



# Restoring lost gingival pigmentation in the esthetic zone

## A case report

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Oral pigmentation is most intense in the keratinized mucosa around the incisors, and depth of pigmentation positively correlates with age.<sup>1</sup> Various methods have been described to reduce gingival pigmentation for esthetic purposes, but only a few case reports are available on how to regain gingival pigmentation.<sup>2-5</sup> Despite complete removal of pigmented gingiva, repigmentation may occur in the long term by melanocytes derived from the surrounding soft tissue.<sup>6</sup> However, in cases in which pigmentation is lost, regaining pigmentation cannot be guaranteed. The time frame is unknown; hypothetically, it could even depend on the etiology of the loss of pigmentation.

There are 4 pigments involved in pigmentation: carotenoids (yellow), oxygenated hemoglobin in the capillaries (red), reduced hemoglobin in the venules (blue), and melanin (brown). Melanin is the main determinant.<sup>7</sup> The physiological oral pigmentation is found on the entire oral mucosa but varies. It is genetically determined and ranges from the darkest brown to the lightest pinkish-white. An increased intensity in pigmentation derives from an enhanced melanocytic activity rather than an increased number of melanocytes. Various pathologic alterations, systemic diseases, endocrine disorders, or systemic medications may lead to changes in oral pigmentation.<sup>1,8-12</sup>

Melanocytes are a derivative of the neural crest and lie in the stratum basale of the epithelium.<sup>13</sup> As the

## ABSTRACT

**Background and Overview.** There is insufficient literature on the lack of oral pigmentation in the esthetic zone. The aim of this case report was to illustrate the potential impact of loss of gingival pigmentation in the esthetic zone, describe its surgical treatment, and discuss the limited literature on this topic.

**Case Description.** An African American woman with high smile line had localized loss of gingival melanin pigmentation as a complication after implant failure and attempted guided bone regeneration in site 8. A highly pigmented free gingival graft was collected from the facial-attached gingiva of the maxillary posterior teeth and placed onto the previously de-epithelialized recipient bed in the maxillary front. Some pigmentation of the graft was preserved and was visible a few weeks after surgery; some pigmentation recovered over time. At 6 months after surgery, the patient was satisfied with the esthetics. Complete recovery of pigmentation took 12 months, at which time the patient was ready to proceed with the final prosthetic work.

**Conclusions and Practical Implications.** Gingival pigmentation can be restored using a free gingival graft from a highly pigmented area. When surgical procedures are performed in such cases, loss of gingival pigmentation should be part of the informed consent. However, further research, including histology, is needed.

**Key Words.** Gingiva; pigmentation; esthetics; high smile line; melanocytes; free gingival graft.

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only melanin-producing human cell, they are mostly responsible for the protection of DNA in the skin from ultraviolet radiation.<sup>14</sup> The function of melanin in the oral epithelium is not well understood.

The melanin in the keratinocytes, not in the melanocytes, determines skin color.<sup>7</sup> Through the process of melanogenesis, melanin is packed into melanosomes. These are transported through dendrites and get then transferred to keratinocytes.<sup>15,16</sup> Several experiments have shown that the physiology of the pigmentation depends on the melanocytes and its melanocytic activity and even more on the keratinocytes and on interacting Langerhans cells.<sup>17</sup> Furthermore, the melanin distribution in the perinuclear area within keratinocytes depends on race and may have an impact on skin color.<sup>18</sup>

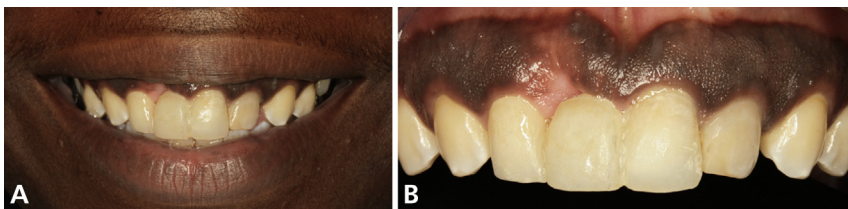
Keratinocytes have been shown to induce melanocytic cell mitosis especially through the mitogen basic fibroblast growth factor.<sup>17,19</sup> Because of these interactions of a melanocyte with its surrounding epidermal keratinocytes through growth factors and the expression of cell surface molecules, a melanocyte and its interacting keratinocytes have been defined as the epidermal melanin unit system.<sup>20</sup>

In this case report and review of the literature, we seek to contribute to the understanding of the processes involved in the treatment of lost gingival pigmentation.

## CASE REPORT

A 35-year-old healthy African American woman with generalized gingival melanosis visited the periodontal clinic at Columbia University College of Dental Medicine with symptoms of light pink gingival lesions in the papilla area facially between the central and lateral right upper incisors (Figure 1). Two years earlier, the patient had had an implant placed at site number 8, which then had to be removed at second-stage surgery because of a lack of osseointegration. Consequently, a guided bone regeneration procedure was attempted by the surgeon; however, the tissue sloughed during the healing process, which occurred by secondary intention, leaving the patient with a light pink patch in the papilla area between upper right central and lateral incisor. The patient felt self-conscious when smiling and therefore requested that her esthetic appearance be corrected. At that point, the decision had already been made by the patient and her prosthodontist to place a tooth-supported bridge from numbers 7 to 9, avoiding a further guided bone regeneration procedure and implant placement.

The proposed treatment options included staining the gingival tissue, as practiced by certain African and Asian ethnic groups; performing a pedicle flap from adjacent



**Figure 1.** Localized loss of gingival pigmentation in a patient with high smile line (A), with fixed temporary prostheses in numbers 7 to 9 (B).

pigmented tissue; or transplanting pigmented gingiva from the posterior teeth to the front.<sup>21,22</sup>

The patient opted to go with one of the surgical solutions. Using a pedicle would have maintained the blood supply to the tissue, but the donor area would have been healing by secondary intention, risking an additional persisting pink hue in the esthetic zone.

The free gingival graft was chosen from an area outside of the esthetic zone. Initially, the recipient bed was de-epithelialized, and the donor tissue was collected from the maxillary right posterior facial attached gingiva using a template (Figures 2A and 2B). The graft was then sutured in place with 6-0 Vicryl sutures, and pressure was applied to the graft to facilitate plasmatic circulation (Figure 2C). The donor site healed by secondary intention without any further intervention. Follow-up pictures are shown for 1 and 6 weeks and for 6, 12, and 20 months after surgery (Figures 3A-D and 4). The final bridge, shown in Figure 4B, was placed at 15 months after surgery. Over the follow-up period, the recipient site gradually gained pigmentation. The patient noticed a significant improvement at 8 weeks after surgery and was satisfied at 6 months after surgery. Comparison between the baseline and 20 months' postoperative time points illustrates the gain in pigmentation and maturation in the long term (Figure 4).

## DISCUSSION

This successful gain in pigmentation is in line with the observations reported by Marcuschamer and colleagues<sup>5</sup> and Fowler and colleagues,<sup>4</sup> who found an entire band of repigmented gingiva after 4 and 6 months, respectively, and complete pigmentation restored at 12 months. Fowler and colleagues<sup>4</sup> performed a frenectomy in the maxillary front and placed a free gingival graft into the denuded recipient bed. Marcuschamer and colleagues<sup>5</sup> published a case report about the use of a free gingival graft to gain gingival pigmentation in the esthetic zone. After guided bone regeneration with flap advancement and coronal positioning of the mucogingival junction, the pink mucosal tissue apical to the mucogingival junction had become visible.

On the basis of these case reports, one could thus conclude that the placement of a free gingival graft is a valuable option to regain pigmentation.

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