

**Supplementary Figure S1. *Clinical treatment sequence for localized sinus bone graft reconstruction of moderate bone atrophy.*** Clinical images of the occlusal (top) view of the initial localized edentulous area of patients treated in the (A) control or (I) stem cell therapy group. Buccal (lateral) views of the surgical site located above the edentulous area in the (B) control and (J) stem cell therapy groups show preparation of a window osteotomy in the lateral aspect of the maxilla for access to the Schneiderian membrane of the maxillary sinus cavity. Following elevation of the maxillary sinus, the (C)  $\beta$ -TCP scaffold or (K) stem cells on the scaffold is placed in the sinus cavity and following closure of the surgical area, occlusal views of the edentulous areas two weeks after healing is shown (D) and (L). Four months following grafting, (E), (M) oral implants are placed in the localized edentulous area of the grafted region and allowed to integrate into the bone for (F), (N) 6 months. Following 6 months, implants in both groups are functionally loaded with a dental restoration to restore the localized edentulous area with a tooth, as shown in the (G), (O) occlusal and (H), (P) buccal views.

**Supplementary Figure S2. *Wound Healing Indices and Pain.*** (A) Wound healing and pain evaluation form completed for all patients at the 1, 2, and 4 week post-operative visit following control or stem cell therapy treatment. (B) Wound healing and (C) pain were equivalent between the two treatment groups throughout the post-operative periods.

**Supplementary Figure S3. *Quality of Life Assessment.*** At the completion of all study-related treatment procedures, all patients completed the five question “Life Quality Assessment” survey and all, except one patient in the control group, indicated that they would have the same procedures performed again, if necessary.

**Supplementary Figure S4. *Higher clinical bone density of regenerated bone with stem cell therapy.*** The Misch (Misch C, 1989) bone density scale was used as a clinical tactile measure of

bone hardness during drilling of the regenerated tissue harvested for biopsy. Using this classification, bone density is classified on a scale from D1 to D5, with D1 being the most dense bone and D5 being the softest (least dense) bone. Bone was more dense in the stem cell therapy relative to the control group (higher number of sites with D2 vs. D3 bone).

**Supplementary Table S1. *Adverse event summary***

**Supplementary Table S2. *Clinical data from treatment procedures***

**Supplementary Table S3. *Patient characteristics of stem cell populations***

**Supplementary Video S1. *Alveolar bone reconstruction procedure with sinus floor augmentation using stem cell therapy.***