
Fig. 1a

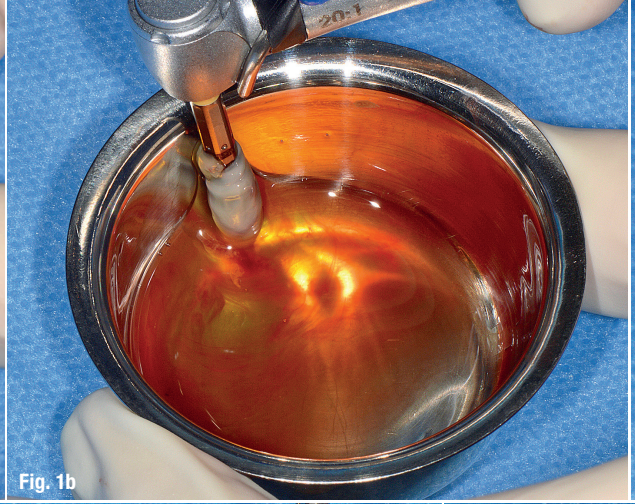
Fig. 1b

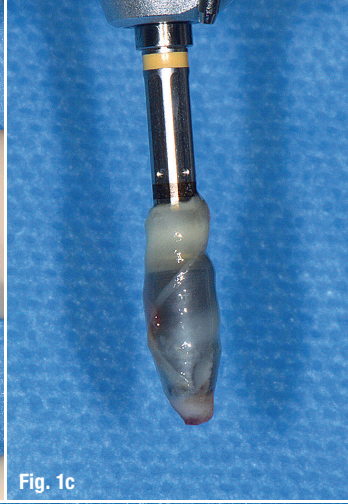
Fig. 1c

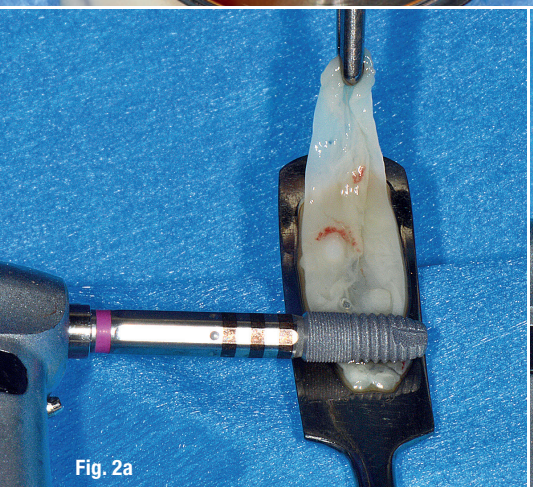
Fig. 2a

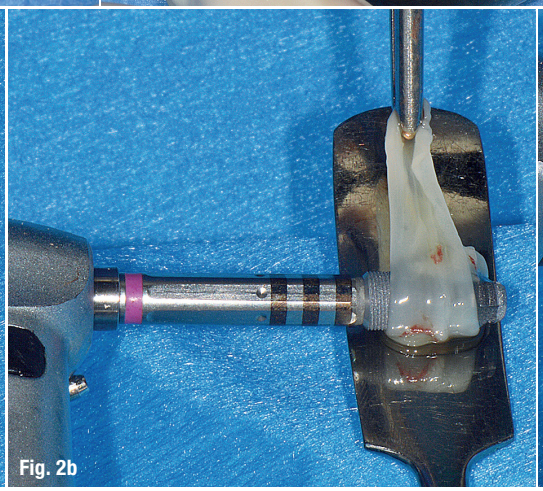
Fig. 2b


Fig. 2c

Techniques for implant coating with L-PRF: Fig. 1a: Placement of the implant against an L-PRF clot in a titanium dish. **Figs. 1b & c: b)** Slow rotation of the implant in contact with the clot while exerting pressure against the wall of the dish. **c)** The implant is wrapped in L-PRF. **Fig. 2a:** Placement of L-PRF membrane (carried on a titanium spatula) in contact with the implant. **Figs. 2b & c:** Membrane wrapped around the implant (via rotation) with the membrane face at the outside.

L-PRF in different intraoral applications

Part IV: Three preparation protocols

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Favourable wound healing has always been a major quest in dental surgery. It is a concern in both healthy and compromised patients. In an effort to improve and accelerate healing of both hard- and soft-tissue, substitutes, including growth factors and biomaterials, have traditionally been employed. Membranes were also introduced to separate tissue. Recent research clearly indicates that leukocyte- and platelet-rich fibrin (L-PRF; a second generation of platelet concentrates) significantly enhances wound healing in both soft- and hard-tissue. Evidence now supports the assertion that this has the potential to replace the above-mentioned substitutes in many situations. Clinical procedures benefit from recent advancements in platelet concentrate protocols, including soft-tissue healing, plastic periodontal surgery, gingiva enlargement, medication-related osteonecrosis of the jaw, regeneration of infra-bony defects, ridge preservation, sinus augmentation, immediate implant placement and implant osseointegration itself. An added benefit is that these platelet concentrate protocols offer signifi-

cantly lower-cost treatment solutions to our patients, owing to their ease of use and inexpensive preparation.

Major indications for the use of L-PRF and the step-by-step preparation of L-PRF clots, membranes and plugs, as well as application approaches to open-flap debridement and ridge preservation, were introduced in the first two parts of this article series. In the third part, two treatment approaches to sinus floor elevation, in which L-PRF is used as grafting material, were presented. In this fourth and last part of the series, implant coating techniques with L-PRF, as well as a coronal advanced flap procedure with use of L-PRF as grafting material, will be described. In addition, a protocol for the preparation of a PRF-Block (Intra-Lock) will be presented.

Step-by-step approach to implant coating with L-PRF

- Prepare implant osteotomy according to the required implant protocol.
- Use L-PRF exudate, obtained after compression of L-PRF clots, to irrigate and clean the osteotomy.
- Position the implant on the implant driver.

Option 1

- Place an L-PRF clot in a small titanium dish.
- Rotate the implant slowly in the clot while exerting a little pressure against the wall of the dish until the L-PRF is fully wrapped around the implant (Figs. 1a–c).
- Insert the implant into the osteotomy.

Option 2

- Place the implant in contact with the L-PRF membrane (Fig. 2a).
- Rotate the implant slowly and wrap the L-PRF membrane around it with the face side (the red side) of the membrane at the outside (Figs. 2b & c).
- Insert the implant into the osteotomy.

Option 3

- Place the L-PRF membrane in contact with the implant (Fig. 3a).
- Rotate the implant slowly until the entire implant surface has been in contact with the membrane; remnants of the L-PRF membrane become visible on the implant surface (Figs. 3b & c).
- Place the face side of the membrane into the osteotomy.
- Insert the implant into the osteotomy.

Option 4

- Collect the L-PRF exudate with a sterile syringe after compression of the clots (Fig. 4a).
- Rinse the implant surface with the L-PRF exudate before insertion (Figs. 4b & c).
- Place the face side of the membrane into the osteotomy.
- Insert the implant into the osteotomy.

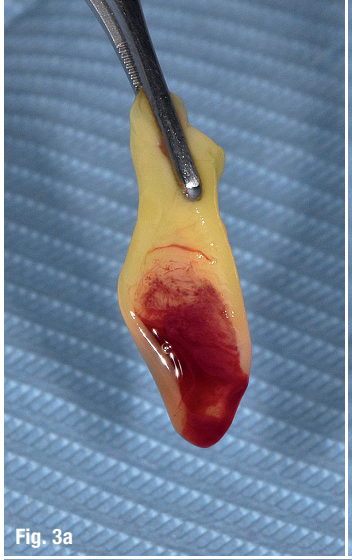
Fig. 3a

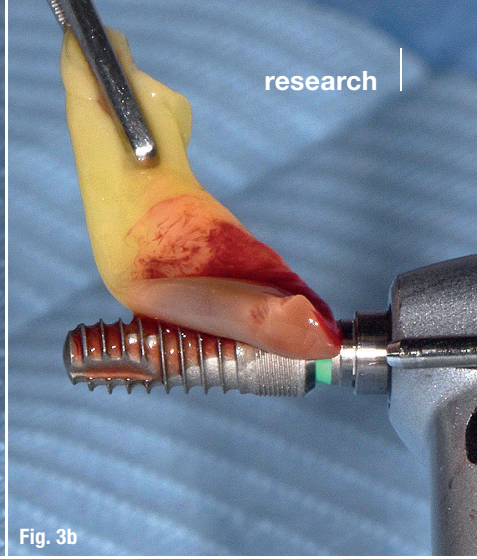
Fig. 3b

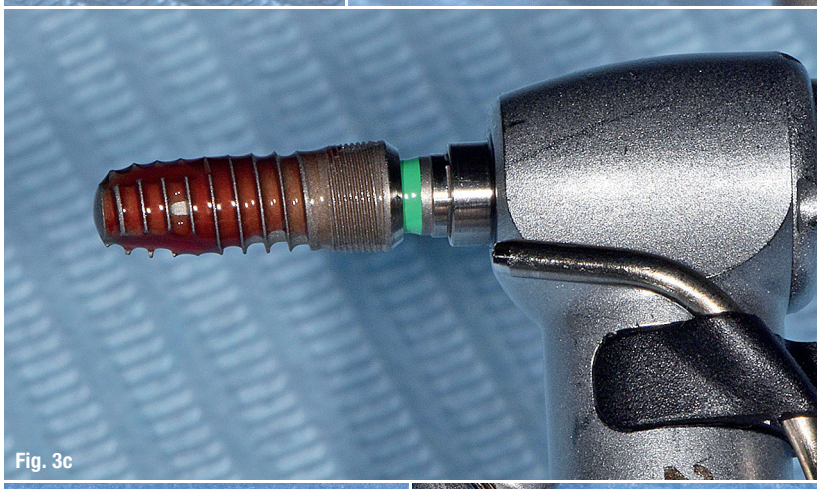
Fig. 3c

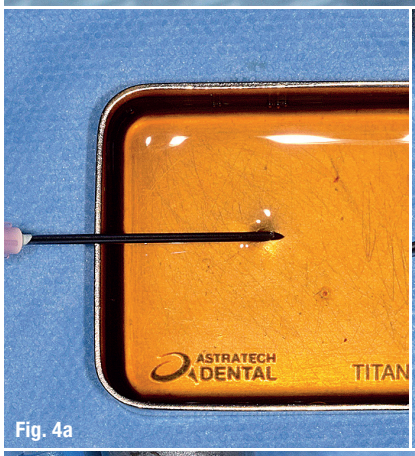

Fig. 4a

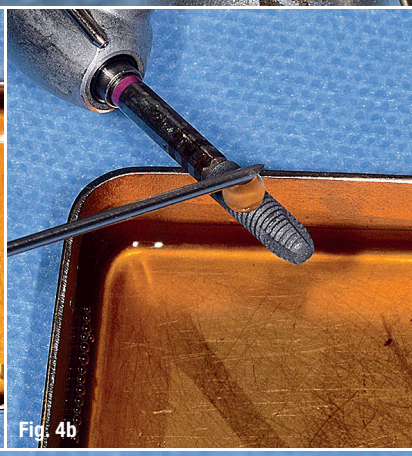
Fig. 4b

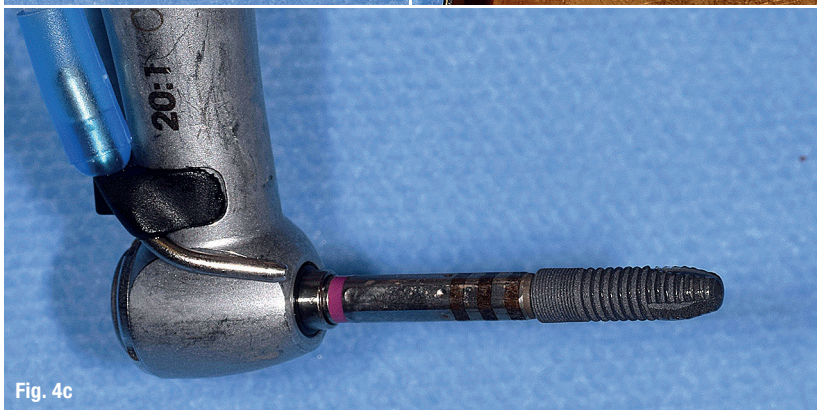

Fig. 4c

Techniques for implant coating with L-PRF: Fig. 3a: The L-PRF membrane needs to be placed in contact with the implant. **Figs. 3b & c:** Slow rotation of the implant in contact with the membrane. **Fig. 4a:** Collection of L-PRF exudate. **Figs. 4b & c:** The implant surface with the L-PRF exudate just before insertion.

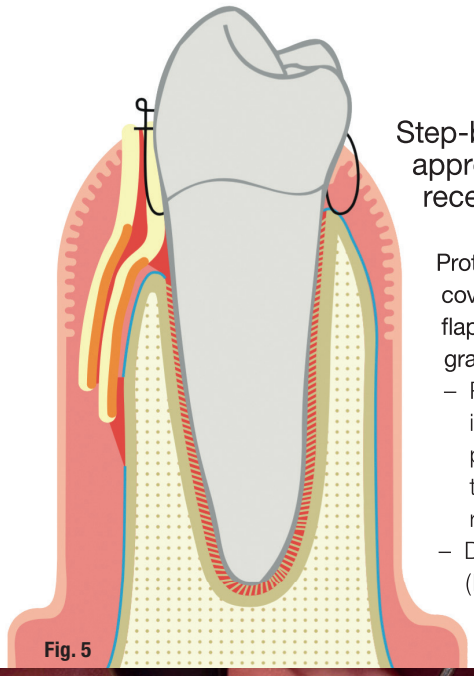

Fig. 5

Step-by-step approach for gingival recession coverage

Protocol for gingival recession coverage with a coronal advanced flap procedure with L-PRF as grafting material (Fig. 5)

- Perform an incision following the coronal advanced flap protocol and full-split, full-thickness preparation of the receptor bed (Fig. 6).
- De-epithelialise the papillae (Figs. 7a & b).
- Suture a minimum of two or three L-PRF membranes (of the correct dimensions) together with resorbable 6/0 sutures (Fig. 8).
- Place the L-PRF graft on the exposed connective tissue (receptor bed) and over the recession and suture it to the periosteum (Figs. 9a–c).
- Suture with coronal advancement of the flap for coverage of the graft (Figs. 10a & b).

Postoperative care

- No pressure or force must be exerted on the graft site for at least six months.
- Only soft food can be consumed and the patient must not bite of chew in the treated area. There must be no mechanical cleaning of the treated area. The patient

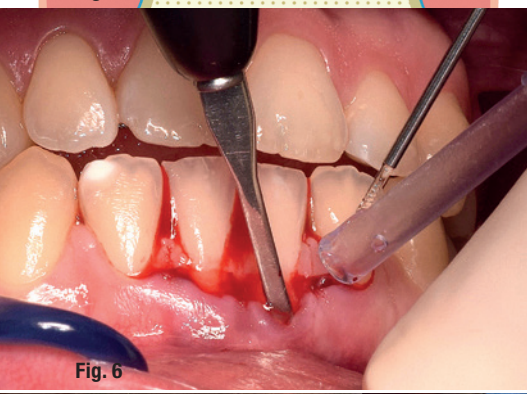

Fig. 6

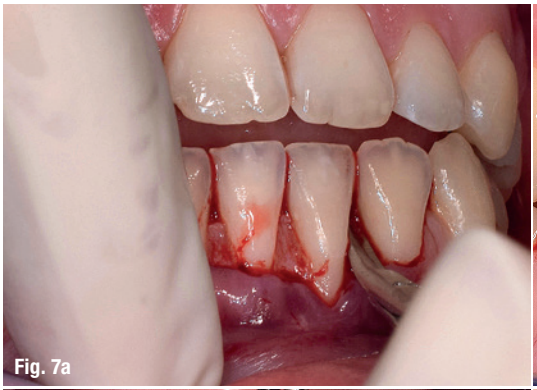

Fig. 7a

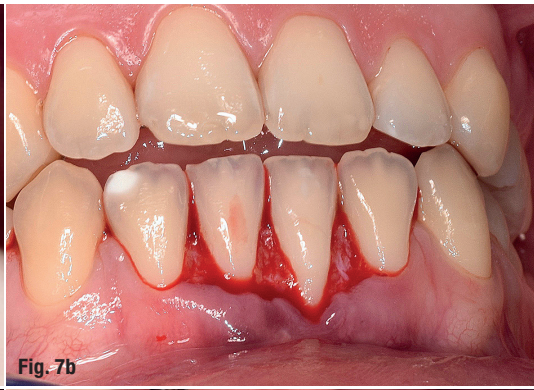

Fig. 7b

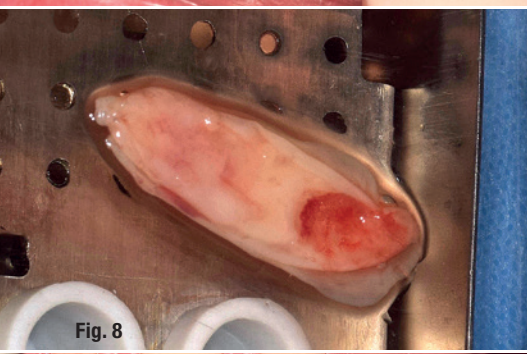

Fig. 8

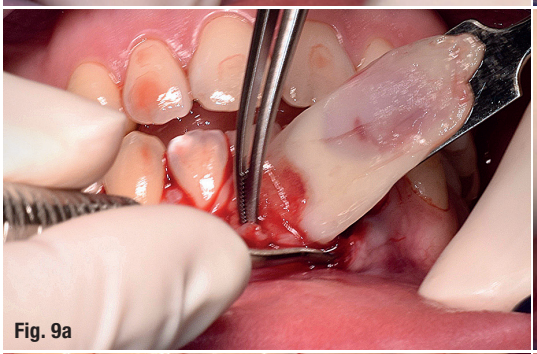

Fig. 9a

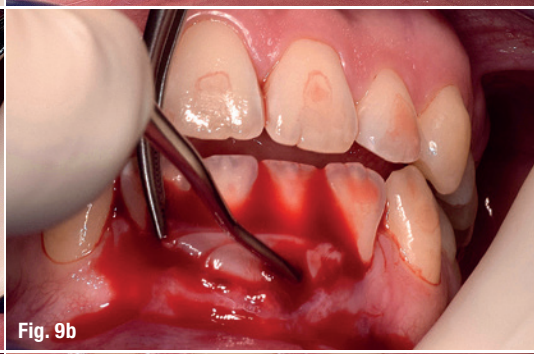

Fig. 9b

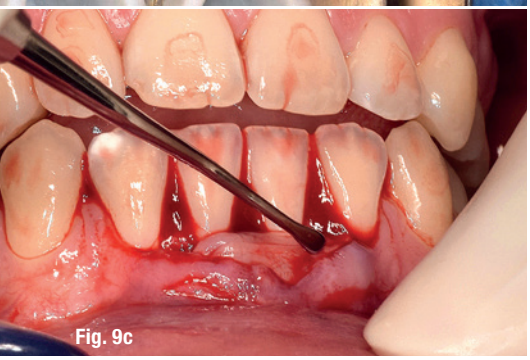

Fig. 9c

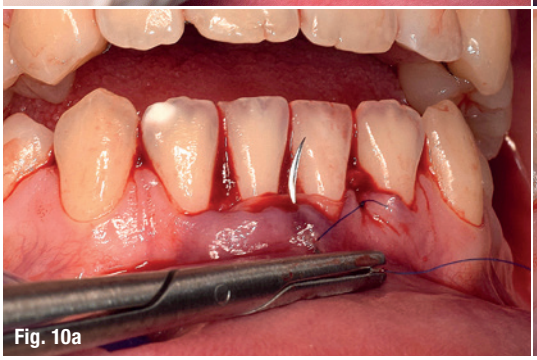

Fig. 10a

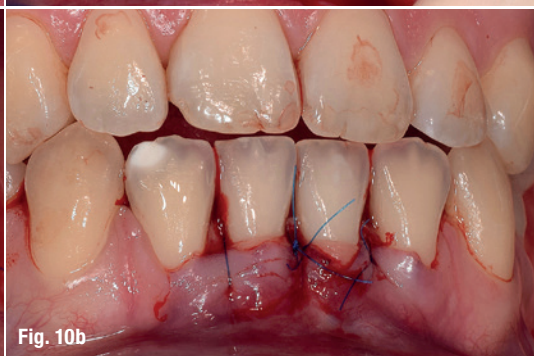

Fig. 10b

Gingival recession coverage: Fig. 5: Graphic representation of the final situation after gingival recession coverage with a coronal advanced flap and L-PRF membranes. Several L-PRF membranes (at least three) are placed on the receptor bed and over the recession. Suturing to coronally advance the flap over the recession is performed. (The periosteum, blue line, is cut in order to enable coronal advancement of the flap.) **Fig. 6:** Split-thickness preparation of the receptor site. **Figs. 7a & b:** De-epithelialisation of papillae. **Fig. 8:** Three L-PRF membranes (with the dimensions of the receptor bed) sutured together. **Figs. 9a–c:** Placement of L-PRF graft on exposed connective tissue (receptor bed) and over the recession. **Figs. 10a & b:** Suturing with coronal advancement of the flap for coverage of the graft.

should be careful to use his or her mouth only moderately. The patient must rinse with 0.12 % chlorhexidine (from the third day post-operatively) three times per day for one minute for at least three weeks.
– Prescribe sufficient painkillers.

Step-by-step approach for the preparation of a L-PRF Bone Block

Protocol for preparation of a L-PRF Bone Block using 0.5 g of a biomaterial of your choice (allogeneic or xenogeneic or synthetic biomaterial; Fig. 11)
– Venepuncture: collect six tubes of blood in 9 ml red-capped tubes following the L-PRF standard protocol and then two tubes in 9 ml white-capped tubes (Fig. 12). The blood for the latter is drawn last and the tubes placed last in the centrifuge (2,700 rpm/408 RCF).
– Interrupt centrifugation after three minutes to remove both white-capped tubes.
– Immediately restart the centrifuge with the red-capped tubes remaining for another nine minutes.
– Immediately aspirate the yellow fluid (liquid fibrinogen) in the white-capped tubes with a sterile syringe (Fig. 13). Get as close as possi-

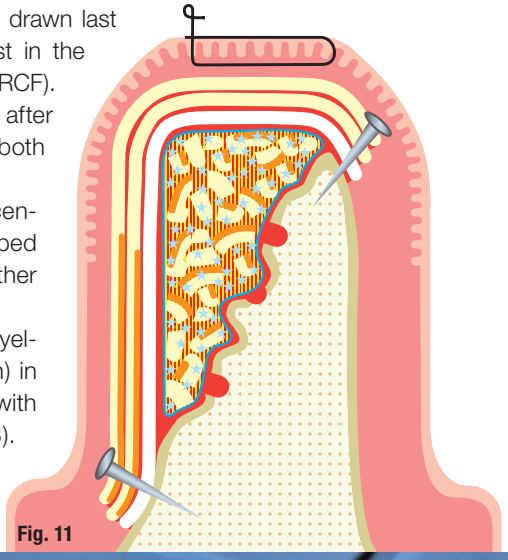
Fig. 11

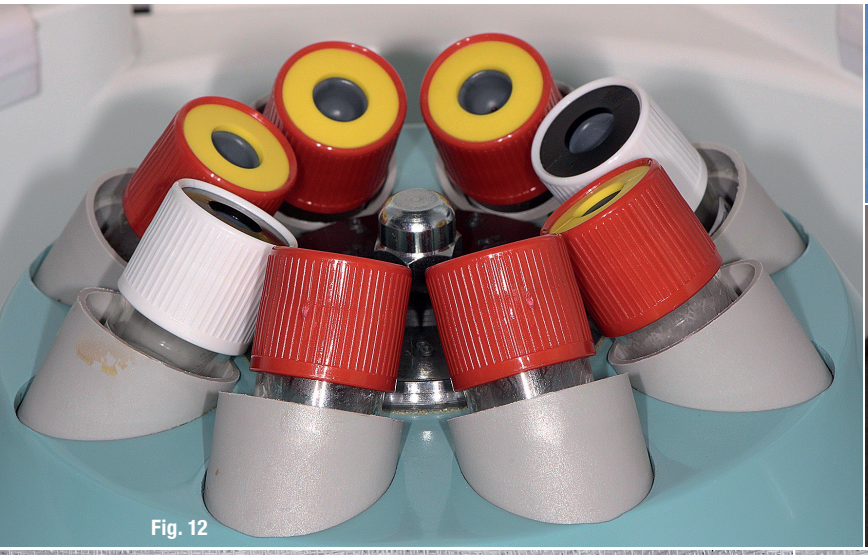
Fig. 12

Fig. 13

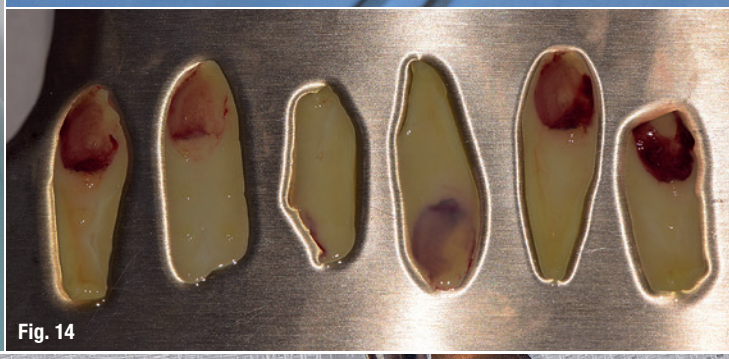
Fig. 14


Fig. 15a


Fig. 15b

Clinical preparation of PRF-Block: Fig. 11: Graphic representation of a L-PRF Bone Block for horizontal bone augmentation. The small holes in the cortical bone guarantee an optimal blood supply. The L-PRF Bone Block is quite well adapted to the bony defect, and the liquid fibrinogen is slowly transformed into fibrin. At least two membranes (face towards bony defect) are used to cover the block; they are fixed via membrane tacks. Primary closure by suturing is preferred. **Fig. 12:** Collection of six tubes (red cap, glass coating) of blood following the standard protocol and two tubes (white cap, plastic coating) collected last for liquid fibrinogen. **Fig. 13:** Collected liquid fibrinogen in a sterile syringe. **Fig. 14:** Clots gently compressed into membranes in the Xpression Box. **Figs. 15a & b: a)** Chopped membranes and bone substitute in a titanium dish; **b)** mixed.

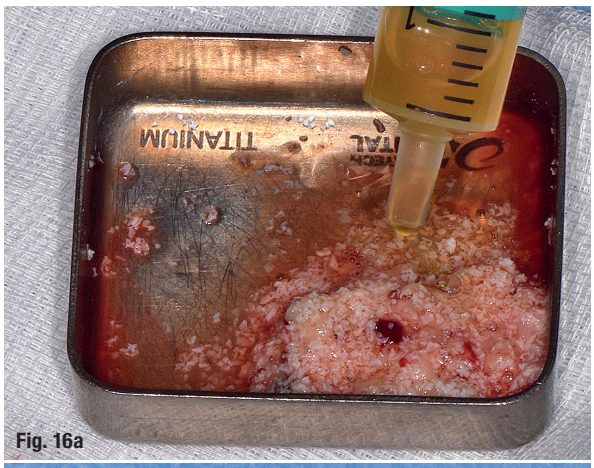
Fig. 16a


Fig. 16b

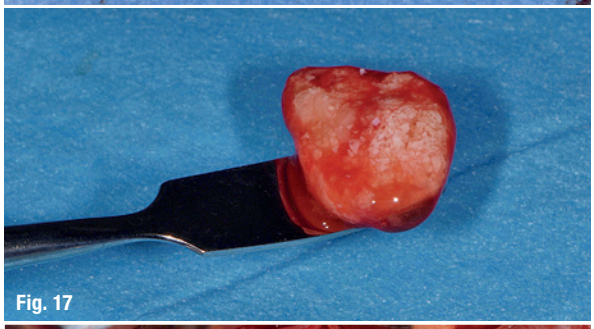
Fig. 17

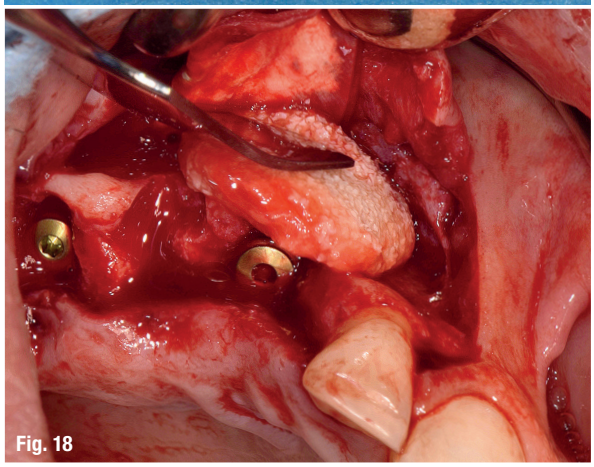
Fig. 18

Figs. 16a & b: Liquid fibrinogen added to the homogeneous mix and stirred gently while shaping it to the desired form. **Fig. 17:** PRF-Block ready to use (± 5 minutes). **Fig. 18:** Placement of the PRF-Block against an implant with buccal dehiscence.

ble to the red cells, but do not aspirate them. Use a plastic 5 cc sterile syringe with a 21-gauge needle and keep the liquid in that syringe with the covering lid on.
– After full centrifugation of the remaining tubes, remove the L-PRF clots and compress them gently into membranes (Fig. 14).

Preparation of a block
– Chop two membranes into very small pieces with curved surgical scissors.
– Mix chopped membranes and bone substitute in a titanium dish (ratio: approximately two membranes per 0.5 g of biomaterial; Figs. 15a & b). If the mix is too dry, one can add some L-PRF exudate from the Xpression Box (Intra-Lock). Ensure you obtain a uniform mix.
– Add 1 cc of liquid fibrinogen to the homogeneous mix and stir gently for five to ten seconds while shaping it to the desired form (Figs. 16a & b). The fibrinogen will clot into fibrin within a few minutes and trap the biomaterial to form a PRF-Block (Fig. 17). A variation would consist of moulding the mixed biomaterial and L-PRF membranes into the surgical defect and squirting the fibrinogen-rich liquid on to it. It would form the block *in situ*, but the liquid can only penetrate ± 5 mm deep into the mix.

about the author

Prof. Marc Quirynen received both his dental degree (in 1980) and his PhD (in 1986) from KU Leuven in Belgium. In 1990, he was appointed professor in the Faculty of Medicine at KU Leuven, where he teaches periodontics and anatomy. He is specialised in oral microbiology.

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