Table S1. Descriptive statistics of mobilized hBM-MSCs into alginate-Ln and col-I scaffolds. Quantification of viable/dead cells present within alginate-Ln and col-I scaffolds with/without mechanical loading. The mechanical stimulation did not affect the cell viability. n= 4, number of donors from which technical replicates were performed.

| Scaffold     | Group  | Viability | Mean (cells/mm$^3$) | Std Dev | Median | Max | Min |
|--------------|--------|-----------|---------------------|---------|--------|-----|-----|
| Alginate-Ln  | -Loading | Non-viable | 1                   | 1       | 1      | 2   | 0   |
|              | -Loading | Viable    | 4                   | 2       | 4      | 6   | 1   |
|              | +Loading | Non-viable | 2                   | 2       | 2      | 4   | 0   |
|              | +Loading | Viable    | 8                   | 5       | 9      | 12  | 1   |
| Col-I        | -Loading | Non-viable | 3                   | 2       | 3      | 5   | 1   |
|              | -Loading | Viable    | 22                  | 6       | 21     | 32  | 17  |
|              | +Loading | Non-viable | 17                  | 12      | 17     | 32  | 3   |
|              | +Loading | Viable    | 245                 | 42      | 237    | 300 | 205 |
Analysis of variance (ANOVA) comparing the model

The SAS software was used to perform an Analysis of variance (ANOVA) of the model to compare the model composed by the variables: type of scaffold (“scaffold”), mechanical stimulation (“loading”), cell viability (“viability”) and donor (“donor”). The GLM (Generalized Linear Model) procedure was applied for weighted analysis with “Cells per mm$^3$” as dependent variable.

The GLM Procedure
Dependent Variable: Cells per mm$^3$
Weight: weighting

Table S2. ANOVA table. The overall $F$ test is significant ($F = 53.16$ and $p < 0.001$), indicating that the model as a whole accounts for a significant amount of the variation in “cells per mm$^3$”. This shows that it is appropriate to test the effects.

| Source       | DF  | Sum of Squares | Mean Square | $F$ Value | Pr > $F$ |
|--------------|-----|----------------|-------------|-----------|----------|
| Model        | 31  | 201267.9784    | 6492.5154   | 53.16     | <.0001   |
| Error        | 60  | 7328.0256      | 122.1338    |           |          |
| Corrected Total | 91 | 208596.0040    |             |           |          |

$DF$: degrees of freedom, MSE: mean square error, SS: sum of squares.

Table S3. Simple Statistics. The R-Square indicates that the model accounts for 96% of variation in “cells per mm$^3$”. The coefficient of variation, Root Mean Square for Error, and mean of the dependent variable are also listed.

| R-Square | Coeff Var | Root MSE | Cells per mm$^3$ |
|----------|-----------|----------|------------------|
| 0.964870 | 29.84819  | 11.05141 | 37.02540         |

$MSE$: mean square error, Coeff Var: coefficient of variation.

Table S4. Test of effects of type III sum of squares. According to a significance level of 5%, the interaction between donor with any of the other variables (scaffold, loading, or viability) is not significant ($p > 0.05$ in all cases between the interactions with donor). This indicates that donor does not depend of the variables scaffold, loading, nor viability, and vice versa. There is a significant effect ($p < 0.05$) for the individual variables scaffold, loading, and viability, and their respective interactions, but not for donor ($p < 0.05$). Looking at the interaction between the variables Donor, Scaffold, Loading and Viability, $p = 0.0388$ indicates a difference in cell count.

| Source                  | DF  | Type III SS | Mean Square | $F$ Value | Pr > $F$ |
|-------------------------|-----|-------------|-------------|-----------|----------|
| Scaffold                | 1   | 35649.81445 | 35649.81445 | 291.89    | <.0001   |
| Loading                 | 1   | 27555.15549 | 27555.15549 | 225.61    | <.0001   |
| Viability               | 1   | 33674.21779 | 33674.21779 | 275.72    | <.0001   |
| Donor                   | 3   | 248.91832   | 82.97277    | 0.68      | 0.5681   |
| Scaffold x Loading      | 1   | 25426.44509 | 25426.44509 | 208.19    | <.0001   |
| Scaffold x Viability    | 1   | 29532.38296 | 29532.38296 | 241.80    | <.0001   |
| Scaffold x Loading x Viability | 2 | 44246.28733 | 22123.14366 | 181.14    | <.0001   |
| Scaffold x Donor        | 3   | 634.93416   | 211.64472   | 1.73      | 0.1699   |
| Loading x Donor         | 3   | 558.30072   | 186.10026   | 1.52      | 0.2176   |
| Viability x Donor       | 3   | 531.87300   | 177.29100   | 1.45      | 0.2368   |
| Scaffold x Loading x Donor | 3 | 756.08832   | 252.02944   | 2.06      | 0.1146   |
| Scaffold x Viability x Donor | 3 | 701.87587   | 233.95862   | 1.92      | 0.1367   |
| Scaffold x Loading x Viability x Donor | 6 | 1751.68482 | 291.94747   | 2.39      | 0.0388   |

$DF$: degrees of freedom, SS: sum of squares.
Statistical pairwise comparison of the cell count by donor

Pairwise least square means comparison between the counts of cells per mm$^3$ for the donors. The calculations were made using the SAS software.

ANOVA: Comparisons (Alginate-Ln/Col-I scaffolds, Donor)

The GLM Procedure
Least Squares Means
Adjustment for Multiple Comparisons: Sidak

Table S5. Least Square-Means of “Cells per mm$^3$” for every donor.

| Donor  | Cells per mm$^3$ | LSMEAN   | Number |
|--------|-----------------|----------|--------|
| Donor 1| 34.5022383      | 1        |
| Donor 2| 37.3481749      | 2        |
| Donor 3| 34.7921832      | 3        |
| Donor 4| 41.4590220      | 4        |

LSMEAN: Least squares means.

Table S6. p-values for pairwise LS-Mean matrix comparing the differences of the cell count regarding the donor. The multiple comparison analysis show that the different donors have similar effects regarding the dependent variable “Cells per mm$^3$”.

| i/j | 1     | 2     | 3     | 4     |
|-----|-------|-------|-------|-------|
| 1   | 0.9964| 1.0000| 0.7622|
| 2   | 0.9964| 0.9980| 0.9752|
| 3   | 1.0000| 0.9980| 0.7954|
| 4   | 0.7622| 0.9752| 0.7954|
Statistical pairwise comparison of the cell count in alginate-Ln and col-I scaffolds

Pairwise least square means comparison between the counts of cells per mm$^3$ for all the experimental conditions. The calculations were made using the SAS software.

ANOVA: Comparison (Alginate-Ln/Col-I scaffolds)

The GLM Procedure
Least Squares Means
Adjustment for Multiple Comparisons: Sidak

Table S7. Least Square-Means of “Cells per mm$^3$” for the conditions “scaffold”, “loading” and “viability”.

| Scaffold | Loading | Viability | Cells per mm$^3$ | LSMEAN | Number |
|----------|---------|-----------|-----------------|--------|--------|
| Alginate-Ln | + Loading | Non-viable | 2.066667 | 1 |
| Alginate-Ln | + Loading | Viable | 7.541667 | 2 |
| Alginate-Ln | - Loading | Non-viable | 1.108333 | 3 |
| Alginate-Ln | - Loading | Viable | 3.875000 | 4 |
| Col-I | + Loading | Non-viable | 12.534435 | 5 |
| Col-I | + Loading | Viable | 243.336777 | 6 |
| Col-I | - Loading | Non-viable | 2.634298 | 7 |
| Col-I | - Loading | Viable | 23.106061 | 8 |

LSMEAN: Least squares means.

Least Squares Means for effect Scaffold*Loading*Viability
Pr > |t| for H0: LSMean(i)=LSMean(j)
Dependent Variable: Cells per mm$^3$

Table S8. p-values for pairwise LS-Mean matrix comparing the differences of the cell count for the conditions “scaffold”, “loading” and “viability”. The multiple comparison analysis show that the condition with “col-I scaffold”, “+ loading” and “viable cells” had significant effects regarding the dependent variable “Cells per mm$^3$” with respect to the other conditions.

| i/j | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | 1.0000 | 1.0000 | 1.0000 | 0.9993 | <.0001 | 1.0000 | 0.3791 |
| 2   | 1.0000 | 1.0000 | 1.0000 | 1.0000 | <.0001 | 1.0000 | 0.8869 |
| 3   | 1.0000 | 1.0000 | 1.0000 | 0.9972 | <.0001 | 1.0000 | 0.2993 |
| 4   | 1.0000 | 1.0000 | 1.0000 | 1.0000 | <.0001 | 1.0000 | 0.5553 |
| 5   | 0.9993 | 1.0000 | 0.9972 | 1.0000 | <.0001 | 0.9997 | 0.9992 |
| 6   | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 |
| 7   | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9997 | <.0001 | 0.4315 |
| 8   | 0.3791 | 0.8869 | 0.2993 | 0.5553 | 0.9992 | <.0001 | 0.4315 |
Supplementary figures

**Figure S1. Comparison of porcine and human cell sizes in culture.** pBM-MSCs (a) are smaller than hBM-MSCs (b). Both images show cells in passage 1. Scale bar: 100 μm.

**Figure S2. Preparation of col-I scaffolds.** The col-I scaffolds were prepared using 10 % BDDGE as crosslinker of col-I solution at pH 5.0 and room temperature for 48 hours. (a) Schematic representation of the crosslink between collagen and BDDGE. The amine groups from the collagen react with the terminal epoxide residues of BDDGE, causing the crosslink between collagen molecules. (b) Stable scaffolds in shape were obtained as confirmed by the boundaries of the scaffold seen macro- (b) and microscopically (c). (d) Optical microscopic view of the col-I scaffolds edge (orange circle in b) at 10X. (d) Confocal microscopy of the col-I scaffold network with COL1A staining. Dimension of the 3D image: 180 (x), 180 (y), 20 (z) μm. BDDGE: 1,4-Butanediol diglycidyl ether, COL1A: monoclonal antibody against collagen-1A.