Current and future options of regeneration methods and reconstructive surgery of the facial skeleton.

Abstract: Musculoskeletal defects attributable to trauma or infection or as a result of oncologic surgery present a common challenge in reconstructive maxillofacial surgery. The autologous vascularized bone graft still represents the gold standard for salvaging these situations. Preoperative virtual planning offers great potential and provides assistance in reconstructive surgery. Nevertheless, the applicability of autologous bone transfer might be limited within the medically compromised patient or because of the complexity of the defect and the required size of the graft to be harvested. The development of alternative methods are urgently needed in the field of regenerative medicine to enable the regeneration of the original tissue. Since the first demonstration of de novo bone formation by regenerative strategies and the application of bone growth factors some decades ago, further progress has been achieved by tissue engineering, gene transfer, and stem cell application concepts. This review summarizes recent approaches and current developments in regenerative medicine.