PERIODONTAL PLASTIC SURGERY

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Disclaimer

The information presented at this program represents personal opinion. Reasonable efforts have been taken intending for educational subject matter to be presented in a balanced, unbiased fashion and in compliance with regulatory requirements.

Disclaimer

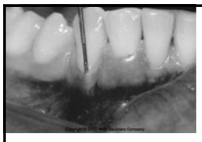
However, each program attendee must always use his/her own personal and professional judgment when considering further application of this information, particularly as it may relate to patient diagnostic or treatment decisions including, without limitation, FDA-approved uses and any off-label uses.

Periodontal Plastic & Reconstructive Surgery

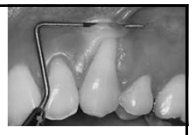
- **Prevent or correct anatomic, developmental, traumatic, or plaque disease-induced defects of the gingiva, alveolar mucosa, or bone**
- **Creation of acceptable, pleasing form and appearance**

Periodontal Plastic & Reconstructive Surgery

- **Free (Keratinized) Gingival Graft**
- **Root coverage**
- **Frenectomy**
- **Vestibular Extension**
- **Crown lengthening**
- **Ridge Augmentation**
- **Soft tissue surgery around implants**



Is Keratinized Gingiva Necessary?

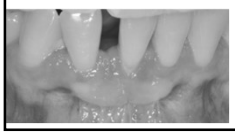


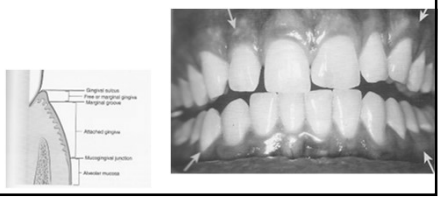
- ≥2 mm keratinized gingiva (1 mm attached) = health
- <2 mm keratinized gingiva → persistent inflammation in spite of hygiene
  - Lang NP, Loe H: The relationship between the width of keratinized gingiva and gingival health, *J Periodontol* 43:623-627, 1972.
- Recession in sites with inadequate width of the keratinized gingiva
  - *Ericsson and Lindhe J Clin Perio. 1984*

Wilson RD: *Int J Periodontics Restorative Dent* 3:41, 1983.
Freedman AL, et al. *J Periodontol* 1992.
Wennstrom JL, *J Clin Periodontol* 1987.
Kennedy et al. *J Clin Perio* 1985

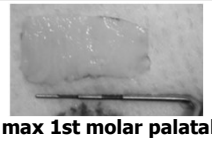
Keratinized Gingiva

- Advised to consider: Minimum 2mm keratinized gingiva (1mm attached gingiva + 1mm free gingiva) to maintain health

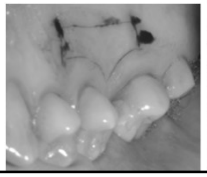


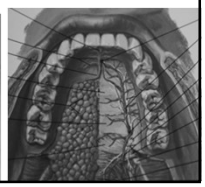


DONOR SITE

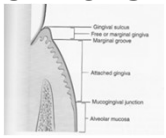


- Palatal mucosa
- Edentulous ridge
  - *Sullivan HC, Atkins JH. Periodontics. 1968*
- Best donor site: mesial line angle max 1st molar palatal root to distal line angle of canine
  - *Reiser et al. IJPRD. 1996*
- Ideal thickness = 1.0-1.5 mm
  - *Mormann et al. J. Perio 1981*



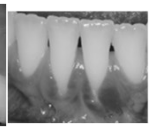


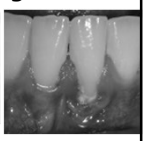
KERATINIZED GRAFT: INDICATIONS



- <2mm KG (1mm attached)
- Hygiene
- Shallow vestibule
- Pre-prosthetic: FPD, RPD, margin

*Inflammation + Recession + No Attached Gingiva





Miller PD Jr: Root coverage using a free soft tissue autograft following citric acid application, Int J Periodontics Restorative Dent 2:65-70, 1982.
Sullivan H, Atkins J: Free autogenous gingival grafts. III. Utilization of grafts in the treatment of gingival recession, Periodontics 6:152-160, 1968.
Holbrook T, Ochsenbein C: Complete coverage of the denuded root surface with a one-stage gingival graft, Int J Periodontics Restorative Dent 3:8-27, 1983.
Wilson RD: Int J Periodontics Restorative Dent 3:41, 1983.
Lang NP, Loe H: The relationship between the width of keratinized gingiva and gingival health, J Periodontol 43:623-627, 1972.

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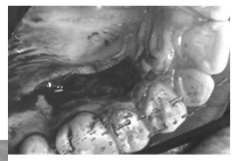
FREE GINGIVAL GRAFT: DISADVANTAGES

- Esthetics
- Post-operative pain



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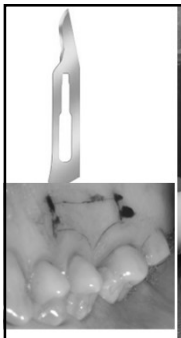
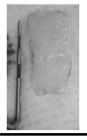
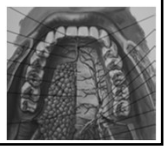


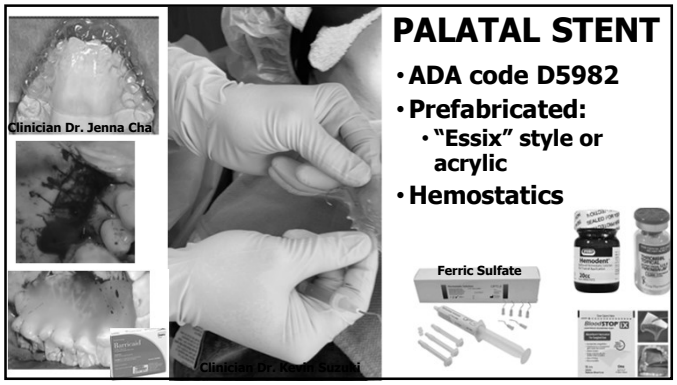
PALATAL HARVEST

#15 Blade
Partial thickness
Retrace as needed
Finger rest(s)
NO HIVAC SUCTION





Clinician Kevin R. Suzuki, DMD



PALATAL STENT

- ADA code D5982
- Prefabricated:
  - "Essix" style or acrylic
- Hemostatics

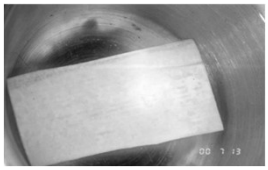
RECIPIENT BED

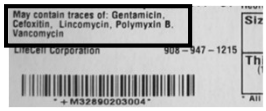
- #15 Scalpel blade
- Retraction
- Finger rest(s)
- Partial thickness
- Apical Scarification

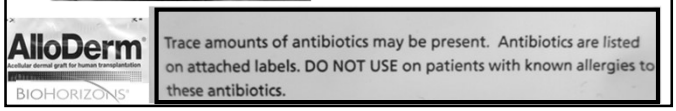
Sullivan et al., 1968

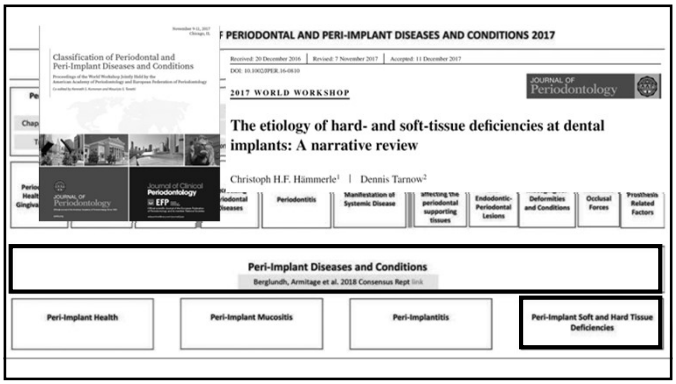
"Alternatives" to Palatal Donor Tissue

Freeze-Dried Acellular Dermal Matrix



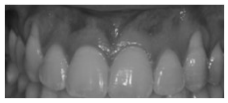


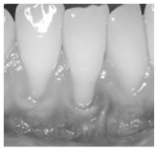




Mucogingival Surgery ("Periodontal Plastic Surgery")

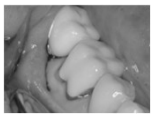
Free Gingival Grafts = KG defects, Pre-prosthetic
Connective Tissue Grafts = Recession, root exposure
Frenectomies = Aberrant Frenum
Implants = Mucogingival defects





Keratinized mucosa

- Minimum dimension for peri-implant health is controversial
- Studies failed to associate deficient KM with inflammation
- Studies show <2mm KM = increased plaque build-up, inflammation

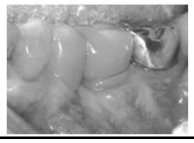


71. Brito C, Tenenbaum HC, Wong BKC, Schmitt C, Nogueira-Filho G. Is keratinized mucosa indispensable to maintain peri-implant health? A systematic review of the literature. *J Biomed Mater Res B Appl Biomater.* 2014;102:643–650.
72. Thoma DS, Muhlemann S, Jung RE. Critical soft-tissue dimensions with dental implants and treatment concepts. *Periodontol 2000.* 2014;66:106–118.
84. Adibrad M, Shahabuei M, Sahabi M. Significance of the width of keratinized mucosa on the health status of the supporting tissue around implants supporting overdentures. *J Oral Implantol.* 2009;35:232–237.
85. Roccuzzo M, Grasso G, Dalmasso P. Keratinized mucosa around implants in partially edentulous posterior mandible: 10-year results of a prospective comparative study. *Clin Oral Implants Res.* 2015.

Width of Keratinized Gingiva and the Health Status of the Supporting Tissues Around Dental Implants

Anil Bouri, Jr, DDS, MSD[1]/Nabil Bissada, DDS, MSD[2]/Mohammad S. Al-Zahrani, MSD, PhD[3]/
Fady Faddoul, DDS, MSD[4]/Imad Nouneh, DDS, MSD[5]

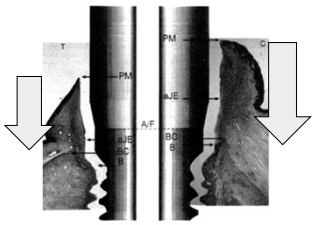
"...increased width of keratinized mucosa around implants is associated with lower mean alveolar bone loss and improved indices of soft tissue health". *Bouri, A., Bissada. Int.J.Oral Max.Implants 2008; 23: 323*



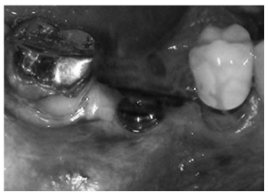
Implants: Clinical outcome if Keratinized Gingiva is thinner?

- **>3.65 mm thick = less implant bone loss**
- **<2 mm thick = more implant bone loss**

Berglundh T. & Lindhe J. Clin Periodontol 1996; 23(10): 971



Berglundh T. & Lindhe J. Clin Periodontol 1996. Oct; 23(10): 971



Absent, Narrow KG around implants = higher GI, PI, BOP, bone loss

Adibrad 2009; Bouri, 2008

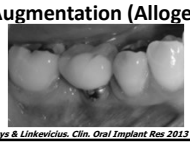
Keratinized Gingiva and Peri-Implantitis

Table 3. Crestal bone loss around implants after 1-year follow-up and statistical difference between groups (Mann–Whitney *U*-test, significant when $P \leq 0.05$)

Group	Group	Mean ± SE	Median	Maximum	Minimum
T1 (n = 33)	Mesially	−1.22 ± 0.08	−1.20	−0.10	−2.10
	Distally	−1.14 ± 0.07	−1.20	−0.10	−1.90
T2 (n = 32)	Mesially	−0.24 ± 0.06	0.00	0.00	−1.10
	Distally	−0.19 ± 0.06	0.00	0.00	−1.30
C (n = 32)	Mesially	−0.22 ± 0.06	0.00	0.00	−1.10
	Distally	−0.20 ± 0.06	−0.05	0.00	−1.00

"Significantly less bone loss...implants placed in naturally thick mucosal tissues vs thin biotype."

"Augmentation (Allogeneic) thin soft tissues...reduce crest bone loss."



>2 mm thick (C) = 0.22 mm bone loss
<2 mm thick (T1) = 1.22 mm bone loss
ADM Grafted (T2) = 0.24 mm bone loss

Puisys & Linkevicius. Clin. Oral Implant Res 2013 (Dec).

Lack of adequate KM around dental implants..more plaque accumulation, tissue inflammation, mucosal recession, and attachment loss.

Lin, Guo-Hao, Hsun-Liang Chan, and Hom-Lay Wang. "The significance of keratinized mucosa on implant health: a systematic review." *Journal of periodontology* 84.12 (2013): 1755-1767.

Clinician: Dr. T. Kang

Clinician: Dr. Kevin R. Suzuki

Surgical modification of peri-implant soft tissue phenotype via modification therapies...decrease mucosal recession.

Suárez-López del Amo F, Wang HL, et al. "Influence of soft tissue thickness on peri-implant marginal bone loss: A systematic review and meta-analysis." *Journal of periodontology* 87.6 (2016): 690-699.

Clinician: Dr. Kevin R. Suzuki

Thin gingiva phenotype and inadequate KMW (<2 mm)...risk indicators for peri-implant disease, pain/discomfort during brushing...Phenotype modification therapy may be indicated at implants sites...

Kherpure, AS., Daubert, D. M. et al. "Role of thin gingival phenotype and inadequate keratinized mucosa width (< 2 mm) as risk indicators for peri-implantitis and peri-implant mucositis." *Journal of Periodontology* 92.12 (2021): 1687-1696.

Keratinized Gingiva and Peri-Implantitis

"Significantly less bone loss occurs around bone-level implants placed in naturally thick mucosal tissues vs thin biotype"

"Augmentation of thin soft tissues with allogenic dermal matrix during implant placement may reduce crestal bone loss."

Puisys and Linkevicius. Clin. Oral Implant Res 2013.

Periodontal Plastic & Reconstructive Surgery

- Gingival augmentation
- Root coverage
- Frenectomy
- Vestibular Extension
- Crown lengthening
- Ridge Augmentation
- Soft tissue surgery around implants

ROOT COVERAGE: Gingival Recession

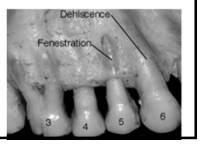
"Soft tissue margin apical to CEJ + root surface exposure"
-Genco and Newman Ann Periodontal 1996

Esthetics
Hypersensitivity
Root decay
Plaque trap
Loss of attachment, Tooth support…Tooth

Baker & Seymour. J Clin Perio 1976; Loe, Anerud, & Boysen J Perio 1992; Susin & Hass. J Perio 2004; Tugnait & Clerehugh J Dent. 2001; Bernimoulin & Curilovic. J Clin Perio 1977; Wennstrom. Ann Perio 1996

Gingival Recession with Root Exposure

- Etiologic factors:
  - Morphology
  - Trauma
  - Inflammatory periodontal disease
  - Occlusal forces



Consequences of Gingival Recession

- Increasing loss of periodontal attachment & tooth support

…Eventual loss of facial bony plate and tooth

Baker & Seymour. J Clin Perio 1976; Loe, Anerud, & Boysen J Perio 1992; Susin & Hass. J Perio 2004; Tugnait & Clerehugh J Dent. 2001; Bernimoulin & Curilovic. J Clin Perio 1977; Wennstrom. Ann Perio 1996

CONNECTIVE TISSUE GRAFT: INDICATIONS

- Root coverage for recession defects (esthetic & function)
  - Class I, II
  - Class III (partial; NOT class IV)
  - Root hypersensitivity
  - Shallow root caries lesions
  - Cervical abrasion

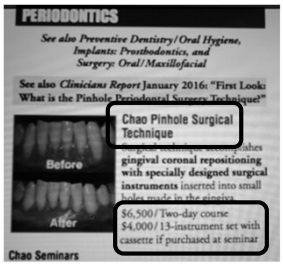
Disadvantages:

- Post-operative healing discomfort (<FGG)

Langer B, Langer L: Subepithelial connective tissue graft technique for root coverage, *J Periodontol* 56:715-720, 1985.

"Pinhole Technique" for Connective Graft Root Coverage

- 1. Primarily Maxilla
- 2. Class I and II (Miller)
- 3.Conservative flaps ("pinhole")
- 4. Allogeneic Dermal Matrix
- 5. Minimizes Post Op Discomfort
- 6. Local Anesthetic
- 7. Rx Antimicrobial rinses
- 8. Technique sensitive



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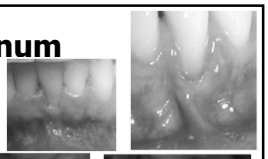
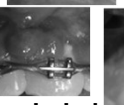
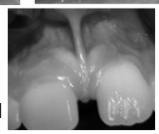
Aberrant Frenum




INDICATIONS FOR TREATMENT:

- Encroachment on gingival margin
- Interferes with hygiene
- Tension opens sulcus
- Orthodontics

***When the lip is manually extended, the gingival margin should not move or blanche**

Takei HH, Azzi RR, Han TJ. Carranza 10th ed. 2006
Edwards JG Am J Orthod 74. 1977

Clinician: Dr. Kevin R. Suzuki

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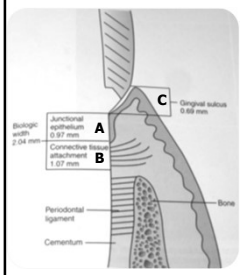
Crown Lengthening

- Expose adequate clinical crown for restoration of a tooth by apically positioning the flap with or without osseous recontouring
  - Functional
  - Esthetic


Newman, Takei, Klokkevold, Carranza. Clinical Periodontology 10th ed. 2006
Rose , Mealy, Genco, Cohen. Periodontics: Medicine,Surgery, and Implants. 2004

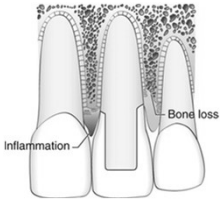
Basic Principles



- Biologic width: attachment apparatus (A + B) = 2mm
- Dentogingival Complex: (A + B + C) = 3mm

Gargiulo et al. Dimensions and relations of the dentogingival junction in humans. J Perio. 32:261-267. 1961
Newman, Takei, Klokkevold, Carranza. Clinical Periodontology 10th ed. 2006
Rose , Mealy, Genco, Cohen. Periodontics: Medicine, Surgery, and Implants. 2004

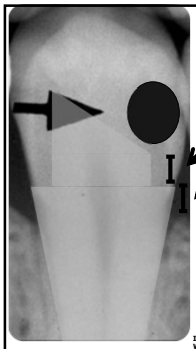
Biologic Width Invasion



- Edema
- Erythema
- Bleeding
- Local gingival overgrowth

- Attachment loss
- Pocket formation
- Alveolar bone loss
- Pain

Basic Principles



(3mm BW + 2mm ferrule)

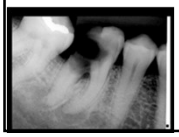
5mm from Base of Decay or fracture to crestal bone

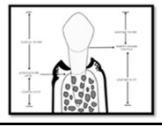
Best to excavate, prepare, and temporize tooth first!

Ingber et al. (1977)
Wagenberg (1989)
Padbury et al. (2003)
Carranza's (2006)
Lindhe' (2008)

Periodontal and restorative considerations

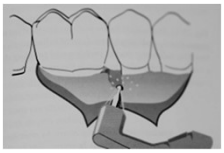
- **RESECTIVE: Esthetic compromise**
  - **Unilateral and/or anterior areas**
- **Restorative Prognosis**
- **Periodontal prognosis – C:R, mobility, furca**
- **Timing: Provisionalize preop, Restore 6+ weeks postop**



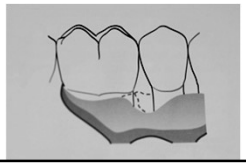


Ostectomy

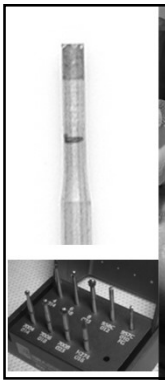
Defects present in bone: walls are reduced to base of the defect

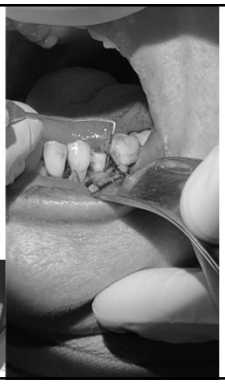


Some supporting bone has to be recontoured to achieve longer ferule



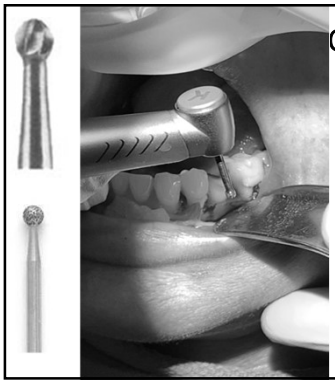
Osseous Recontour (1)



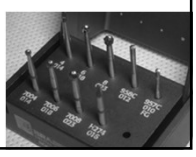


- Surgical handpiece
- End-cutting bur, surgical length
- Finger rest(s)
- Avoid gouging root

Osseous Recontouring (2)

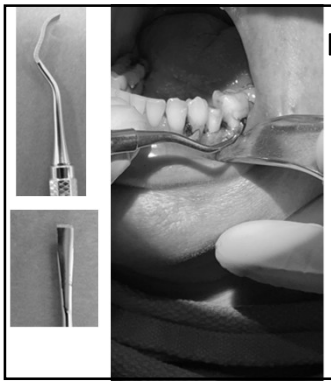


- Surgical length round bur
- Paintbrush strokes
- #4, #6, #8 Carbide



Hand Instrumentation (1)

- Interproximal Bone file
- Sawing motion
- Serrated edges
- Avoid instrumenting cementum



Hand Instrumentation (2)

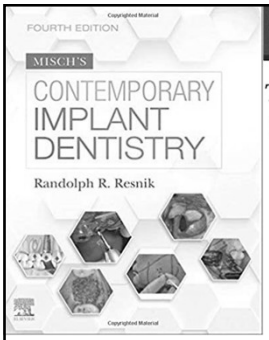
- Back-Action (TGSK)
- Pulling and Pushing motions

Management of Mucogingival Defects

- Lack of keratinized gingiva – free gingival graft
- Aberrant frenum - frenectomy
- Recession – connective tissue graft (or FGG)
- Decreased vestibular depth – Vestibular extension (+free gingival graft?)
- Gummy Smile/Vertical Maxillary Excess – Orthognathic surgery?, Lip Repositioning?, Crown lengthening
- Inadequate restorative ferule – Crown lengthening

Periodontal Plastic & Reconstructive Surgery

- Gingival augmentation
- Root coverage
- Frenectomy
- Vestibular Extension
- Crown lengthening
- Ridge Augmentation
- Soft tissue surgery around implants



Chapter 37

Tooth Extraction, Socket Grafting, and Barrier Membrane Bone Regeneration

Carl E. Misch, Jon B. Suzuki

Elsevior-Mosby Co. 2020

Wound Healing: Extraction Sockets

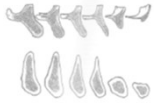
- "Bone resorption (33%) from facial within first 3 months"
- 50% width in 1 year
- Impossible to predict

- Iasella JM, et al. J Periodontol. 2003.

40% to 60% decrease from facial within 3 years

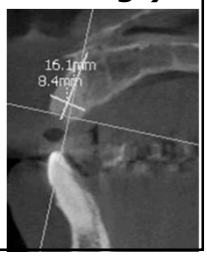
Posterior faster than anterior

-Peitrokowski, J Prosth Dent. 1967



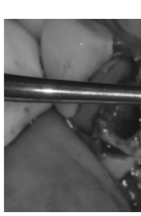
Potential new "minimum standard of care" in Dentistry

Ridge Augmentation ("Socket Grafting") for all extracted teeth*



**except presence of infection*

DEGRANULATION



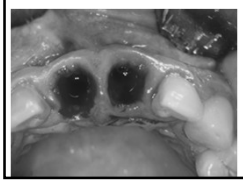
2/4 Molt Surgical Curette

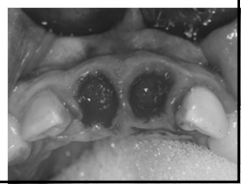
PR1/2 Prichard Periodontal Surgical Curette

BONE GRAFTS

- **What bone graft should you use?**

...and in what order of preference?





What bone graft should you use?
...and in what order of preference?

Autograft	Transplants from one region to another in the same individual.	Same Human
Allograft	Transplants from one individual to a genetically non-identical individual of the same species.	Different Humans
Xenograft	Transplants from one species to another.	Man : Animal
Alloplast	Transplants of inorganic (synthetic/natural) or polymer derived bone substitutes.	Man : Synthetic

Periodontal Plastic & Reconstructive Surgery

- **Gingival augmentation**
- **Root coverage**
- **Frenectomy**
- **Vestibular Extension**
- **Functional & Esthetic crown lengthening**
- **Ridge Augmentation**
- **Soft tissue surgery around IMPLANTS**