

Bioactive Glass and its Clinical Significance in Wound Healing

D.E. Day¹, S.B. Jung², C.W. Lewis³, C.M. Zelen⁴, D.G. Armstrong⁵, W.W. Li⁶

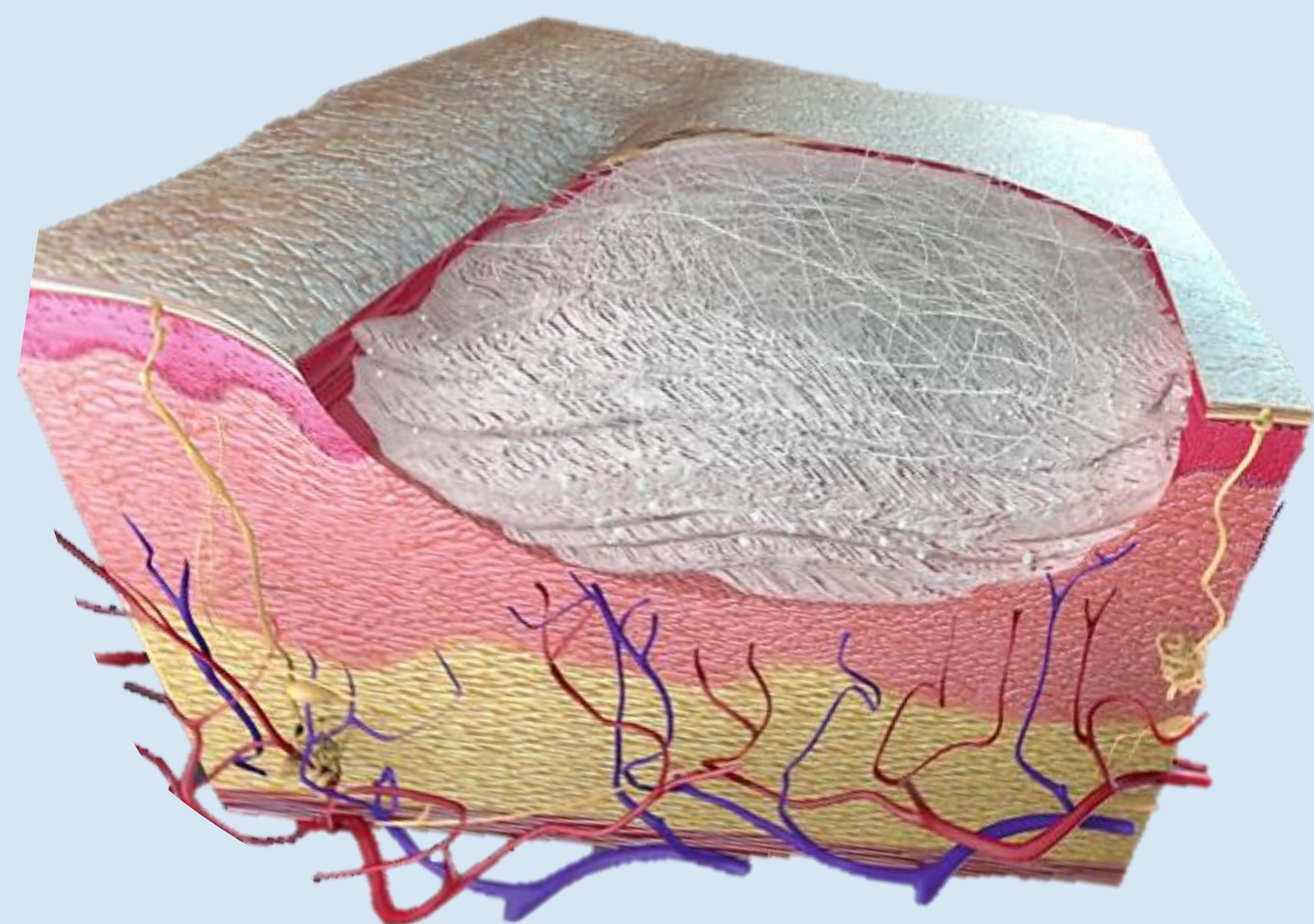
¹Missouri Science & Technology; ²Mo-Sci Corporation; ³ETS Wound Care; ⁴Professional Education and Research Institute;

⁵University of Southern California – SALSA, ⁶Angiogenesis Foundation

Introduction

- New and innovative technologies are essential to easily and cost effectively manage chronic wounds.

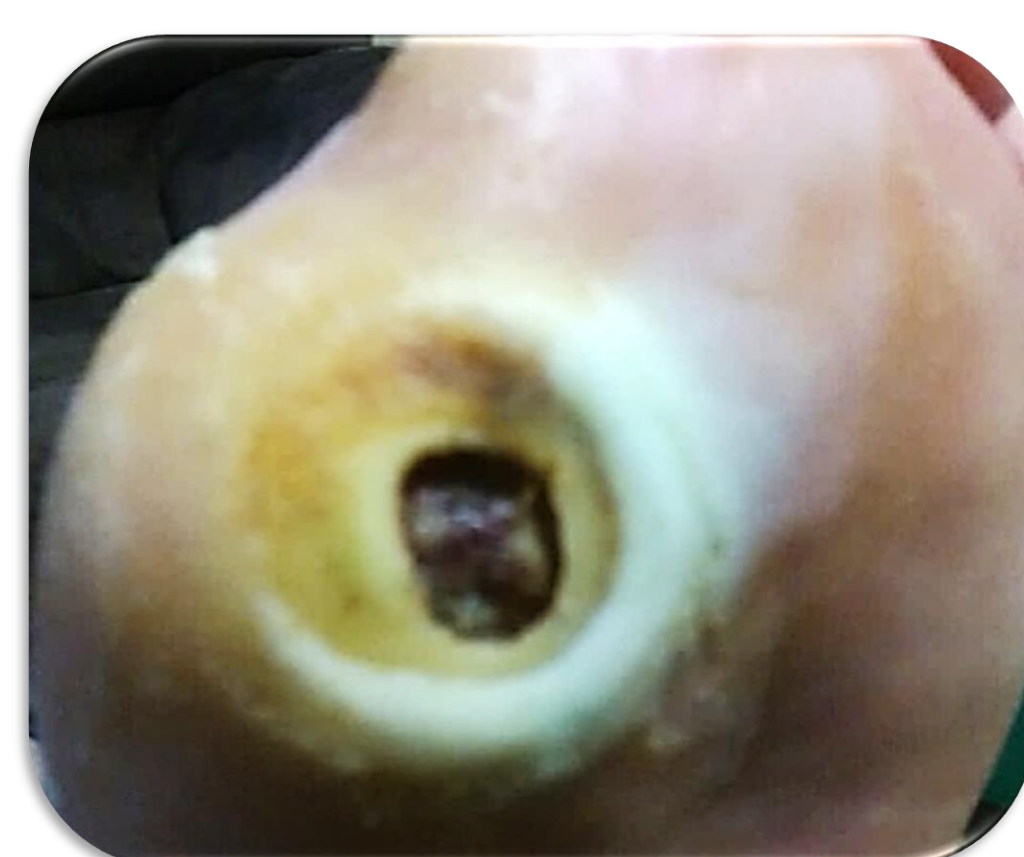
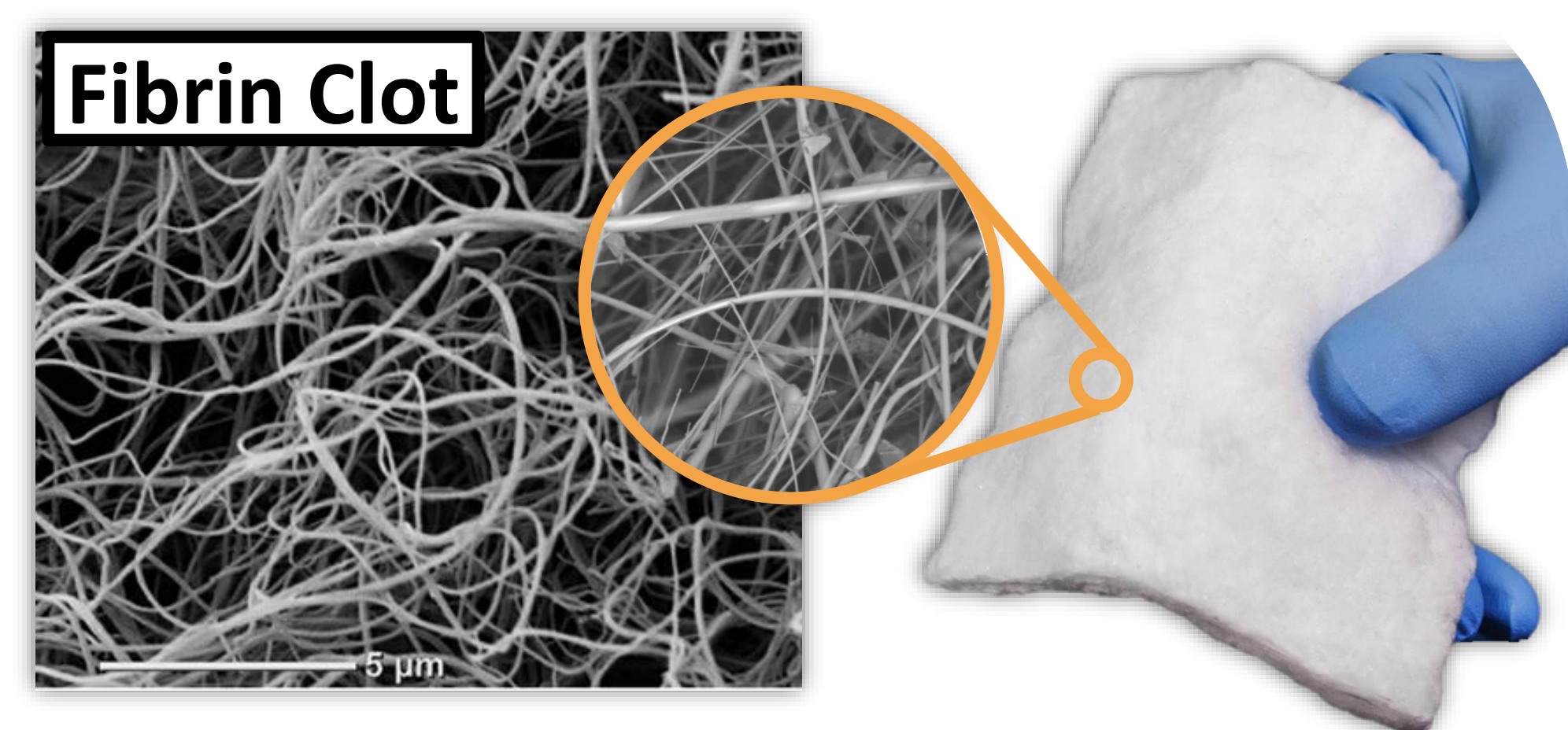
What is Bioactive Glass?



- Inorganic¹
- Synthetic¹
- Bioresorbable¹
- A glass material family with primary constituents normally found in blood plasma (e.g., calcium, potassium, magnesium, sodium, phosphorus)¹
- Biocompatible¹
- Compatible with different form factors (e.g., powders, fibers, 3-D structures)¹
- Bioactive properties studied +40 years¹
- Decades of human clinical history for many healthcare applications¹

Bioactive Glass in Wound Healing

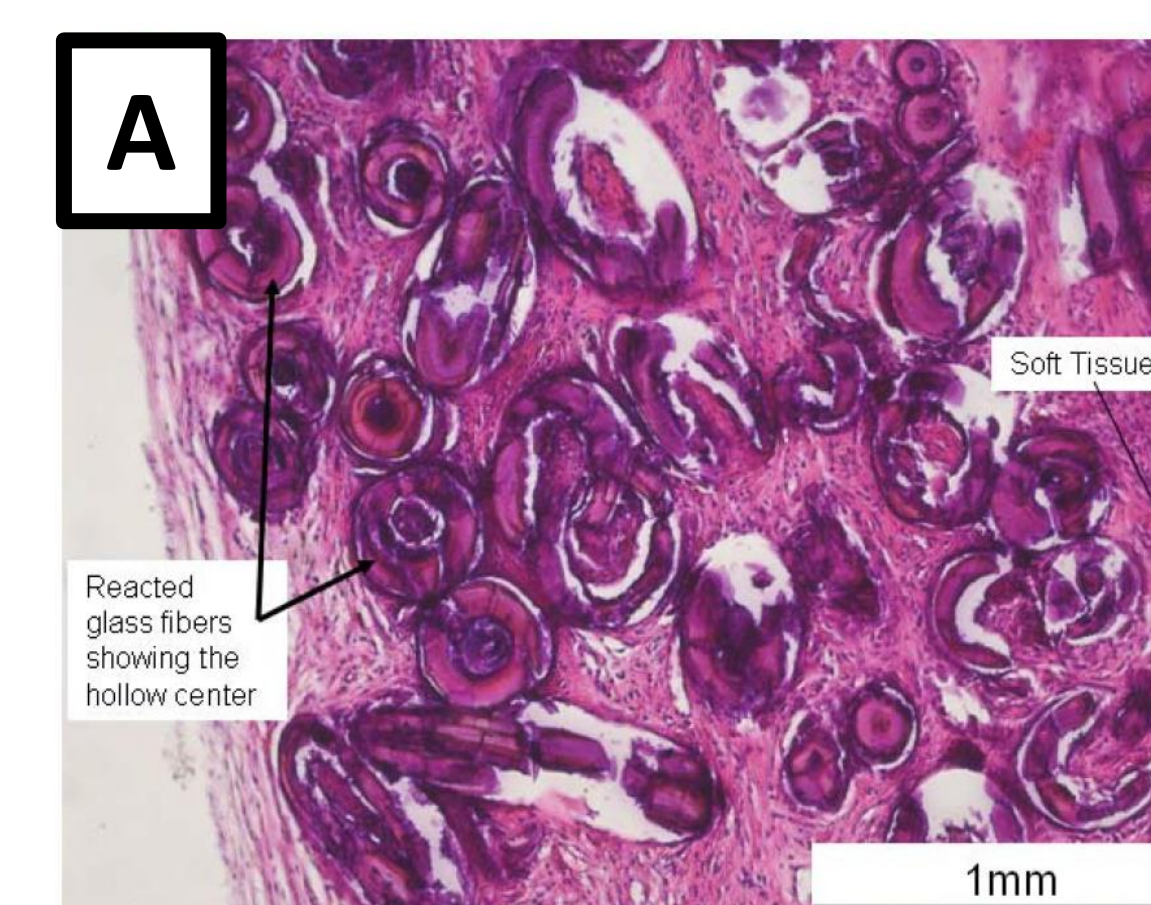
1. Conforms to any shape²
2. Provides thermal insulation²
3. Mimics fibrin clot microenvironment⁴
4. Absorbs wound exudate⁴
5. Completely dissolves releasing its constituents⁴
6. Demonstrated effectiveness in chronic wounds



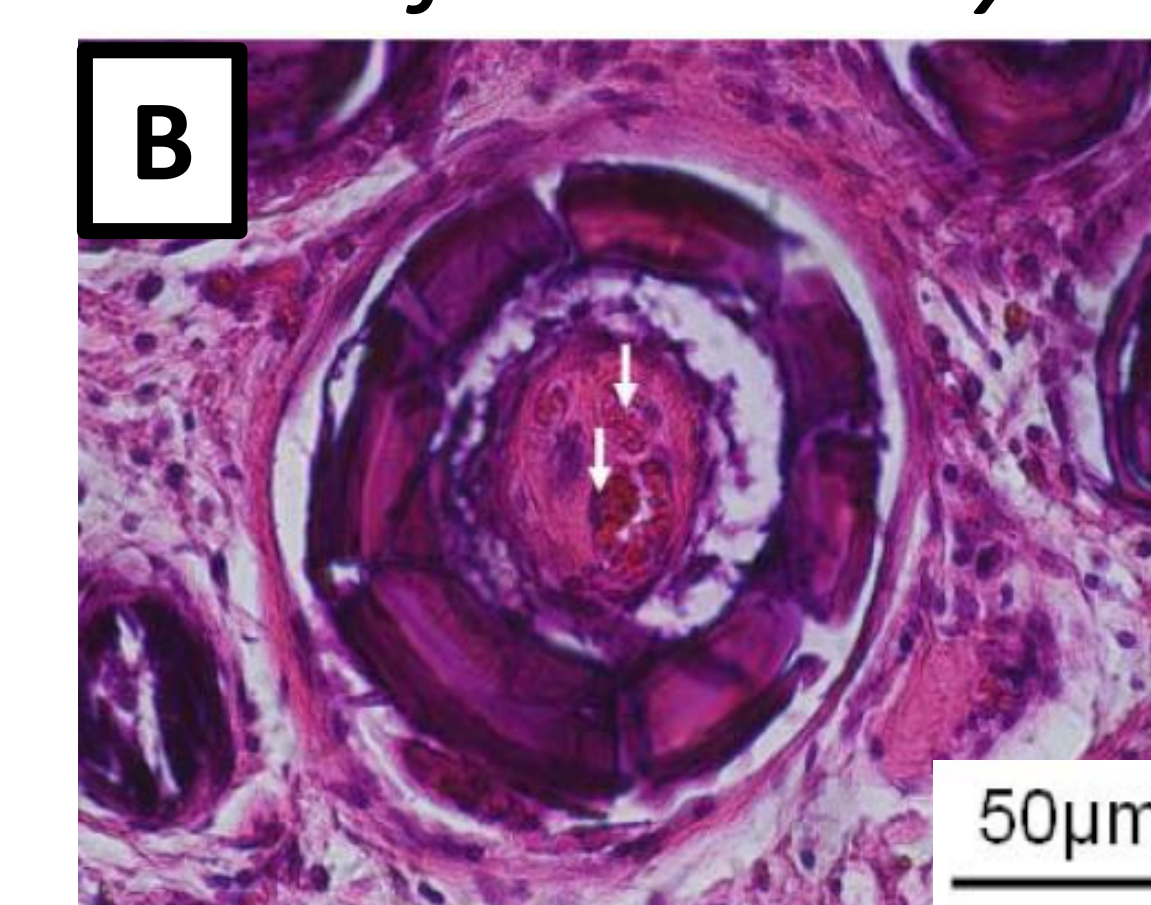
80yo Male, Wagner 3
Healed in 33 days using
bioactive glass

7. Potential therapeutic effects related to composition (*not FDA approved indications*):

Angiogenic^{4,6}
Hemostatic⁷



Anti-infective⁵
Anti-inflammatory⁸



Subcutaneous implantation bioactive glass in rat model⁴.
Soft tissue (purple) and vessels & RBCs (white arrow) inside fiber.

Conclusion

- Bioactive glass is an exciting new material family with the potential for unparalleled clinical applications in wound healing and beyond.

References

1. Rahaman+ 2017 *Acta Biomater*; 2355.
2. Jung 2011 *Nanotech Insights*; 2(3):2.
3. Jung 2013 *Intro to Bioceram*; 33:1.
4. Jung 2010 *MS&T Dissertation*; 2075.
5. Ottomeyer+ 2016 *Adv Microbiol*; 776.
6. Lin+ 2014 *J Biomed Mater Res Part A*; 4491.
7. Miguez-Pacheco+ 2015 *Acta Biomater*; 2:1.
8. Dong+ 2017 *J Mater Chem B*; 5240.