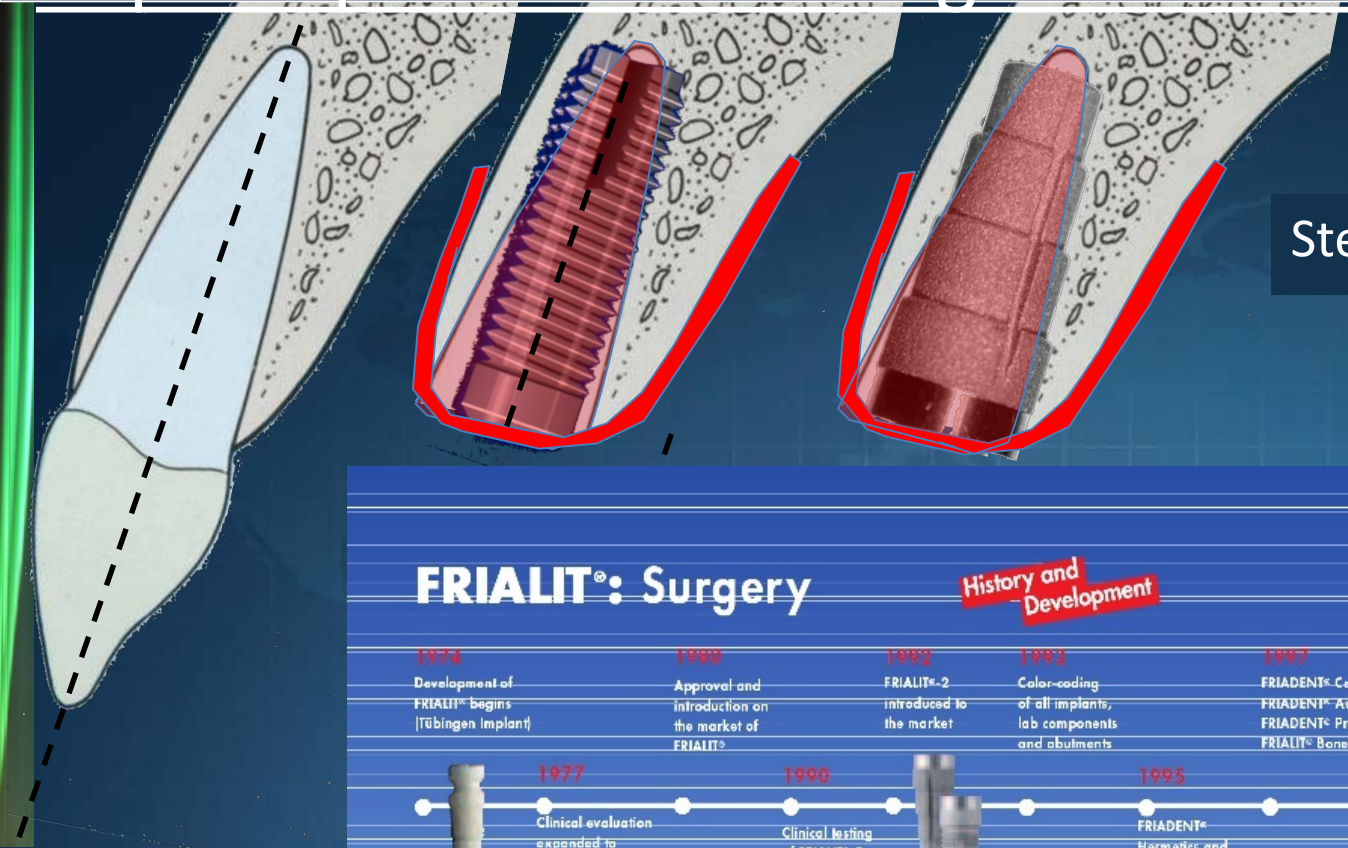
Implant placement strategies – immediate or early?



‘90ies

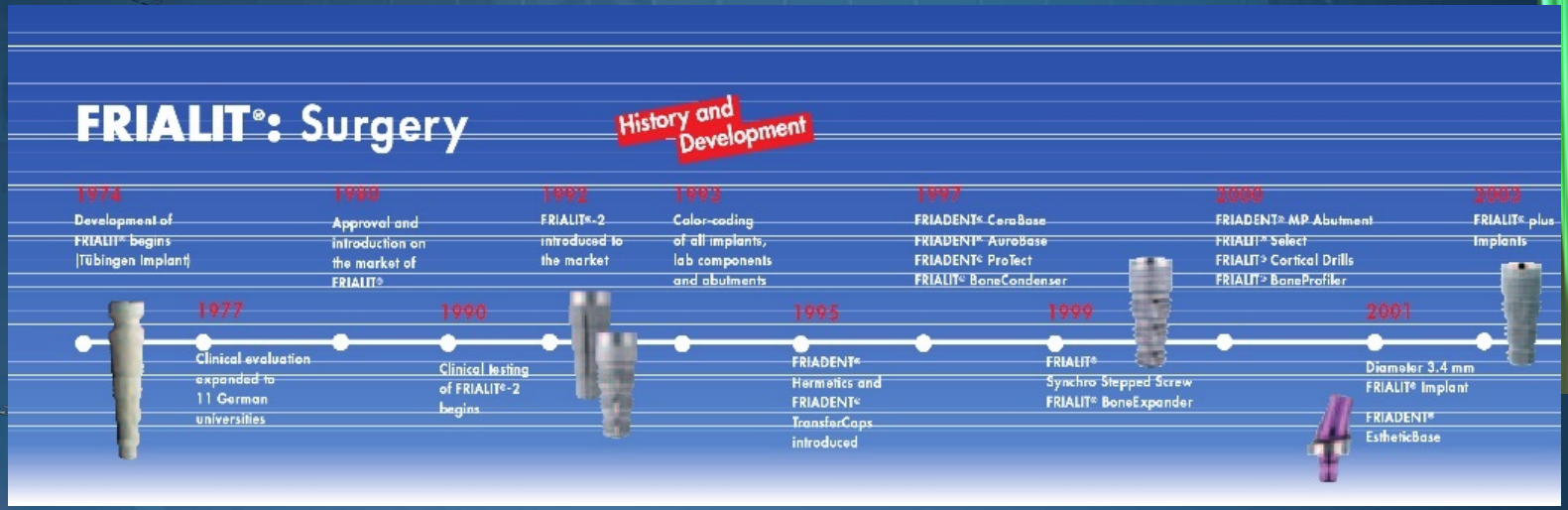
1. +/- Augmentation
2. Auto-/allograft
3. +/- membrane
4. ((HA-)cylindric)

Implant placement strategies – immediate or early?

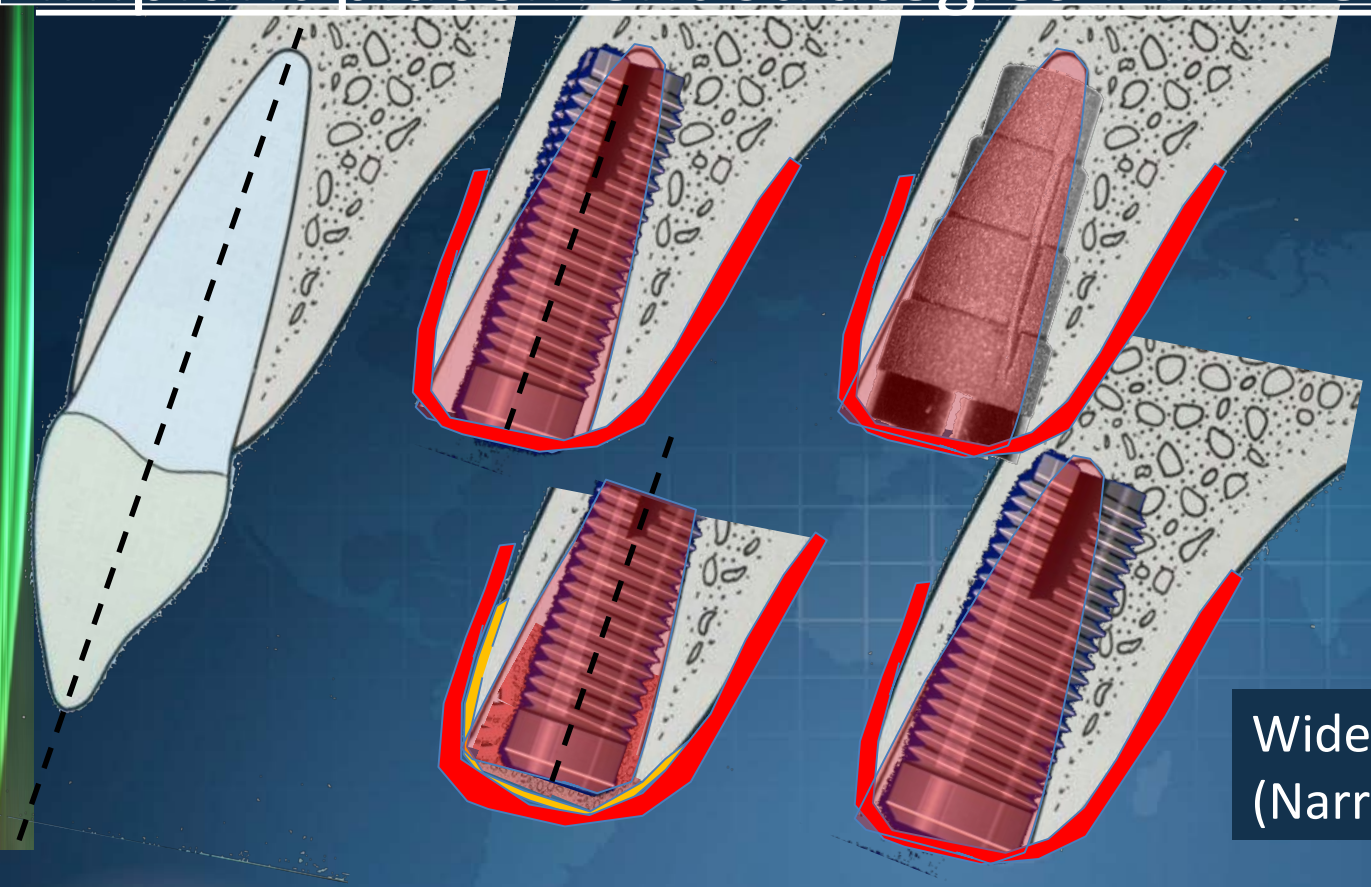


‘90ies →

Stepped implants



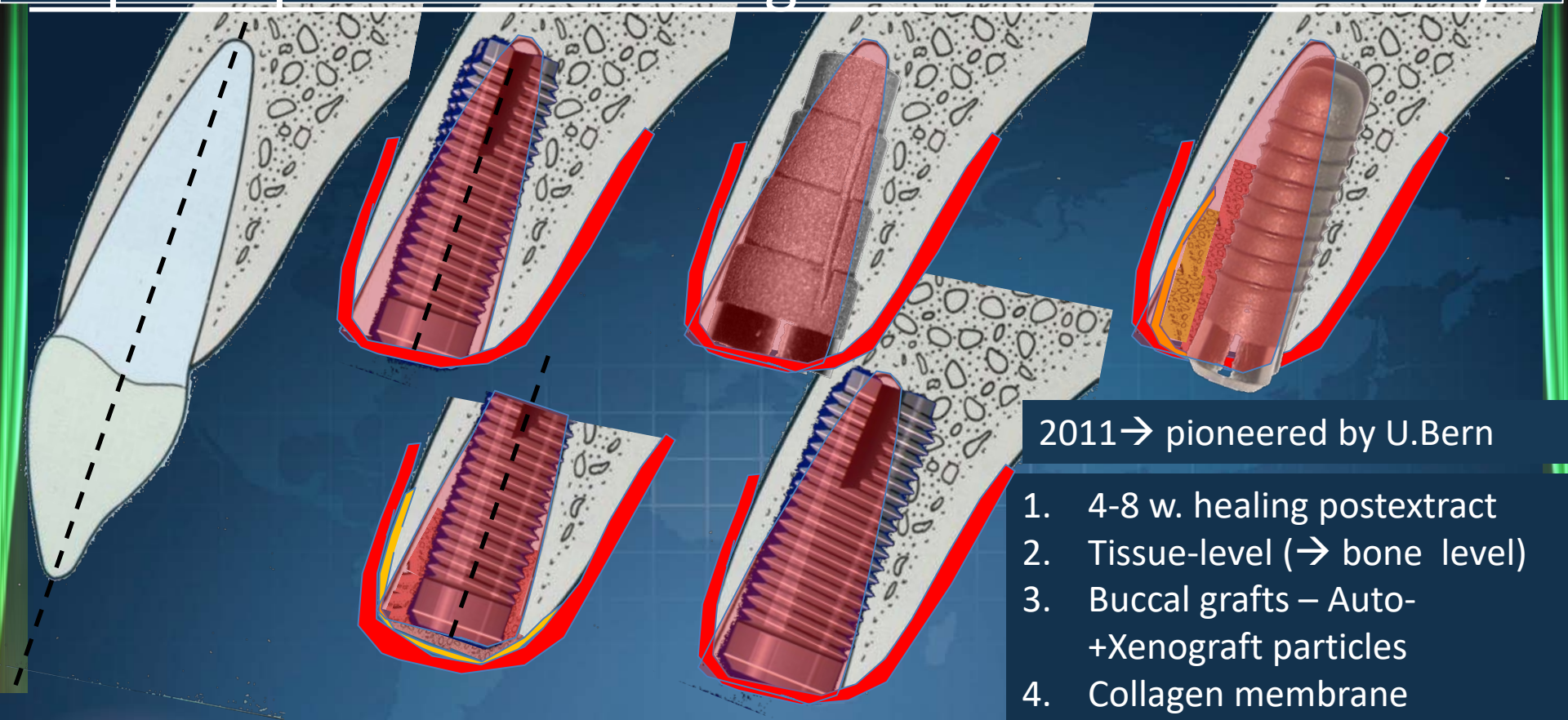
Implant placement strategies – immediate or early?



late
‘90ies

Wide implants
(Narrow implants)

Implant placement strategies – immediate or early?



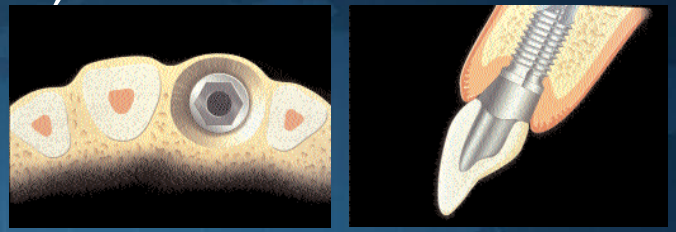
2011→ pioneered by U.Bern

1. 4-8 w. healing postextract
2. Tissue-level (→ bone level)
3. Buccal grafts – Auto- +Xenograft particles
4. Collagen membrane
5. Submerge 8-12 w.

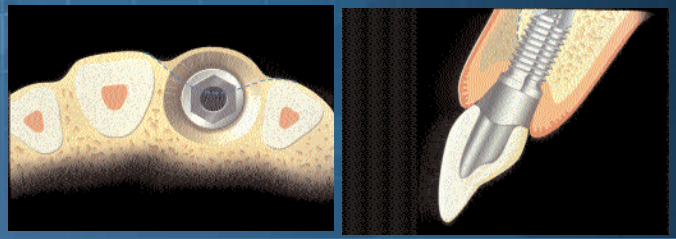
A deductive reasoning approach

Premise: A 1.5 mm wide “circumferential crater” exists around all implants, including on the buccal side. Hence,

1. ... the bone thickness should be at least 2 mm, preferably 4 mm
2. If < 2mm bone is available, part of the buccal bone plate will be lost after remodeling, with the consequence of a high risk of soft tissue recession
3. Such a large amount of bone buccally does not exist normally, and has to be created with augmentation procedures in almost every esthetically demanding case



Thickness that bone on buccal side of implant should have to support gingival margin despite horizontal crater formation.



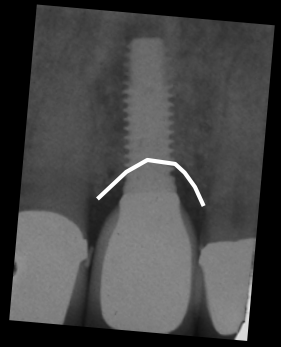
Influential paper
BUT
The evidence of the premise is weak
see: Zhang et al. COIR 2014

Amount of bone needed to accommodate circumferential crater without loss of height in buccal mucosal margin; dotted line = *original degree of B-L resorption*

From: Grunder et al. IJPRD 2005

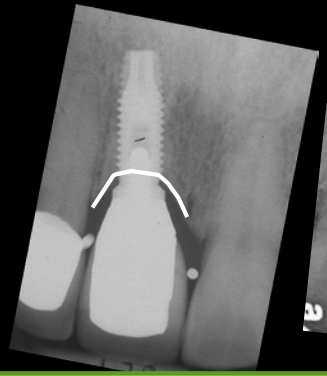
“Saucerization” – influence by the implant design?

BioHorizon
4 x 12 mm



3i Osseotite NT
4 x 13 mm

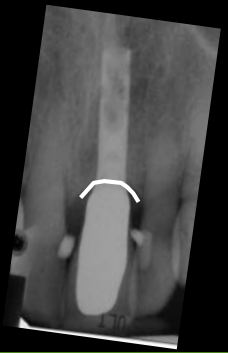
3i Certain Prevail
3.8 x 11.5 mm



Innova Endopore
4 x 9 mm

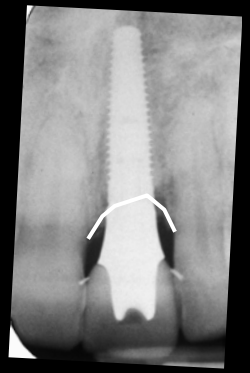
Brånemark Std.
3.75 x 18 mm

ITI Std.+ Narrow-
3.3 x 12 mm

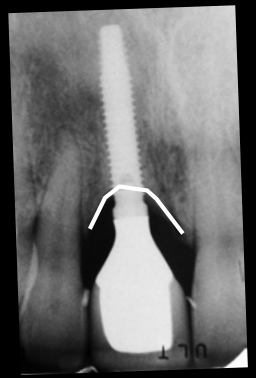


Replace Select Straight
4.3 x 15 mm

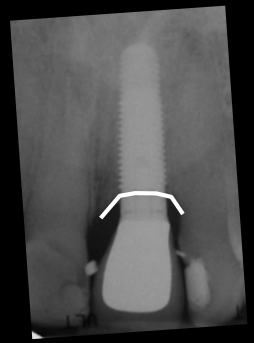
Replace Select Taper
4.3 x 16 mm



Steri-Oss Replace
3.3 x 18 mm

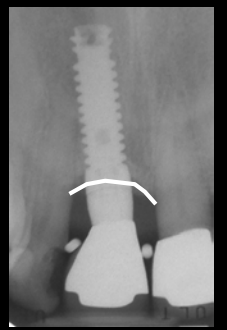


Zimmer ScrewVent -taper
4.7 x 16 mm



Zimmer ScrewVent
3.8 x 16 mm

Zimmer MicroVent
4.3 x 16 mm



“Saucerization” – influence by the implant design or by anatomy?

BioHorizon Tapered 4 x 12 mm

3i Osseotite NT 4 x 13 mm

3i Certain Prevail 3.8 x 11.5 mm

Innova Endopore 4 x 9 mm

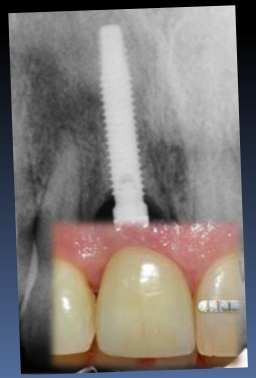
Brånemark Std. 3.75 x 18 mm

ITI Std.+ Narrow- 3.3 x 12 mm

Replace Select Straight 4.3 x 15 mm

Replace Select Taper 4.3 x 16 mm

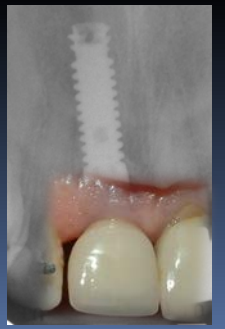
Steri-Oss Replace 3.3 x 18 mm



Zimmer ScrewVent -taper 4.7 x 16 mm

Zimmer ScrewVent 3.8 x 16 mm

Zimmer MicroVent 4.3 x 16 mm



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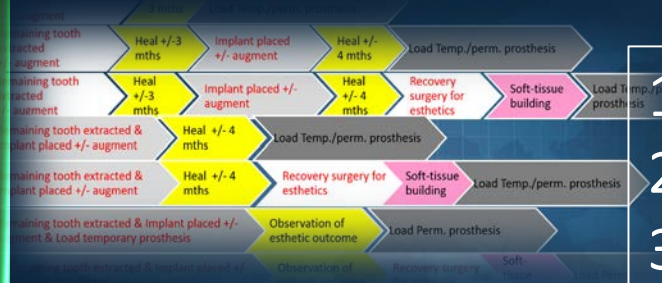
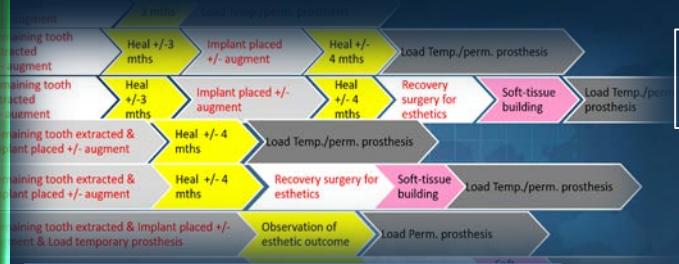
The parameters to achieve the best possible appearance of peri-implant soft-tissues?

Potential effect of site or surgery variables on outcome?

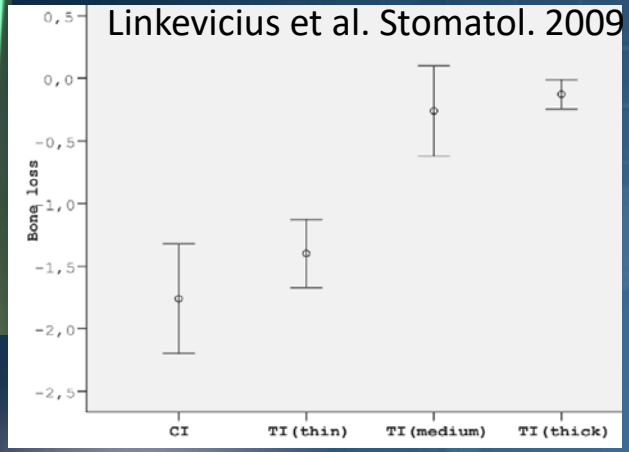


1. Tissue biotype / thickness
2. Incision / flap design
3. Osteotomy procedure
4. Implant position, vertical & adjacent tissues
5. Torque / primary stability
6. Flap handling
7. Suturing technique
8. Cover screw / tenting abutment

Potential effect of site or surgery variables on outcome?



Mucosa thickness over implant may influence crestal bone changes



Linkevicius et al. Stomatol. 2009

1. Tissue biotype / thickness – thin vs thick

Thin biotype gingiva is more prone to recession

Kan et al. IJOMI 2011

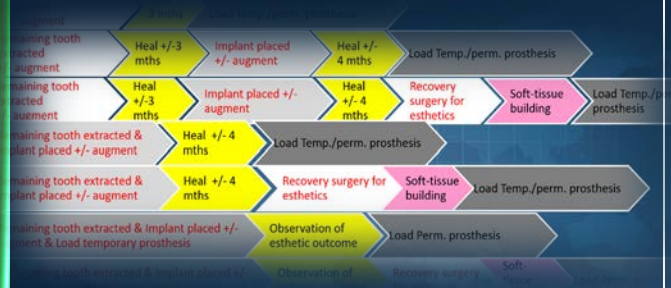
Lops et al. J.Esth.D 2015

da Rosa et al. IJPRD 2014

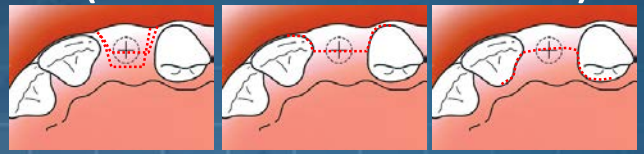
Cardarolopi et al. IJPRD 2015

Zuiderveld et al. 2014

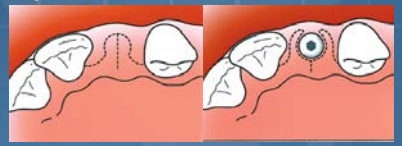
Potential effect of site or surgery variables on outcome?

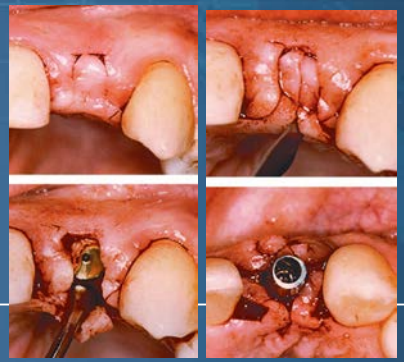


1. Tissue biotype / thickness – thin vs thick
2. Incision / flap design - use
   1. Trapezoidal instead of intra-sulcular incision (Gomez-Roman IJOMI 2001)

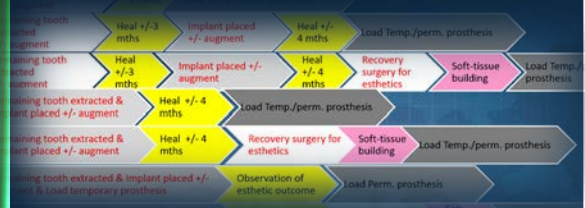


   2. Split-finger approach (Misch et al. Imp Dent 2004)





Potential effect of site or surgery variables on outcome?



1. Tissue biotype / thickness – thin vs thick
2. Incision / flap design - **papilla-sparing approach**
3. Osteotomy procedure — Evidence is inconclusive
4. Implant position, vertical & adjacent tissues
5. Torque / primary stability — Evidence is conflicting
6. Flap handling — Evidence is inconclusive
7. Suturing technique — Evidence is inconclusive
8. Cover screw / "tenting" abutment — Evidence is lacking

If also immediate placement:

Extraction reason

Extraction technique

Socket debridement

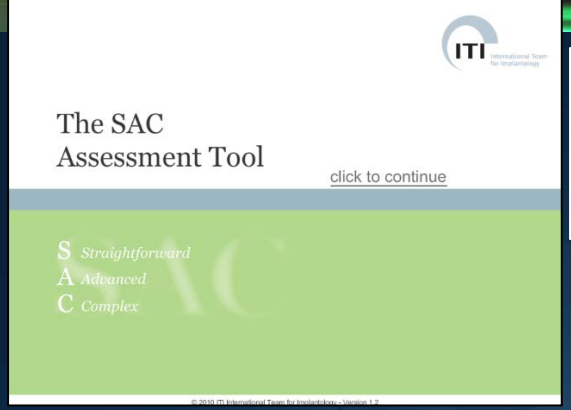
Evidence is inconclusive, or conflicting or lacking

Keratinized gingiva - Wennström & Derks COIR 2012 — Evidence is lacking

Crown-implant ratio - Gulje et al. IJOMI 2015 — Not likely

"Platform-switching" — Evidence is conflicting

Abutment connect-disconnect — Evidence is lacking



SAC Classification –

Straightforward - Advanced - Complex

General determinants

1. Esthetic Risk	2. Complexity of Treatment Process	3. Risks of complications and consequences
High	High	High
Low	Moderate	Moderate
	Low	Low

Modifying Factors

Basis for informed consent to therapy

The SAC Assessment Tool

High Risk

Moderate Risk

Low Risk

1. Compromised General or Local health
2. Smoking Habits
3. Growth Considerations
4. Iatrogenic factors

Reduced Immune system	Heavy Smoker (>10 cigs/day)	Ongoing	Sub-optimal preceeding outcome
	Light smoker (<10 cigs/day)		Moderate / Suboptimal outcome
Healthy, co-operative with an intact immune system	Non-smoker	Completed	Optimal

Modifying Factors

ITI
The SAC Assessment Tool

High Risk

Moderate Risk

Low Risk

Patient Esthetic Expectations	1. Lip Line	2. Gingival biotype	3. Tooth Crown Shape	4. Implant site Infection	nt teeth bone level & restorative status	6. Width of span	7. Soft tissue anatomy	8. Bone anatomy at alveolar crest
High	High	High scalloped, thin	Triangular	Acute	>=7mm to contact point & Restored	>=2 teeth	Soft tissue defects	Vertical bone deficiency
Medium	Medium	Medium scalloped, medium thick		Chronic	5.5-6.5mm to contact point	1 tooth (<= 7mm)		Horizontal bone deficiency
Low	Low	Low scalloped, thick	Rectangular	None	<=5mm to contact point & Virgin	1 tooth (>= 7mm)	Intact soft tissue	No bone deficiency

Modifying Factors

The SAC Assessment Tool

High Risk

Moderate Risk

Low Risk

Bone volume	Anatomic Risk	Esthetic Risk	Complexity of Treatment Process	Risks of complications and consequences
• Horizontal • Vertical		• Zone • Biotype • Facial bone wall		
Deficient, requiring prior augmentation	High risk of involvement	Yes Thin Insufficient <1mm	Implant placement with staged procedures	High / Severely compromised outcome
Deficient, but allowing simultaneous augmentation	Moderate risk of involvement		Implant placement with simultaneous procedures	Moderate / Suboptimal outcome
Adequate	Minimal risk of involvement	No Thick Sufficient >1mm	Implant placement without adjunctive procedures	Minimal / No adverse effect

Modifying Factors

The SAC Assessment Tool

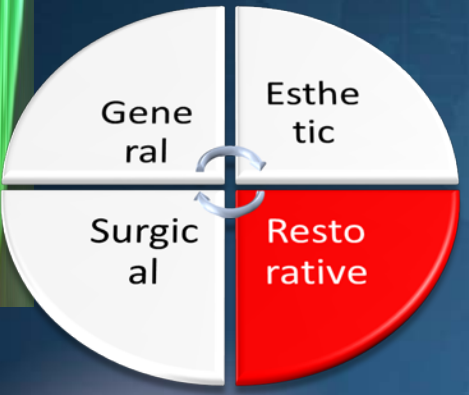
High Risk

Moderate Risk

Low Risk

1. Oral environment a. Adjacent tooth b. Tooth loss reason	a. Interarch distance b. Mesio-distal space c. Restoration span d. Saddle volume/ character	Occlusion a. Scheme b. Bite involvement c. Parafunction	Restoration a. During healing b. Develop soft tissue c. Loading protocol d. Biomaterials e. Anticipated Maintenance
a. Virgin b. Periodontal disease or parafunction	a. Adjunctive therapy needed to gain sufficient space b. to achieve satisfactory result c. Full arch d. Required	a. No guidance b. Involved in guidance c. Present	a. Fixed b. Margin > 3mm from crest c. Immediate d. -- e. High
	a. Restricted b. some reduction required c. Extended space		a. Removable b. Margin <3mm from crest c. -- d. PFM e. Moderate
a. Restored teeth b. Caries or Trauma	a. Adequate b. Sufficient c. Single tooth d. Not required	a. Anterior guidance b. minimal involvement c. Absent	a. None b. not required c. Conventional/Early d. Resin-metal e. Low

Modifying Factors



ITI The SAC Assessment Tool

Modifying Factors

1. Compromised General or Local health	2. Smoking Habits	3. Growth Considerations	4. Iatrogenic factors
Reduced Immune system	Heavy Smoker (>10 cigs/day)	Ongoing	Sub-optimal preceeding outcome
	Light smoker (<10 cigs/day)		Moderate / Suboptimal outcome
Healthy, co-operative with an intact immune system	Non-smoker	Completed	Optimal

Patient Esthetic Expectations	1. Lip Line	2. Gingival biotype	3. Tooth Crown Shape	4. Implant site Infection	nt teeth bone level & restora tive status	6. Width of span	7. Soft tissue anatomy	8. Bone anatomy at alveolar crest
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Low	Low	Low scalloped, thick	Rectangular	None	<=5mm to contact point & Virgin	1 tooth (>= 7mm)	Intact soft tissue	No bone deficiency

Esthetic Risk

Bone volume • Horizontal • Vertical	Anatomic Risk	• Zone • Biotype • Facial bone wall	Complexity of Treatment Process	Risks of complications and consequences
Deficient, requiring prior augmentation	High risk of involvement	Yes / Thin /Sufficient <1mm	Implant placement with staged procedures	High / Severely compromised outcome
Deficient, but allowing simultaneous augmentation	Moderate risk of involvement		Implant placement with simultaneous procedures	Moderate / Suboptimal outcome
Adequate	Minimal risk of involvement	No /Thick /Sufficient > 1mm	Implant placement without adjunctive procedures	Minimal / No adverse effect

Anticipated Maintenance

1. Oral environment • a. Adjacent tooth • b. Tooth loss reason	2. Restorative volume • a. Interarch distance • b. Mesio-distal space • c. Restoration span • d. Saddle volume/character	3. Occlusion • a. Scheme • b. Bite involvement • c. Parafunctions	4. Provisional Restoration • a. During healing • b. Development soft tissue • c. Loading protocol • d. Biomaterials • e. Anticipated
a. Virgin b. Periodontal disease or parafunction	a. Adjurctive therapy needed to gain sufficient space b. to achieve satisfactory result c. Full arch d. Required	a. No guidance b. Involved in guidance c. Present	a. Anterior b. Margin > 3mm from crest c. Immediate d. -- e. High
	a. Restricted b. some reduction required c. Extended space		a. Removable b. Margin <3mm from crest c. -- d. PFM e. Moderate
a. Restored teeth b. Caries or Trauma	a. Adequate b. Sufficient c. Single tooth d. Not required	a. Anterior guidance b. minimal involvement c. Absent	a. None b. not required c. Conventional/Early d. Resin-metal e. Low

Learning objectives of this presentation

1. Evaluation systems to appraise the qualities of the soft tissues in patients having received a single crown
2. The effects of various clinical variables on peri-implant soft tissue appearance and cortical bone loss
3. Clinical research focused on dimensional relationships between the implant-crown-complex and clinical and radiographical landmarks

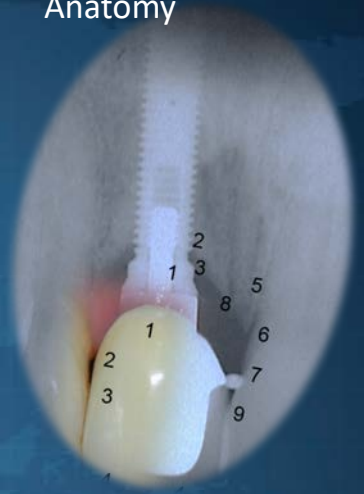
Studying esthetic outcome and anatomic dimensions

Observation studies (i.e., measured at a single point of time)

Bone level		
Buccally	Clinic	Radiographic
Proximally	Clinic	Radiographic
Soft tissue:		
Appearance	Clinic	Photographic
Level	Clinic	Photographic/models
Buccally -	Proximally	

Bone and soft tissue levels and appearance may be **associated** with different variables

Clinical variables, e.g.,
Implant hardware
Surgical procedures
Anatomy



Outcome measure (i.e. measured as a change from baseline)

Bone level		
Buccally	Clinic	Radiographic
Proximally	Clinic	Radiographic
Soft tissue:		
Appearance	Clinic	Photographic
Level	Clinic	Photographic/models
Buccally -	Proximally	

Different variables may **cause** or influence bone and soft tissue levels and appearance changes

Simplistic versus complex (multivariate) statistics

1. Generalized estimating equations (GEE)
2. General linear modelling (GLM)
3. Multilevel analyses (AKA mixed / hierarchical / random effects models

Studying esthetic outcome and anatomic dimensions

Observation (i.e., single point of time)

Bone level

Buccally	**Clinic**	Radiographic
Proximally	**Clinic**	Radiographic

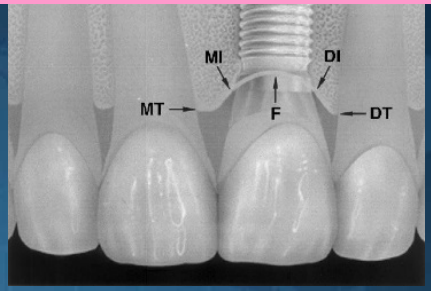
Soft tissue:

Appearance	**Clinic**	Photographic
Level	**Clinic**	Photographic/models
Buccally -	**Proximally**	

Bone and soft tissue levels and appearance may be **associated** with different variables

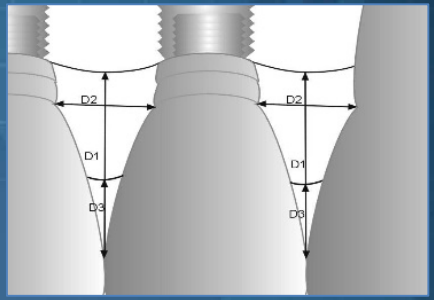
Kan et al.
J Perio 2003
n=45 pat.
Bivariate statistics

Association?: YES



Gastaldo et al.
J Perio 2004
n=48 pat.
Bivariate statistics

Association?: YES



Studying esthetic outcome and anatomic dimensions

Observation (i.e., single point of time)

Bone level

Buccally	Clinic	Radiographic
Proximally	Clinic	**Radiographic**

Soft tissue:

Appearance	Clinic	Photographic
Level	Clinic	Photographic/models
Buccally -	Proximally	

Observation (i.e., single point of time)

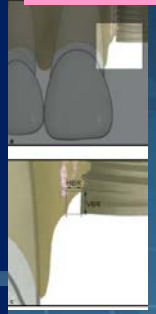
Bone level

Buccally	Clinic	Radiographic
Proximally	**Clinic**	**Radiographic**

Soft tissue:

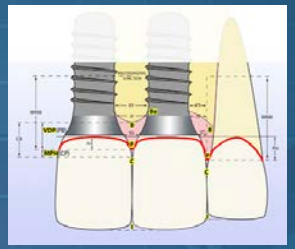
Appearance	Clinic	Photographic
Level	Clinic	Photographic/models
Buccally -	Proximally	

Bone and soft tissue levels and appearance may be **associated** with different variables



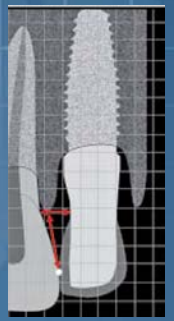
Vela et al.
IJPRD 2012
n=50 pat.
Bivariate statistics

Association?: YES



Kourkouta et al.
COIR 2009
n=15 pat.
Bivariate statistics

Association?: YES



Perez et al.
IJPRD 2012
n=46 imp..
Bivariate statistics

Association?: YES

Studying esthetic outcome and anatomic dimensions

Observation (i.e., single point of time)

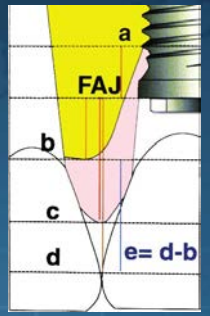
Bone level

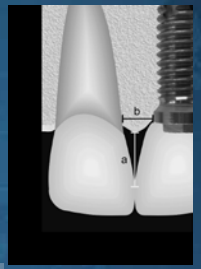
Buccally	Clinic	Radiographic
Proximally	**Clinic**	**Radiographic**
Soft tissue:		
Appearance	**Clinic**	**Photographic**
Level	**Clinic**	**Photographic/models**
Buccally -	**Proximally**	

Bone and soft tissue levels and appearance may be **associated** with different variables

Choquet et al.
J Perio 2001
n=26 pat.
Bivariate statistics

Association?: YES





Kawai & Almeida
Cleft P-C J 2008
n=40 pat.
Bivariate statistics

Association?: YES

Lops & Romeo
COIR 2008
n=46 pat.
Bivariate statistics

Association?: NO

Studying esthetic outcome and anatomic dimensions

Observation (i.e., single point of time)

Bone level

Buccally	**Clinic**	**Radiographic**
Proximally	**Clinic**	**Radiographic**

Soft tissue:

Appearance	**Clinic**	**Photographic**
Level	**Clinic**	**Photographic/models**

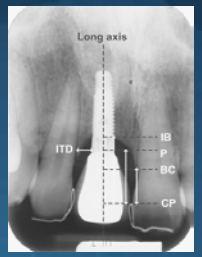
Buccally - Proximally

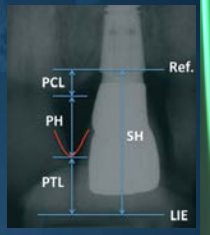
→ + cbCT

Bone and soft tissue levels and appearance may be **associated** with different variables

Nispakultorn et al.
COIR 2010
n=40 pat.
Bivariate stats

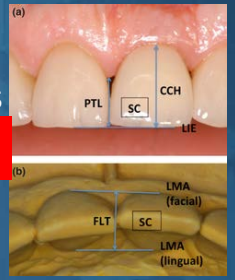
Association?: YES

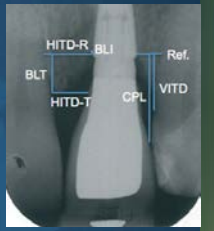




Chang & Wennstrom
COIR 2013
n=32 pat.
Multivariate stats

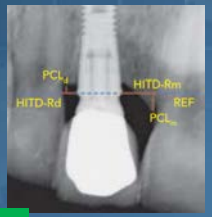
Association?: NO

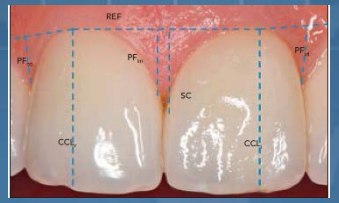




Peng et al.
IJPRD 2013
n=25 pat.
Bivariate stats

Association?: YES





Studying esthetic outcome and anatomic dimensions

Outcome measure (i.e. measured as a change from baseline)

Bone level

Buccally	**Clinic**	Radiographic
Proximally	**Clinic**	Radiographic

Soft tissue:

Appearance	**Clinic**	Photographic
Level	**Clinic**	Photographic/models
Buccally -	**Proximally**	

Outcome measure (i.e. measured as a change from baseline)

Bone level

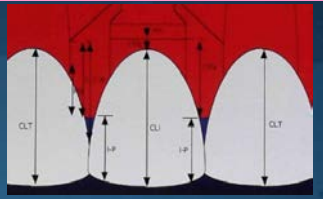
Buccally	**Clinic**	Radiographic
Proximally	**Clinic**	**Radiographic**

Soft tissue:

Appearance	**Clinic**	**Photographic**
Level	**Clinic**	**Photographic/models**
Buccally -	**Proximally**	

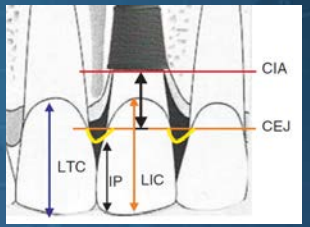
Different variables may cause or influence bone and soft tissue levels and appearance changes

Grunder
IJPRD 2000
n=10 pat.
No statistics



Association?: YES

Gotfredsen
CIDRR 2004, CIDRR 2009
n=20 pat.
Bivariate stats



Association?: NO

Cosyn et al.
COIR 2011, JCP2012ab ,COIR2013
n=115 pat.
Multivariate stats

Association?: NO

Studying esthetic outcome and anatomic dimensions

Outcome measure (i.e. measured as a change from baseline)

Bone level

Buccally	**Clinic**	Radiographic
Proximally	**Clinic**	**Radiographic**

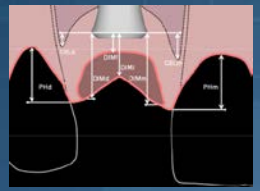
Soft tissue:

Appearance	Clinic	**Photographic**
Level	Clinic	**Photographic/models**

Buccally - **Proximally**

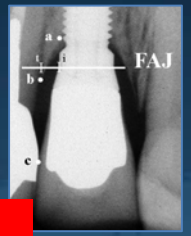
Tissue level implants

Gallucci et al.
JCP 2011
n=20 pat.
Multivariate stats



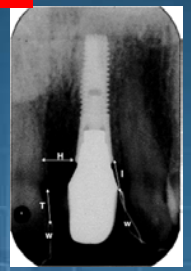
Association?: NO

Henriksson&Jemt
CIDRR 2004
n=18 pat.
Bivariate stats



Association?: NO

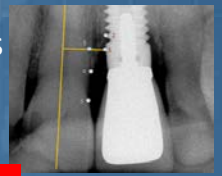
Palmer et al.
JCP 2007
n=66 pat.
Bivariate stats



Association?: NO

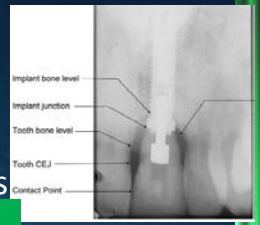
Schropp et al.
COIR 2005, 2013, 2014ab
n=72 pat.
Bivariate stats

+ cbCT (2014)



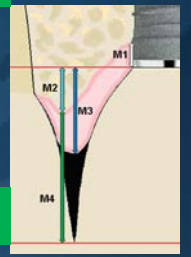
Association?: NO

Ryser et al.
JOMS 2005
n=40 pat.
Multivariate stats



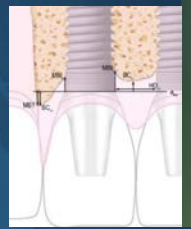
Association?: YES

Degidi et al.
J Perio 2008
n=49 pat.
Bivariate stats



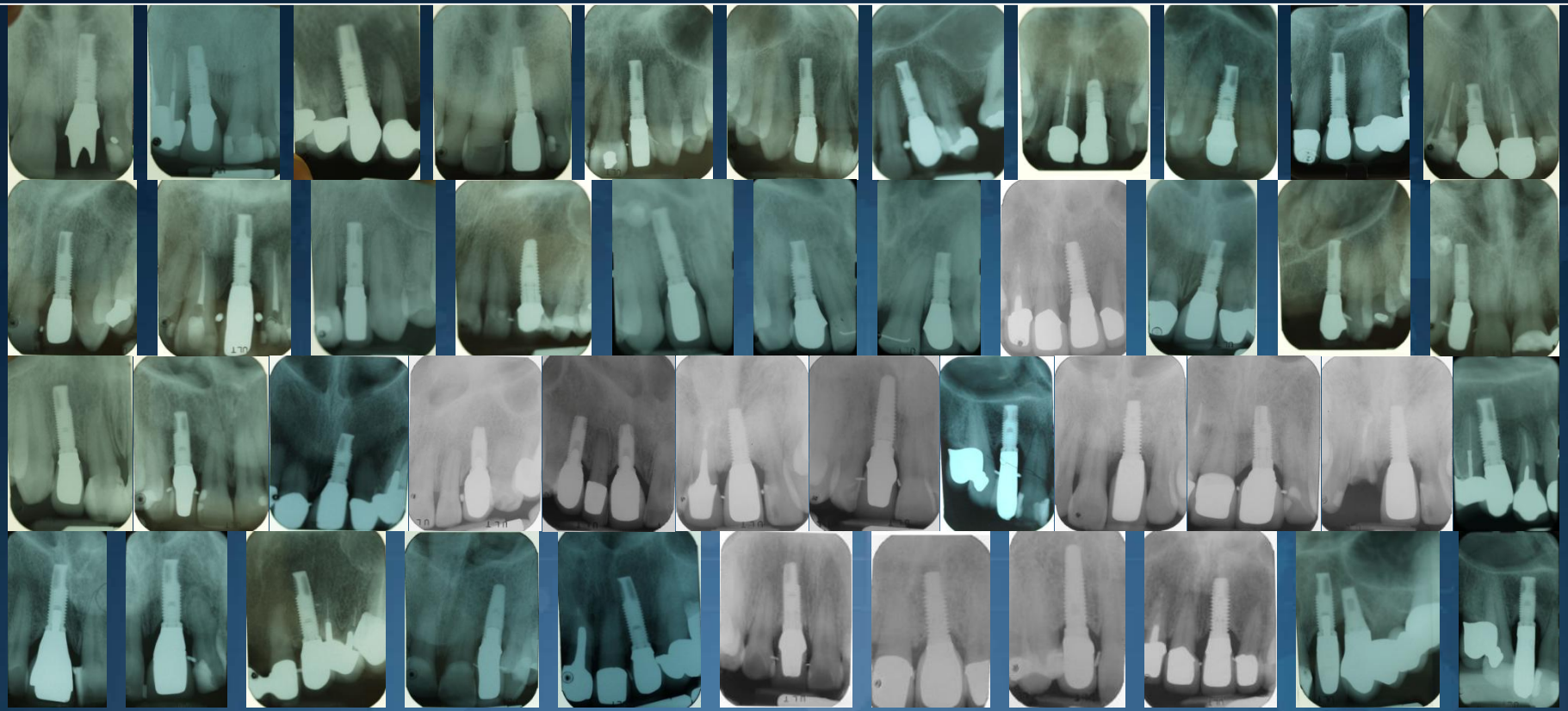
Association?: YES

Tymstra et al. & vanNimwegen et al.
JCP2011 & IJP 2015
n=45 pat.
Multivariate stats



Association?: NO

A satisfactory esthetic outcome as an effect of bone level?



Studying bone levels and anatomic dimensions

Outcome measure (i.e. measured as a change from baseline)

Bone level

Buccally	Clinic	Radiographic
Proximally	**Clinic**	**Radiographic**

Soft tissue:

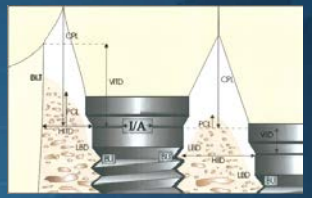
Appearance	Clinic	Photographic
Level	Clinic	Photographic/models
Buccally -	Proximally	

Jemt
IJP 2008
n=38 pat.
Bivariate stats

Association?: NO

Cardaropoli et al.
COIR 2003
n=28 pat.
Multivariate stats

Association?: NO

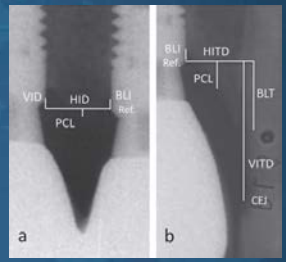


BICON implants
Urdaneta et al.
COIR 2014
n=206 pat.
Multivariate stats

Association?: NO

Chang&Wennstrom
COIR 2010
n=43 pat.
Multivariate stats

Association?: NO

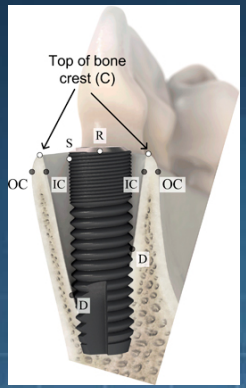


Studying esthetic outcome and anatomic dimensions

Outcome measure (i.e. measured as a change from baseline)

The advent of use of cbCT,
pre- & post-placement

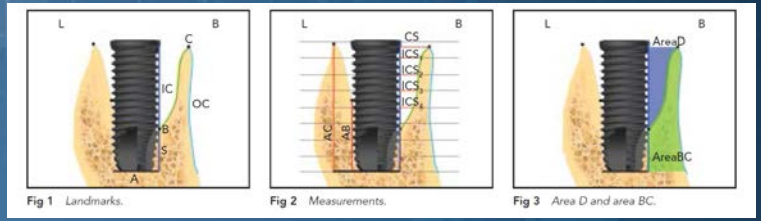
Miyamoto & Obama (2011)
Benic et al. (2012-2011e)
Roe et al. (2012)
Vera et al. (2012)
Buser et al. (2013a,b)
Cortes et al. (2013)
Fu et al. (2014-2013e)
Koutouzis et al. (2015, 2014)
Kaminaka et al. (2015-2014e)
Schropp et al. (2015-2014e)
Hasan et al. (2015)
Lemes et al. (2015)
Chappuis et al. (2015e)
Noelken et al. (2015e)
Veltri et al. (2016-2015e)
Kuchler et al. (2016-2015e)



Association?: NO

From: Sanz et al. / Tomasi et al. / Ferrus et al. / Multicentre study. COIR 2010

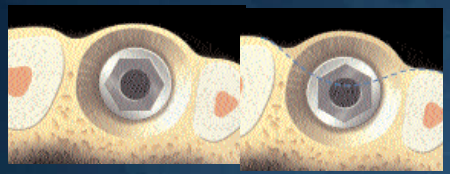
After 3 years: Both the interproximal papilla filling and the midfacial mucosa stability were not influenced by variables such as type of fixture configuration, tooth category, smoke habit, and thickness of buccal bone wall of ≤ 1 mm (thin buccal wall). (Cecchinato et al. COIR 2015)



Rossi et al. - IJPRD 2013 – 9 pat. Bivariate stats – pre-post- 4 mths

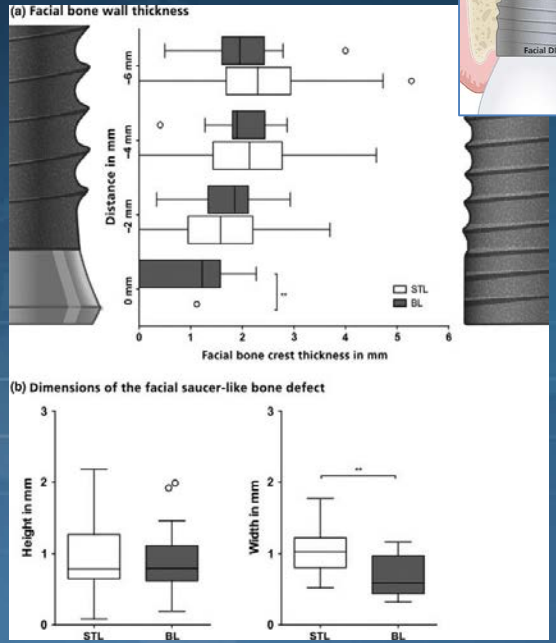
Studying esthetic outcome and anatomic dimensions

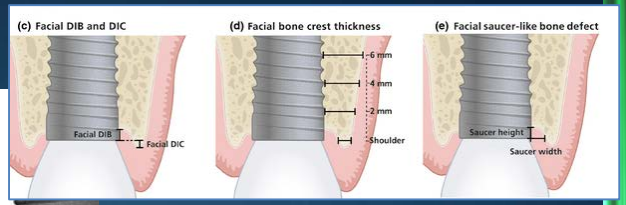
Outcome measure (i.e. measured as a change from baseline)



Graphical display of 1.5 mm wide "saucers" claimed to be present around all implants

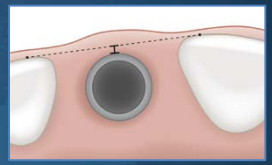
From: Grunder et al. IJPRD 2005



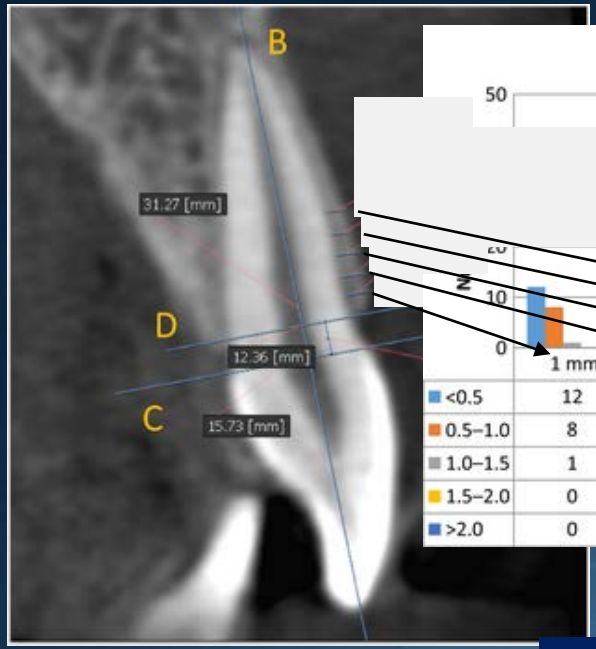


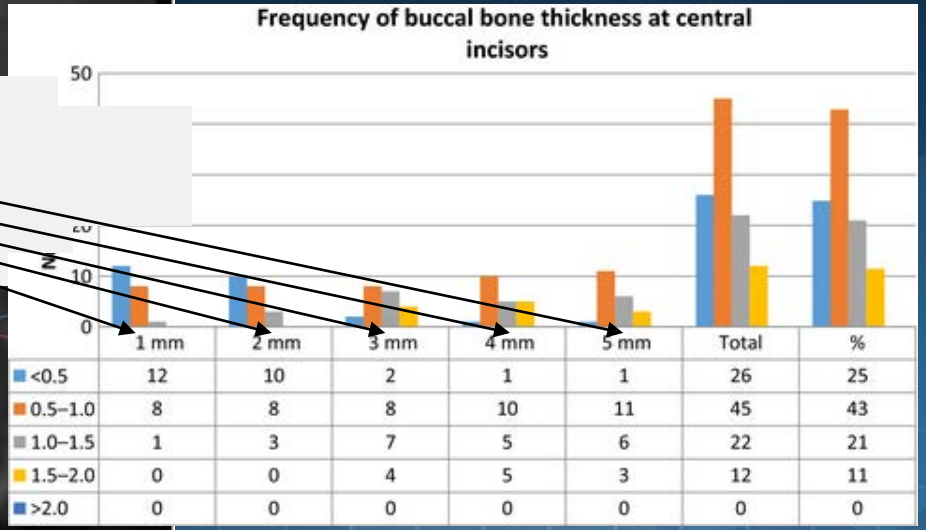
Chappuis et al. COIR 2015
N= 61 pat.
Bivariate stats, Pre-post 5-9 yrs

Hor. dist. of "saucer" :
TL: 1.0 mm
BL: 0.6 mm

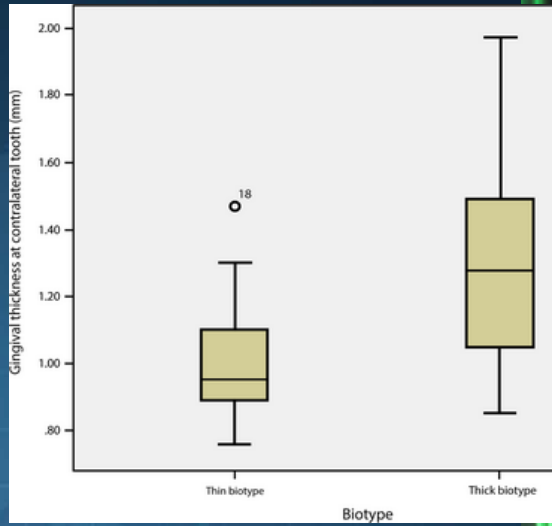


Buccal bone vz. gingival thickness vz. esthetics?





	1 mm	2 mm	3 mm	4 mm	5 mm	Total	%
<0.5	12	10	2	1	1	26	25
0.5–1.0	8	8	8	10	11	45	43
1.0–1.5	1	3	7	5	6	22	21
1.5–2.0	0	0	4	5	3	12	11
>2.0	0	0	0	0	0	0	0



Gingival thickness,
Thin vs thick biotype

N= 21 pat.

Correlation between buccal bone & gingival thickness is only moderate

From:
De Bruyckere et al. JCP 2015
Younes et al. COIR 2016

Buccal bone vz. gingival thickness vz. esthetics?

CLINICAL ORAL IMPLANTS RESEARCH WILEY
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Original Article

Three-Dimensional buccal bone anatomy and aesthetic outcome of single dental implants replacing maxillary incisors

Mario Veltri, Annika Ekestubbe, Ingemar Abrahamsson, Jan L. Wennström

COIR LAST ISSUE!

COIR 2016; 27: 956: "Within present limitations, acceptable and stable aesthetics are not jeopardized by a thin or missing buccal bone"

N= 12 pat.

Association?: NO

BUT!

cbCT accuracy of ≤1.2 mm peri-implant buccal bone ?

Poor (Schulze et al. 2001)
Poor (Spin-Netto et al. 2011)
Poor (Benic et al. 2013)
Modest (Gonzales et al. 2016)

Summarizing – Take home message

1. Evaluation systems to appraise the qualities of the soft tissues in patients having received a single crown

PES & PES/WES have been validated and appear to predominate in use

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2. The effects of various clinical variables on peri-implant soft tissue appearance and cortical bone loss

Effects of many variables singularly and in combination are largely unknown, principally due to small datasets and short study duration

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1. Evaluation systems to appraise the qualities of the soft tissues in patients having received a single crown

PES & PES/WES have been validated and appear to predominate in use

2. The effects of various clinical variables on peri-implant soft tissue appearance and cortical bone loss

Effects of many variables singularly and in combination are largely unknown, principally due to small datasets and short study duration

3. Clinical research focused on dimensional relationships between the implant-crown-complex and clinical and radiographical landmarks

C**ross-sectional studies with simplistic statistics indicate associations, while longitudinal studies with adequate multi-level multivariate statistics provide less conclusive data**