

Supplementary Materials

TyroFill–Titanium Implant Constructs for the Coordinated Repair of Rabbit Mandible and Tooth Defects

Weibo Zhang ¹, Joachim Kohn ² and Pamela C. Yelick ^{1,*}

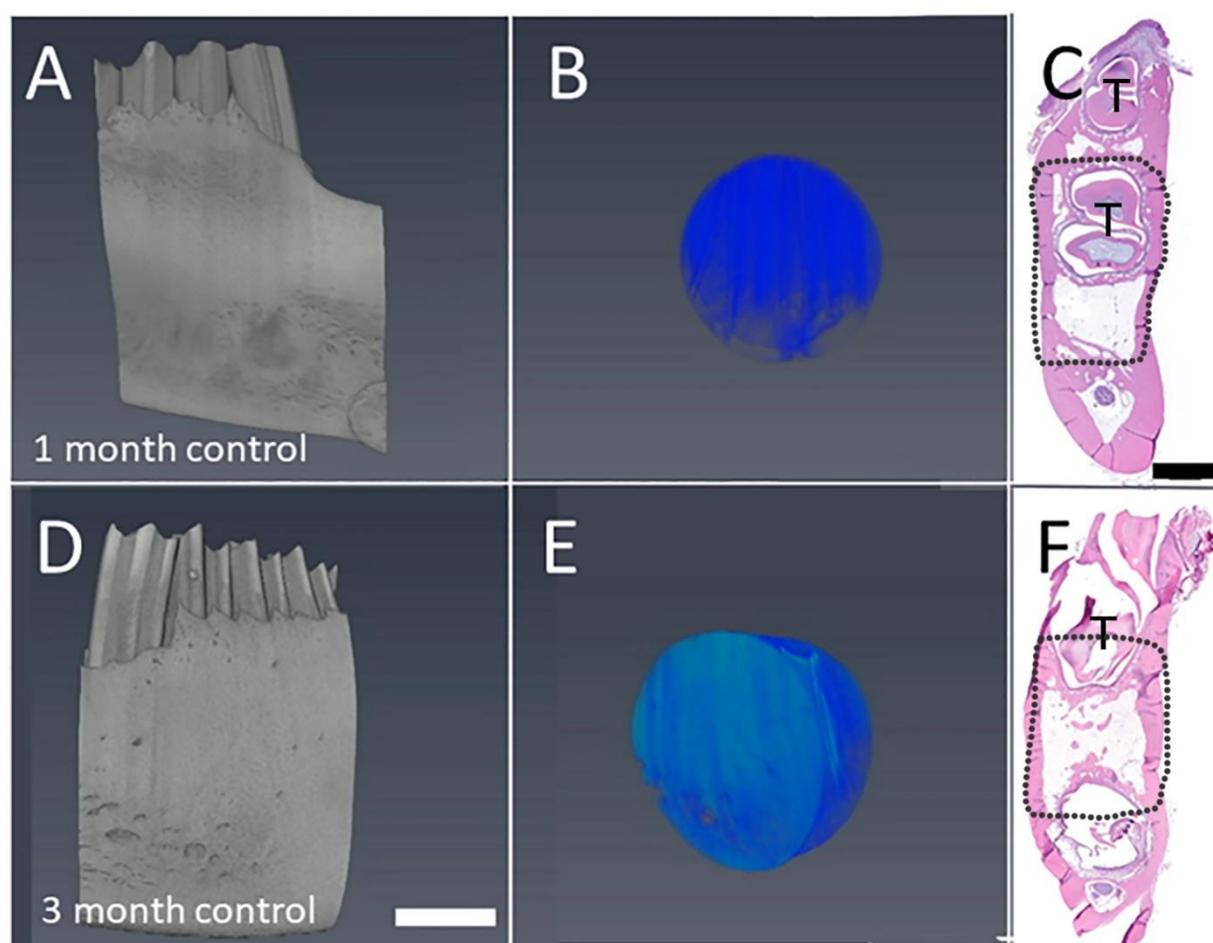


Figure S1. Microcomputed tomography (μ CT) and histology of unoperated control mandibles. (A,B) 1 month and (D,E) 3 months control mandibles. (A,D) 3D reconstructed μ CT data. (B,E) A selected 10 mm x 6 mm region of interest. H,E stained sectioned 1 month (C) and 3 months (F) control mandibles. Dotted lines indicate the approximate position of implant placement. Abbreviations: T, Tooth. Scale bars = 2mm.

Table S1: Microcomputed tomography (μ CT) data of harvested implants. TryoFill constructs showed improved new bone formation as compared to previously used E1001(1K)-bTCP constructs. No significant differences were observed due to the limited number of implants placed in this study.

| TryoFill | | Bone Density | BV/TV (%) | Trabecular Thickness (mm) |
|----------|-------------|-----------------|-------------------|---------------------------|
| 1M | Cell seeded | 0.65 ± 0.02 | 19.65 ± 5.87 | 0.33 ± 0.13 |
| | Acellular | 0.70 ± 0.11 | 15.35 ± 3.81 | 0.26 ± 0.00 |
| | Control | 0.67 ± 0.13 | 61.12 ± 11.02 | 0.65 ± 0.05 |
| 3M | Cell seeded | 0.38 ± 0.08 | 56.05 ± 10.13 | 0.87 ± 0.52 |
| | Acellular | 0.56 ± 0.01 | 39.42 ± 10.98 | 0.51 ± 0.00 |
| | Control | 0.62 ± 0.08 | 53.50 ± 4.22 | 0.58 ± 0.07 |

| E1001(1K)-bTCP | | Bone Density | BV/TV (%) | Trabecular Thickness (mm) |
|----------------|-------------|-----------------|-------------------|---------------------------|
| 1M | Cell seeded | 0.54 ± 0.06 | 5.79 ± 2.47 | 0.07 ± 0.04 |
| | Acellular | 0.46 ± 0.12 | 13.05 ± 6.8 | 0.11 ± 0.01 |
| | Control | 0.47 ± 0.24 | 49.67 ± 0.00 | 0.264 ± 0.00 |
| 3M | Cell seeded | 0.52 ± 0.06 | 19.45 ± 10.57 | 0.19 ± 0.11 |
| | Acellular | 0.4 ± 0.10 | 18.51 ± 0.00 | 0.19 ± 0.00 |
| | Control | 0.42 ± 0.21 | 42.94 ± 0.00 | 0.43 ± 0.00 |

Table S2: EDAX analysis of Ti Dental Implant Surfaces. Calcium was not detected on the surface of unimplanted control or 1-week *in vitro* cultured acellular Ti dental implants. Calcium was detected on the surface of Ti dental implants removed from 1 month and 3 month implanted constructs, although no obvious trend was observed likely due to the limited number of samples used in this study.

| Ca ⁺⁺ | % Weight | |
|--------------------|----------|-------|
| | Average | SD |
| Unoperated Control | 0.00% | 0.000 |
| 1W Cell seeded | 0.17% | 0.002 |
| 1W Acellular | 0.00% | 0.000 |
| 1M Cell seeded | 1.04% | 0.013 |
| 1M Acellular | 0.49% | 0.005 |
| 3M Cell seeded | 0.13% | 0.001 |
| 3M Acellular | 0.62% | 0.007 |

Supplemental Videos 1–6:

Video S1. μ CT analysis of a cell-seeded construct after 1 month implantation. Scattered radio-opaque areas indicate calcified tissue formation throughout the implant site.

Video S2. μ CT analysis of an acellular construct after 1 month implantation. Very few radio-opaque areas of calcification were observed throughout the implant site.

Video S3. μ CT analysis of an unoperated control mandible at 1 month.

Video S4. μ CT analysis of a cell-seeded construct after 3 months implantation. Highly calcified mineralized tissue nodules indicative of new bone formation were observed throughout the implanted site.

Video S5. μ CT analysis of an acellular construct after 3 months implantation. Newly formed bone can be observed throughout the implant, but less than seen in cell-seeded constructs.

Video S6. μ CT CT analysis of an unoperated control mandible at 3 months.