

# The Reliability of Free Buccal Fat Graft for Treatment of Severe Gingival Recessions at Mandibular and Maxillary Exposed Roots

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## Abstract

**Introduction:** The occurrence of gingival recessions (GRs) is multifactorial, mainly due to trauma induced by traumatic toothbrushing, orthodontic tooth movement, as well as anatomical factors such as bone dehiscence, teeth malposition, and muscle pull. Fat tissue in the oral cavity is widely available and easily accessed. The use of pedicled buccal fat pad (BFP) graft is well known in maxillofacial surgery and has been shown promising results, becoming safe and effective graft for several clinical applications. However the use of fat tissue harvested from the buccal fat pad as a free graft (BFFP) is less common, but recently, it has been described by the author for different intraoral clinical applications. The aim of this study is to present additional application using the BFFG for coverage of severe muco-GRs and to discuss the promising outcomes of this procedure. **Patients and Methods:** A technique for harvesting intraoral BFFG for the use in mucogingival surgery is presented. A total of 10 patients (age:  $38.3 \pm 6.8$  years) with 17 teeth presenting severe GRs ( $4.8 \pm 1.8$  mm) were included in the study. Recessions treated using BFFGs were recorded at baseline and 12 months after surgery. **Results:** A total of 17 GRs were treated using BFFG. At 12 months, significant reduction of recession occurred. Initial recession was reduced from  $4.8 \pm 1.8$  mm to  $1.7 \pm 0.9$  mm. A mean of 3.1-mm reduction in GR was achieved compared to baseline. **Conclusions:** The new, simple, technique for treatment of severe GRs using BFFG resulted in significant reduction of GRs.

**Keywords:** Buccal fat pad, connective tissue graft, free fat graft, gingival recession, mucogingival surgery

## INTRODUCTION

Gingival recession (GR) is defined as the displacement of the marginal gingival tissue apical to the cemento-enamel junction with exposure of the root surface to the oral environment.<sup>[1]</sup> GR is a common condition and its etiology is multifactorial and associated with several mechanisms such as mechanical (traumatic toothbrushing), inflammatory or pathological (periodontal disease), physiological (aging), anatomical (bone dehiscence and teeth malposition), and as a sequence of orthodontic treatment.<sup>[2,3]</sup> The severity of GR is classified into four types (Miller's Class I type recession to Class IV type).<sup>[4]</sup> Patients with GRs may have severe esthetic problems, especially at the anterior regions of the dentition. They may suffer from root hypersensitivity, root caries or abrasion, plaque accumulation due to irregular margins, and gingival bleeding. The treatment targets are to achieve satisfied function esthetics. Several and different surgical techniques are described to manage GRs in order to achieve root coverage.<sup>[5-12]</sup>

The buccal fat pad (BFP) was reported as a pedicled graft for treatment of severe gingiva recessions in maxillary molars.<sup>[13,14]</sup> The use of the pedicle BFP flap (PBFPF) as a graft for intraoral defects is a common procedure since its first publication by Egyedi.<sup>[15]</sup> The outcomes from the use of this flap for closure of intraoral defects have been encouraging. The success of the PBFPF has been attributed to the simplicity of the procedure, its rich vascular supply, minor donor site morbidity, and its fast epithelialization within 3–6 weeks.<sup>[16-19]</sup>

Autologous fat transplantation is a commonly applied procedure in reconstructive and esthetic surgery.<sup>[20]</sup> It has

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been used for more than 100 years now. Its clinical behavior, characteristics, and healing are all well known in this area of medicine. Fibrosis is considered as the main healing mechanism of autologous free fat grafts (FFGs).<sup>[21,22]</sup>

The use of the BFP as a free graft (BFFG) in the oral cavity was introduced as a clinical innovation by the author in 2011 at the Academy of Osseointegration Annual Meeting, Washington DC. The review of dental and maxillofacial surgery literature revealed only a few publications considering the use of the BFFG. Neder in 1983 reported the use of BFFG for oral lesion reconstruction in two patients.<sup>[23]</sup> Kablan and Laster were the first to report the clinical and histological healing staging of the BFFG in 2012. In this report, the BFFG was combined covering bone augmentations to obtain and maintain primary closure.<sup>[24]</sup> Similar report of the use of BFFG was published in 2014 by Kablan and Laster.<sup>[25]</sup> In 2015, Kablan reported a case series that described the use of BFFG in the treatment of peri-implantitis.<sup>[26]</sup> The BFFG improved the clinical attachment level of soft tissue around the affected implants and their survival, with excellent functional and esthetic outcomes of the treated implants. The fibrotic healing of the BFFG inhibited the recurrence of the peri-implant lesions. Kablan in 2016 described the use of the BFFG for the closure of defects in the hard palate. In that report, the BFFG proved the simplicity of the graft and its ability to survive its free transfer. The BFFG successfully covered different hard palate defects.<sup>[27]</sup> De Castro *et al.*, in 2015, in their case report, described the use of FFG for closure of oronasal fistula and suggested it as a treatment option for some cases of anterior maxillary defects.<sup>[28]</sup> The current study reports additional clinical application of the BFFG and suggests the use of this graft as a predictable new method for treatment of severe GR at different sites in both maxillary and mandibular teeth.

## PATIENTS AND METHODS

### Methods

This study includes 10 patients, 6 women and 4 men, who were treated over a period of 2 years (2013–2015) and followed up for 3–4 years. After written informed consent, the free fat tissue graft was used as a soft-tissue graft for root coverage. Ten healthy patients (age:  $38.3 \pm 6.8$  years) with 17 teeth presenting with GRs ( $4.8 \pm 1.8$  mm) were included in the study. Recessions treated using BFFG were recorded at baseline before the surgery. The BFP was accessible intraorally through a small incision at the buccal mucosa opposite to the maxillary third molar. The recipient site was prepared by mechanical root planing and then grafted with the BFFG. The fat graft passively and easily rested over the exposed roots, and then, the flap was displaced coronally and sutured firmly. Follow-up was held every 2 weeks for 3 months and then every 3 months. The healing process was uneventful. Recessions treated using BFFG were recorded at 12 months after surgery.

### Technique

#### *Illustrative case*

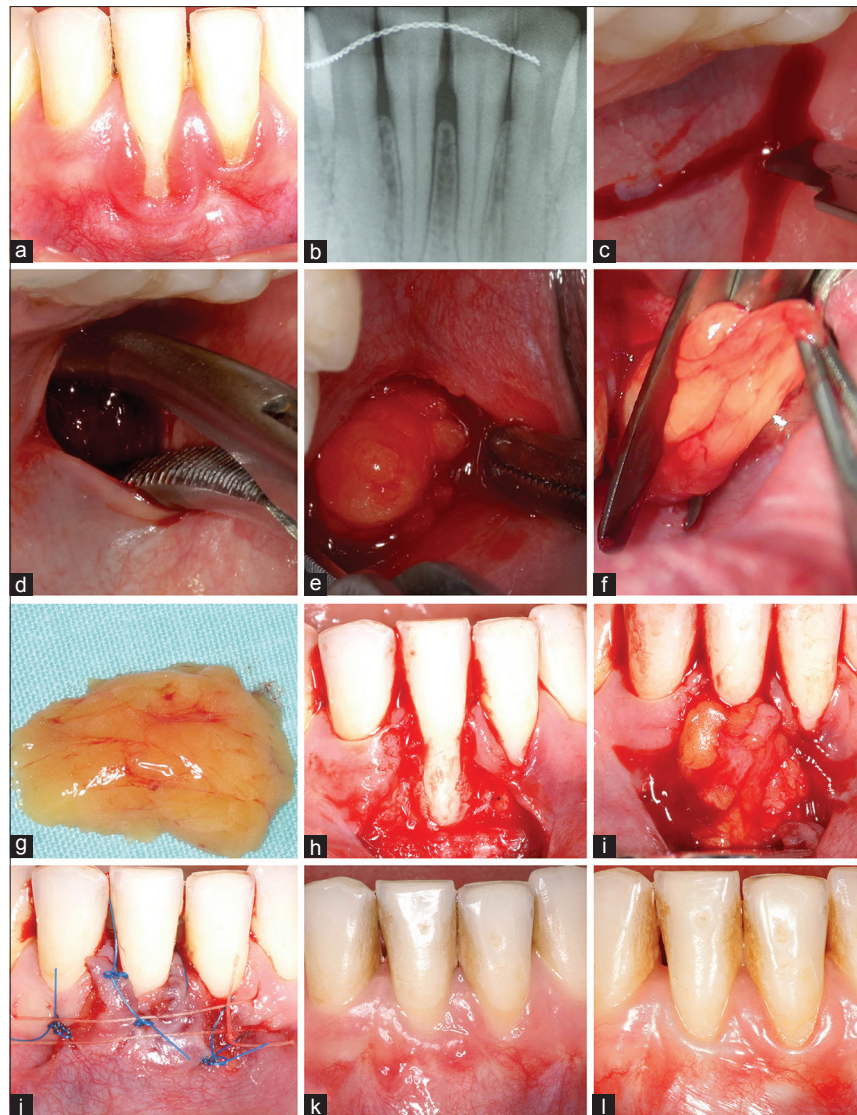
A 22-year-old patient was referred due to severe GR of tooth 41 following orthodontic treatment. The patient complained about esthetic problem and marginal inflammation. The clinical and radiographical examinations revealed a narrow-type recession defect of 6 mm with inadequate keratinized tissue, marginal inflammation, calculus at the exposed root surface, and gingival bleeding without pathological mobility of the tooth [Figure 1a and b]. After local anesthesia, the right BFP was the donor site and accessed written informed consent, with a small incision at the oral mucosa, the fat tissue was reached with blunt dissection, and the FFG was harvested followed by placement of three sutures to close the donor site [Figure 1c-g]. After local anesthesia at the recipient site, root planing was performed first before the flap elevation. Thereafter, two divergent releasing incisions were made at the mesial and distal sides of the exposed root toward the bottom of the vestibule followed by a full-thickness flap that was elevated at the level of the keratinized tissue apical to the recession. Elevation of the flap proceeded apically with a split thickness [Figure 1h]. The second root planing was performed after the flap elevation. The root surface was gently debrided with Gracey curettes to eliminate bacterial plaque and degraded cementum, and the area was rinsed with sterile saline solution to remove any debris. The FFG was easily adapted to the recipient site [Figure 1i], and the flap was displaced coronally and sutured firmly [Figure 1j]. The BFFG can be left partially exposed to the oral cavity. The follow-up was performed every 2 weeks for the first 3 months thereafter every 3 months and included plaque control maintenance [Figure 1k and l]. The recession defect was significantly reduced, with satisfied soft-tissue quality, color, and volume.

#### *Case 1*

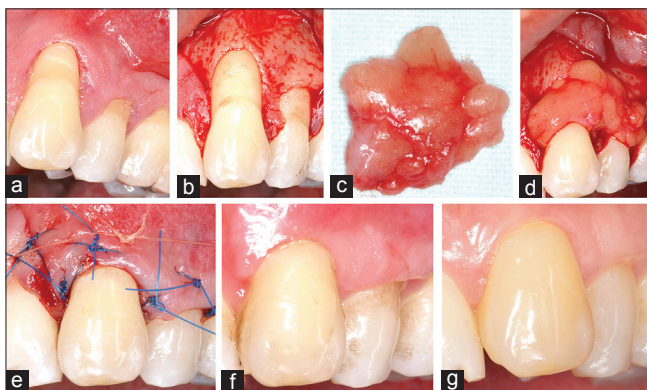
A 28-year-old male was referred due to GR involving his right maxillary canine and first premolar (teeth 23–24). The patient complained about the esthetic problem and the hypersensitivity caused from the exposed roots [Figure 2a]. After written informed consent, he was treated with BFFG and coronally repositioning of the flap [Figure 2b-e]. The BFFG was easily spread and well adapted to the root surfaces [Figure 2d]. The flap was advanced coronally covering the fat graft and sutured firmly [Figure 2e]. The outcomes that were recorded at 3 weeks and 12 months after the surgery demonstrated satisfactory and stable root coverage with excellent color match to the adjacent gingiva [Figure 2f and g]. The follow-up of this case is 4 years.

#### *Case 2*

A 45-year-old female who suffers from multiple GRs involving her maxillary teeth presented at our clinic for treatment of her problem. She was a healthy patient with good oral hygiene. The examination revealed bilateral GRs that involved the right first premolar, the left canine, and the first and the second premolars at the maxilla [Figure 3a and b]. After written informed consent, the BFFG used to treat both sides was harvested from the right



**Figure 1:** (a and b) Clinical and radiographic views, gingival recession tooth 41. (c-g) Free fat graft harvest, step by step. (h) Full-thickness flap and initial preparation of the root surface. (i) The free fat graft is well adapted to the donor site. (j) The flap is displaced coronally and sutured. (k) Four-week follow-up. (l) Twelve-month follow-up, nice color match



**Figure 2:** (a) Preoperative clinical view, two gingival recessions of adjacent teeth 23–24. (b) Intraoperative; flap elevation, mechanical root planing. (c and d) The free fat graft is easily spread and adapted to the roots surface. (e) The flap is coronally positioned and sutured. (f) Follow-up 2 weeks after the surgery. (g) Twelve - months follow up after the surgery

BFP [Figure 3e]. The recessions were treated by BFFG and coronal advancement of the flaps bilaterally [Figure 3c-g]. The healing process proceeded very well. At 2 weeks, the sutures were removed [Figure 3h and i]. The follow-up 12 months after the surgery showed excellent coverage of the exposed roots bilaterally, significant reduction of the recessions, and good gain of keratinized tissue [Figure 3j and k]. This case is followed for 3 years.

### Case 3

A 31-year-old healthy male presented with GRs that involved the mandibular lateral incisor (tooth 32) and the canine at the left side (tooth 33). The case was diagnosed as wide-type Miller's Class I GR, thick soft-tissue biotype, and partial loss of interdental papillae [Figure 4a]. The BFFG was used to cover the teeth roots and coronal advancement of the flap in attempts to rebuild the lost soft tissue [Figure 4b-d]. Two weeks after the

surgery, nice healing was observed with improvement of the soft tissue covering the treated roots [Figure 4e]. At 12 months, the recipient-site soft-tissue volume and quality were satisfied with excellent color and architecture and regeneration of the lost interdental papillae [Figure 4f]. This case was followed for 28 months.

### Postsurgical instructions

The patients were informed about the importance of the strict follow-up regimen. The postoperative instructions included a soft diet for 2 weeks, teeth brushing except for the surgical area, and mouth rinsing with chlorhexidine digluconate twice daily for 2 weeks. Amoxicillin 500 mg was prescribed every 8 h for 7 days or clindamycin 300 mg every 8 h for 7 days for patients allergic to penicillin. The sutures were removed 14 days after the surgery. After this time, the patients were instructed to brush the operated area gently with a soft toothbrush and local application of corsodyl gel at the operated site for additional 2 weeks. Follow-up was held every 2 weeks for 3 months and then every 3 months.

### RESULTS

All patients were followed up 1 and 2 weeks postoperatively, then every 2–3 weeks during the first 3 months, and thereafter every 3 months. The healing process had been completed uneventfully. The BFP healed very well without complications and any esthetic disturbance. The root coverage that was obtained at the surgery day was maintained without wound dehiscence. Among the 17 GRs that were treated using BFFG, at 12 months, a significant reduction of recession was maintained. The initial recession was reduced from  $4.8 \pm 1.8$  mm to  $1.7 \pm 0.9$  mm. A mean of 3.1-mm reduction in GR was achieved compared to baseline. The follow-up period was 32–62 months (average: 42 months). All the patients were satisfied from the surgery, from the healing process, and from the final outcomes. They were happy from the esthetic results and functional quality of the treated teeth.

### DISCUSSION

Several root coverage procedures for GRs were performed as cosmetic and functional treatments.<sup>[29]</sup> Adequate volume and good color match at the recipient site are considered essential key factors for the treatment success and predictability. Soft-tissue grafts with poor color match to the surrounding tissue at the recipient site should be avoided. Coronally advanced flap may be used and can provide a good color match, but its efficacy is debatable in the treatment of severe GRs, where the keratinized tissue is insufficient.<sup>[6-7]</sup> In the present study, the BFFG was used combined with coronally positioned flap to enhance the soft-tissue quality and volume at the exposed roots.

The BFP has been extensively used as a pedicle flap (PBFPP) in oral and maxillofacial reconstruction since its first publication in 1977. The PBFPP applications are well documented with its advantages by means of its available volume and healing. The

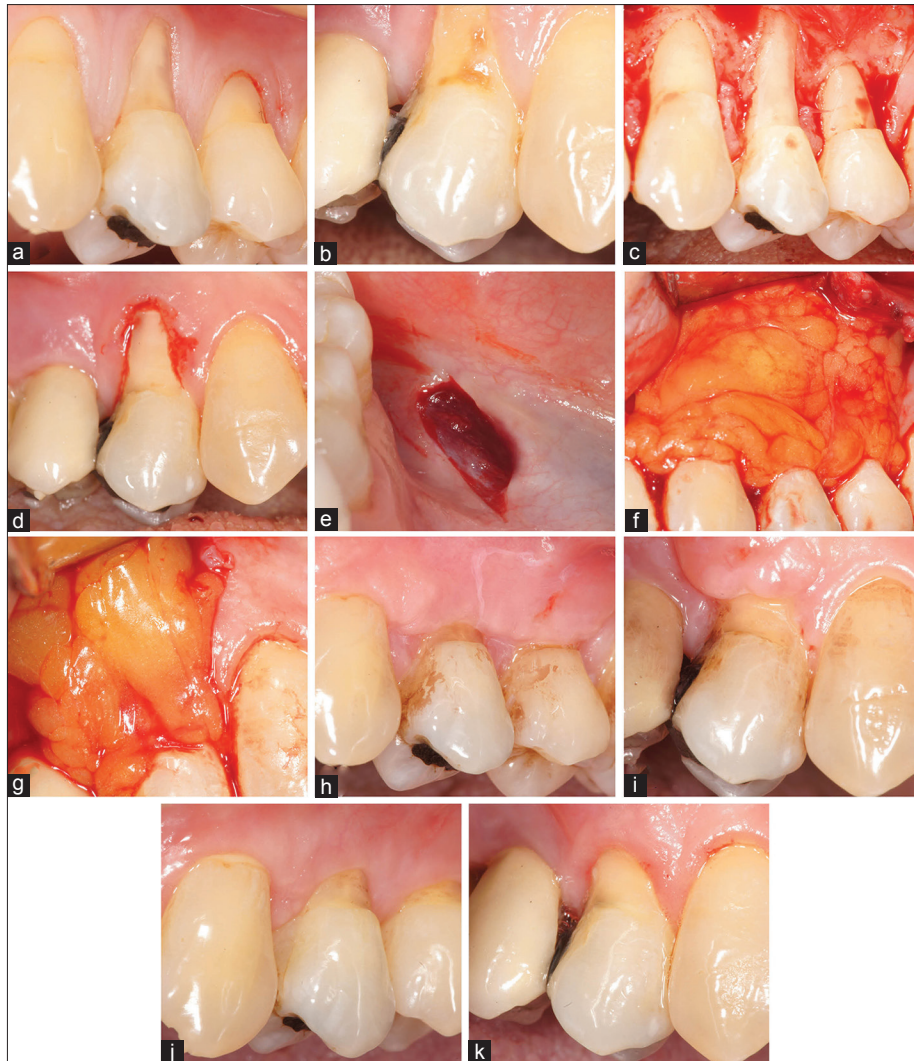
main disadvantage of this flap that it can not reach the anterior regions of the oral cavity, and its use is limited to the posterior areas inside the mouth.<sup>[30-32]</sup>

El-Haddad *et al.*, in 2008, reported the use of pedicle BFP (PBFPP) to treat severe GR (Miller's Class IV) at tooth 26. They achieved good cosmetic and functional outcomes and stated the minimal morbidity of the donor site (BFP). The PBFPP healed by epithelialization and a new keratinized tissue was achieved. The main disadvantage of the PBFPP was its limitation to the maxillary teeth posterior to the canines. They concluded that the PBFPP is not applicable at the anterior maxillary teeth neither at all the mandibular teeth.<sup>[13]</sup> Several reports have been published to describe the PBFPP as a successful and a predictable tool in the treatment of severe GRs at the maxillary teeth posterior to the canines.<sup>[14,32]</sup>

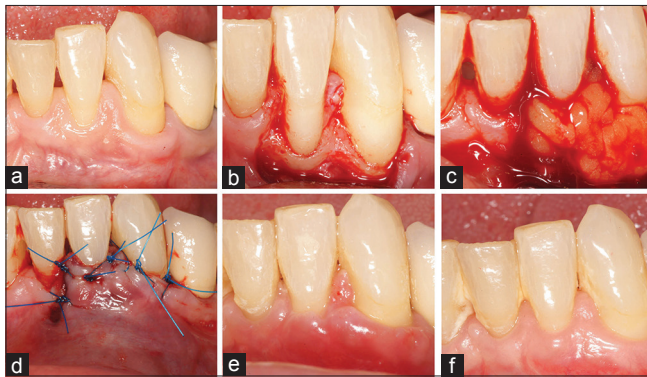
The use of autologous FFGs to correct contour deformities and to enhance the volume of the recipient sites is widely familiar in the cosmetic surgery.<sup>[33,34]</sup> Following several years of handling the fat tissue by the author in various clinical applications in the maxillofacial field, it is now well established that fat tissue from the BFFG can survive and heal very well, so it can be used as an excellent tissue graft in different defects in the oral cavity.<sup>[24-27]</sup> In a previous study, it was demonstrated by the author that the BFFG heals by fast epithelialization of its exposed parts on the one hand and simultaneous fibrosis of the graft that proceeds from immature fibrosis to full maturation after 4 months on the other hand.<sup>[24]</sup>

In the present study, the use of BFFG in the treatment of GRs with more than 5 years of experience can be considered as excellent and predictable option. The results from this group of 17 patients suggest that the BFFG is an effective option for the treatment of GRs and served as a volumizer to augment the thinned out and the recessed gingiva around the affected teeth. The BFFG provides two important functions at the recession defect: the first is to bring new soft tissue volume to the defect and to augment the missing tissue and the second is to obtain and maintain the primary closure of the advanced local flap. At the recession area, there is usually a thin soft biotype, and the BFFG is especially useful because it may act as a liner for the sutures that pass through it, and it helps the original soft tissue to withstand the tensions that develop as a result of postoperative swelling. The BFFG has several advantages over the pedicled BFP graft.<sup>[25]</sup> The main advantages of using the BFFG is the fact that it is available and applicable to all the regions in the oral cavity. This advantage was again demonstrated in the present study. The BFFG was used to cover exposed roots in both jaws including the anterior maxillary teeth and all mandibular teeth. The author believes that by harvesting free fat tissue from both, BFP can provide enough volume to treat multiple GRs and maybe efficient to treat full-mouth GRs, and to our knowledge, there is no connective tissue donor site in the oral cavity that can provide the same quantity and ability.

During clinical follow-up of the treated cases, the BFFG provided an immediate covering of the exposed roots, obtained



**Figure 3:** (a and b) Preoperative view, multiple and bilateral gingival recessions affected teeth 14 and 23–25. (c) Flap elevation, planing of the root surface of teeth 24–25. (d) Root planing of tooth 14 before flap elevation. (e) The right buccal fat pad was the donor site for the buccal fat pad as a free graft. (f and g) The free fat graft is easily spread over the recipient sites and closely adapted; f: left side, g: right side. (h and i) Two-week follow-up; h: left side, i: right side. (j and k) Twelve months after the surgery, excellent soft tissue covering with good color match; j: left side, k: right side



**Figure 4:** (a) Preoperative clinical view, gingival recession involved anterior mandibular teeth 32 and 33. (b,c) Intraoperative views; b: the recipient surgical bed, c: the buccal fat pad as a free graft covering the exposed roots. (d) Coronal positioning and suturing of the flap. (e) Two-week follow-up. (f) Twelve-month follow-up

and maintained the primary closure that was achieved by coronal positioning of the flap. The exposed roots maintained their coverage in the long-term follow-up periods, and the esthetic outcomes were very good with excellent soft-tissue thickness and color. The long-term stability of the combination of coronal advancement of the flap over the BFFG can make this technique an excellent option to treat GR.

### CONCLUSIONS

Technically, BFP is easily accessed and mobilized. It is a simple procedure that can be performed in a very short time and without causing morbidity for the patient. The BFFG serves as an excellent option as a graft for soft-tissue replacement at the recession defects. The long-term stability of the gained coverage of the exposed teeth makes it a good choice and an excellent option for the treatment of GRs at the both jaws.

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## Conflicts of interest

There are no conflicts of interest.

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