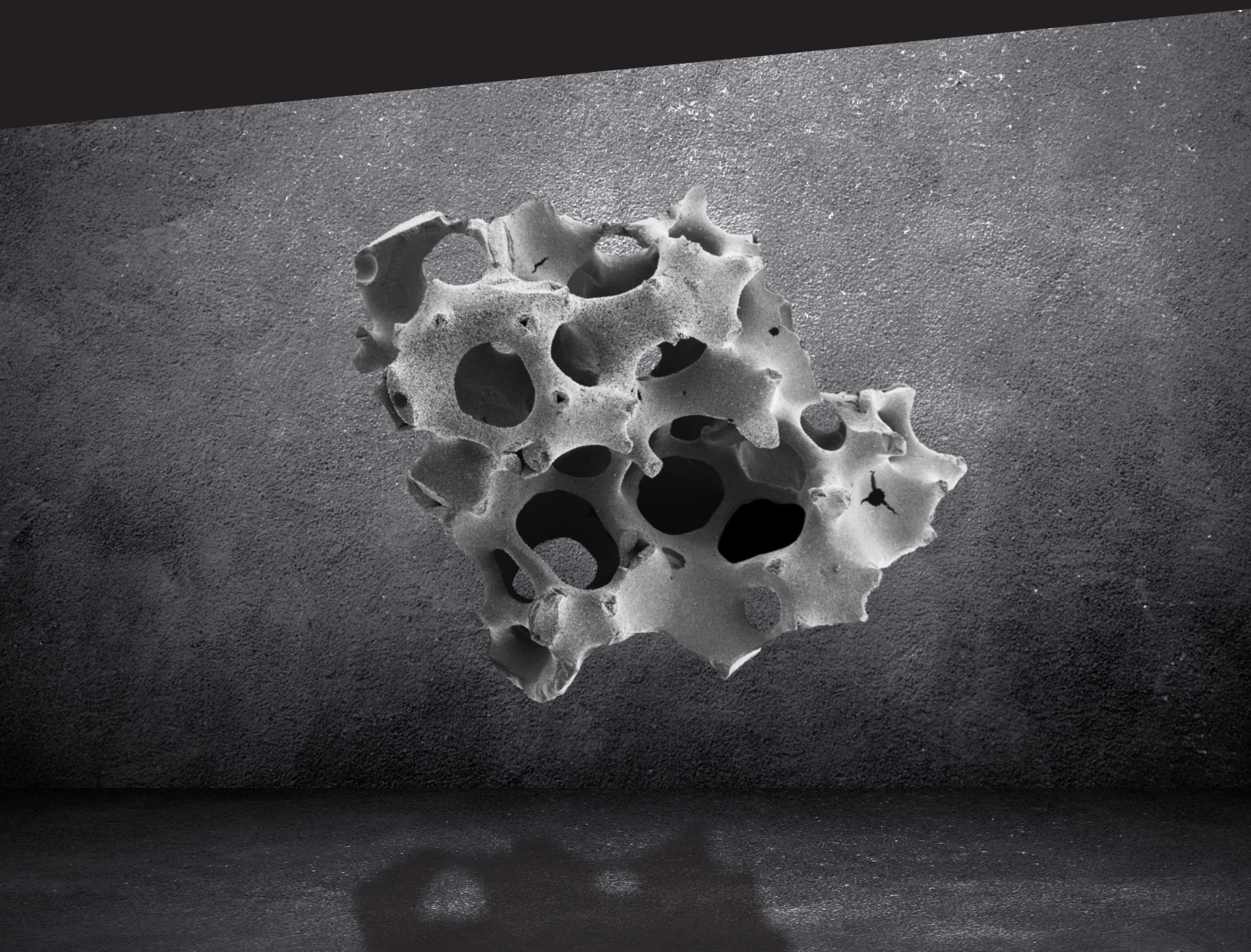
CELLING BIOSCIENCES

DELIVERY

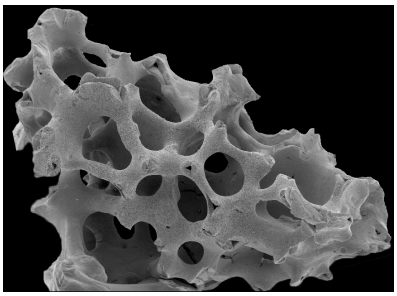
SOLUM IV

The Inorganic Solution to Organic Bone Growth

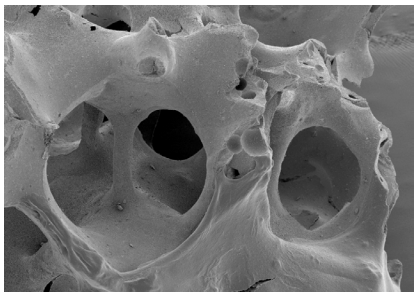


SOLUM IV

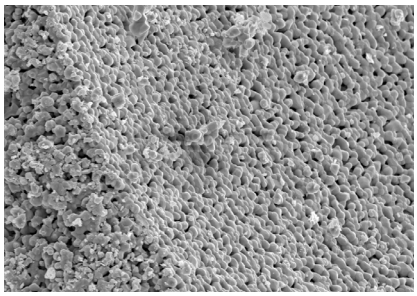
Solum IV is a synthetic extracellular matrix biomaterial with a well-organized architecture of interconnected pores designed to support cell adhesion, migration, and proliferation[1]. Utilizing a naturally-derived biopolymer, Solum IV, when combined with bone marrow aspirate, becomes a moldable, three-dimensional structure capable of conforming to the full geometry of the recipient site, creating an *in vivo* bioreactor for bone growth. The hydroxyapatite particles utilize their high porosity and interconnecting macro-structures to facilitate transportation of nutrients and fluids, leading to production of new tissue through cell-to-cell communication, as well as communication with the surrounding environment.



Structural View



Macro-View



Micro-View

FEATURES

Proprietary Processing

- Designed for cells
- Unique pore size and structure
- Versatility in design

Novel Structure

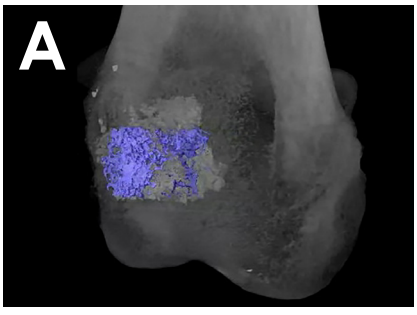
- Biomimetic architecture
- Large continuous surface area
- Optimized to support neovascularization

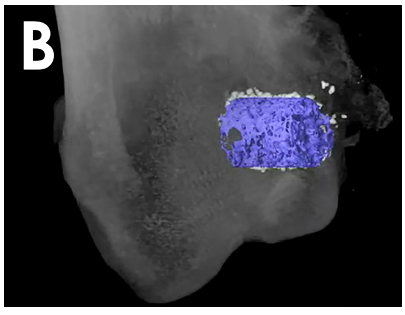
Environmentally Intelligent

- Moldable
- Supports the natural healing process
- Facilitates proliferation[1]

Results-Driven

- Enhanced cell attachment[1]
- Osteogenic gene expression activated in vitro[1]
- In vivo bone growth





RESULTS-DRIVEN

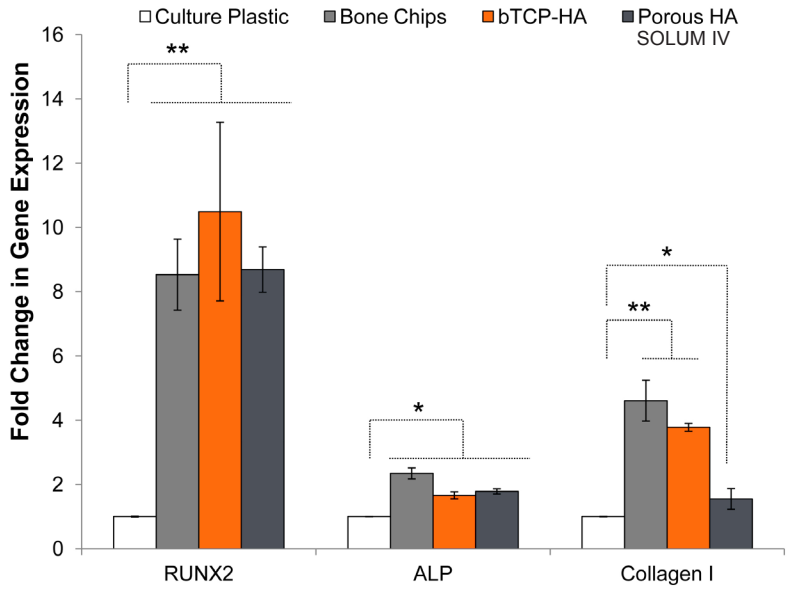
MicroCT images of rabbit critical size defect at 13 weeks, new bone formation shown in purple. (A) Commercially available bone void filler with similar chemical composition. (B) Celling Biosciences' Solum IV.

ENVIRONMENTAL INTELLIGENCE

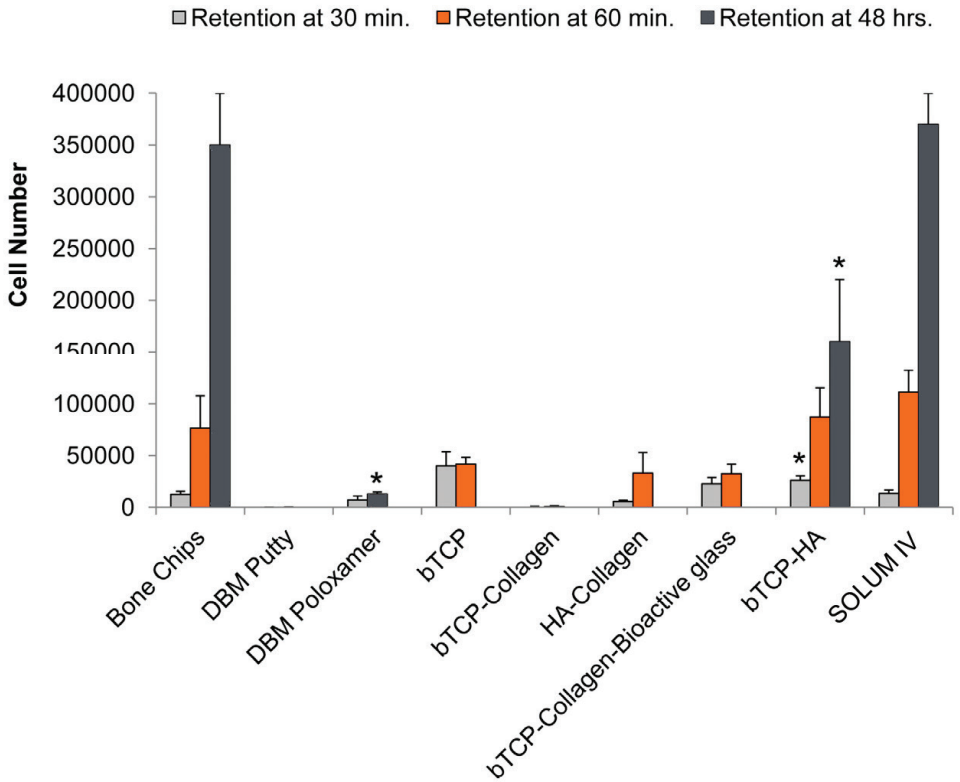
[1]Table 1. Average pH values of substrates buffered in human plasma over 48 hours (pH values in phosphate buffered saline in parentheses).

Substrate	1 min	5 min	30 min	60 min	24 h	
βTCP-Collagen-Bioactive glass	8.47 (6.73)	9.67 (7.33)	9.68 (7.95)	9.57 (9.16)	10.09 (10.49)	Highly Basic
DBM putty	7.66 (7.11)	7.75 (7.34)	7.72 (7.55)	7.62 (7.52)	7.92 (7.53)	Within Physiological Range
Cancellous bone chips	7.61 (7.21)	7.65 (7.17)	7.59 (7.17)	7.47 (7.17)	7.75 (7.14)	
Collagen	7.66 (7.33)	7.62 (7.40)	7.49 (7.30)	7.47 (7.39)	7.15 (7.35)	
SOLUM IV	7.54 (7.23)	7.56 (7.24)	7.50 (7.33)	7.42 (7.39)	7.74 (7.36)	
βTCP-HA	7.54 (7.20)	7.73 (7.25)	7.48 (7.20)	7.39 (7.21)	7.80 (7.22)	
HA-Collagen	7.44 (6.94)	7.47 (6.98)	7.37 (7.06)	7.32 (7.08)	7.61 (6.85)	
βTCP-Collagen	7.32 (7.01)	7.38 (6.91)	7.44 (6.84)	7.29 (6.71)	7.65 (6.62)	Slightly Acidic
DBM strip	7.42 (6.70)	7.34 (6.38)	7.24 (6.39)	7.14 (6.46)	5.44 (6.27)	
DBM poloxamer	6.23 (6.74)	6.13 (6.07)	5.61 (5.06)	4.87 (4.66)	4.95 (4.42)	Highly Acidic

[1]Figure 2. Relative expression of Runx2, alkaline phosphatase, and type I collagen as a fold increase over tissue culture plastic by cells incubated with cancellous bone chips, TCP-HA, and porous HA granules after 48h of incubation at 37°C. Error bars represent standard error of the mean (n = 4 per substrate). Asterisks denote significant difference (* $p < 0.05$, ** $p < 0.01$) by ANOVA and Tukey post test.



[1]Figure 3. In an *in vitro* setting, bone marrow stromal cell retention on 9 different commercially available, insolubilized substrates after 30 minutes, 60 minutes, and 48 hours of incubation at 37°C. Error bars represent standard error of the mean (n = 4 per substrate). Asterisk denotes significant difference (* $p < 0.05$) against the appropriate bone chip measurements by ANOVA and Dunnett post test.



[1]Murphy et al., J. Clin. Med. 2013, 2, 49-66.

Literature Number: 1299-0003-MRK Rev D per DCR 0825

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