In Vivo Comparative Evaluation of Biocompatibility and Biodegradation of Bovine and Porcine Collagen Membranes

Abdu Mansur Dacache Neto, Suelen Cristina Sartoretto, Isabelle Martins Duarte, Rodrigo Figueiredo de Brito Resende, Adriana Terezinha Neves Novellino Alves, Carlos Fernando de Almeida Barros Mourão, Jose Calasans-Maia, Pietro Montemezzi, Gilson Coutinho Tristão and Mônica Diuana Calasans-Maia

1 Graduate Program, Dentistry School, Universidade Federal Fluminense, Niteroi 24020-140, RJ, Brazil; abdudacache@globo.com (A.M.D.N.)
2 Oral Surgery Department, Dentistry School, Universidade Veiga de Almeida, Rio de Janeiro 20271-020, RJ, Brazil; susartoretto@hotmail.com (S.C.S.)
3 Oral Surgery Department, Dentistry School, Universidade Iguaçu, Nova Iguaçu 26260-045, RJ, Brazil; resende.r@hotmail.com (R.F.D.B.R.);
4 Clinical Research Laboratory in Dentistry, Universidade Federal Fluminense, Niteroi 24020-140, RJ, Brazil; monicacalasansmaia@gmail.com (M.D.C.-M.)
5 Post-Graduation Program in Dentistry, Universidade Veiga de Almeida, Rio de Janeiro 20271-020, RJ, Brazil; marciiodonto@terra.com.br (I.M.D.)
6 Oral Surgery Department, Universidade Federal Fluminense, Niteroi 24020-140, RJ, Brazil;
7 Oral Diagnosis Department, Universidade Federal Fluminense, Niteroi 24020-140, RJ, Brazil; aterezinhanovellino@gmail.com (A.T.N.N.A.)
8 Post-Graduation Program in Biotechnology, Universidade Federal Fluminense, Niteroi 24020-140, RJ, Brazil; mouraocf@gmail.com (C.F.D.A.B.M.)
9 Orthodontics Department, Universidade Federal Fluminense, Niteroi 24020-140, RJ, Brazil; josecalans@id.uff.br (J.C.-M.)
10 Private Practice, 24128 Bergamo, Italy; m.montemezzi@libero.it (P.M.)
11 Periodontics Department, Universidade Federal Fluminense, Niteroi 24020-140, RJ, Brazil; gilsontb@vm.uff.br (G.C.T.)
* Correspondence: monicacalasansmaia@gmail.com; Tel.: +55-21-98153-5884
Table S1. Semiquantitative evaluation seven days post-implantation. The collected data from the semiquantitative analysis were used to evaluate the tissue reaction and biocompatibility, as suggested in ISO 10993-6. The values for each animal are a median of 10 sections evaluated per animal.

| Animals              | SHAM | BioGide® | Lyostypt® |
|----------------------|------|----------|-----------|
| Polymorphonuclear    | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5 |
| Lymphocytes          | 1 1 1 1 2 | 1 1 1 1 1 | 1 1 1 1 2 |
| Plasma Cells         | 1 0 1 1 | 1 2 2 1 | 1 2 2 1 |
| Macrophages          | 2 1 1 2 | 1 1 1 1 | 3 3 3 3 |
| Giant cells          | 0 0 0 0 0 | 0 0 0 0 0 | 1 2 1 1 2 |
| Necrosis             | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 |
| Score from inflammatory cells SUBTOTAL (X 2) | 10 8 6 8 10 10 8 10 10 10 8 18 |
| Neovascularization   | 0 0 0 0 0 | 1 1 1 1 | 0 1 1 2 1 2 |
| Fibrosis             | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 0 |
| Fatty infiltrate     | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 0 |
| Score from tissue response SUB-TOTAL | 0 0 0 0 0 | 1 1 1 1 | 0 1 1 2 1 2 |
| Averge               | 8.4 | 10 | 12.6 |
| Result (Test-control) | --- | 1.6 | 4.2 |

Table S2. Semiquantitative evaluation 21 days post-implantation. The collected data from the semiquantitative analysis were used to evaluate the tissue reaction and biocompatibility, as suggested in ISO 10993-6. The values for each animal are a median of 10 sections evaluated per animal.

| Animals              | SHAM | BioGide® | Lyostypt® |
|----------------------|------|----------|-----------|
| Polymorphonuclear    | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5 |
| Lymphocytes          | 0 0 1 1 0 | 1 2 2 2 2 | 2 2 2 2 2 |
| Plasma Cells         | 0 0 0 0 1 | 1 1 1 0 | 0 0 0 0 0 |
| Macrophages          | 1 1 1 1 2 | 0 1 1 3 3 | 3 3 3 3 3 |
| Giant cells          | 0 0 0 0 0 | 0 1 0 0 0 | 0 1 1 1 1 |
| Necrosis             | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 |
| Score from inflammatory cells SUBTOTAL (X 2) | 6 4 6 6 10 4 12 10 14 14 14 14 16 14 14 |
| Neovascularization   | 0 0 0 0 0 | 1 1 2 2 2 | 2 3 2 3 3 1 |
| Fibrosis             | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 0 |
| Fatty infiltrate     | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 0 |
| Score from tissue response SUB-TOTAL | 0 0 0 0 0 | 1 1 2 2 2 | 2 3 2 3 3 1 |
| Averge               | 6.4 | 12.4 | 16.6 |
| Result (Test – control) | --- | 6 | 10.2 |
Table S3. Semiquantitative evaluation 63 days post-implantation. The collected data from the semiquantitative analysis were used to evaluate the tissue reaction and biocompatibility, as suggested in ISO 10993-6. The values for each animal are a median of 10 sections evaluated per animal.

| 7 days | SHAM | BioGide® | Lyostypt® |
|--------|------|----------|-----------|
| Animals | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5 |
| Polymorphonuclear | 1 2 1 1 1 | 1 1 1 2 1 | 0 1 1 1 1 |
| Lymphocytes | 1 0 0 0 1 | 2 2 2 2 2 | 1 2 2 1 1 |
| Plasma Cells | 0 0 0 0 0 | 1 0 0 0 1 | 1 0 1 1 1 |
| Macrophages | 1 1 1 1 1 | 3 3 3 2 3 | 0 2 1 3 3 |
| Giant cells | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 |
| Necrosis | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 |
| Score from inflammatory cells | 6 6 4 4 6 | 14 12 12 12 14 | 4 10 10 12 12 |
| Neovascularization | 0 0 0 0 0 | 1 1 1 1 2 | 1 0 1 0 0 |
| Fibrosis | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 |
| Fatty infiltrate | 0 0 0 0 0 | 0 0 0 0 0 | 0 0 0 0 0 |
| Score from tissue response | 0 0 0 0 0 | 1 1 1 1 2 | 1 0 1 0 0 |
| SUB-TOTAL | | | |
| TOTAL | 6 6 4 4 6 | 15 13 13 13 16 | 5 10 11 12 12 |
| Avarage | 5.2 | 15.2 | 10 |
| Result (Test–control) | --- | 10 | 4.8 |