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Resistance of PGLA 910 Sutures to Hydrolytic Degradation Under Hyperglycemic Conditions: A Comparative In Vitro Study

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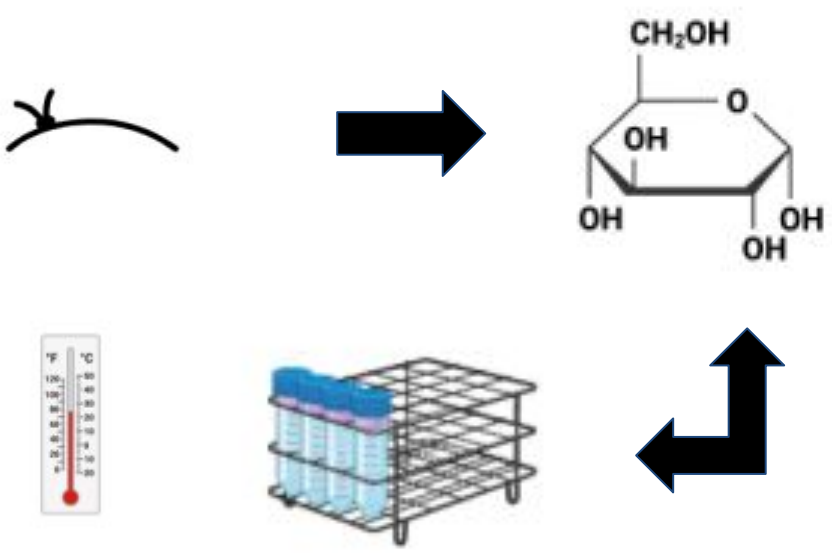
Introduction

Diabetes affects over 537 million adults worldwide, increasing the risk of surgical site infections and impaired wound healing. Hyperglycemia may accelerate the hydrolytic degradation of absorbable sutures. However, the specific impact of elevated glucose on PGA versus PGLA 910 sutures remains incompletely elucidated.

Objectives

To compare the *in vitro* resistance of PGA and PGLA 910 sutures to hydrolytic degradation under varying glucose concentrations.

Methodology



Sutures incubated in 0, 300, and 600 mg/dL glucose at 37°C for 28 days

Results and Conclusions

Mechanical Integrity & Degradation:

- Both sutures maintained mechanical integrity up to day 7 ($p = 0.080$).
- At day 28: PGA retained only 1.12 N (8.4%), while PGLA 910 retained 3.81 N (26.2%) — a 3.4-fold higher residual strength for PGLA 910 ($p < 0.001$).
- Glucose concentration did not significantly affect degradation kinetics ($p = 0.153$).

pH & Morphology:

- pH monitoring showed progressive acidification, strongly correlated with strength loss (PGA: $\rho = 0.89$; PGLA 910: $\rho = 0.86$), supporting autocatalytic hydrolysis.
- SEM analysis: PGA showed severe surface deterioration after 28 days (Figure 1A) compared to its day 0 control (Figure 1B). In contrast, PGLA 910 surfaces remained relatively preserved.

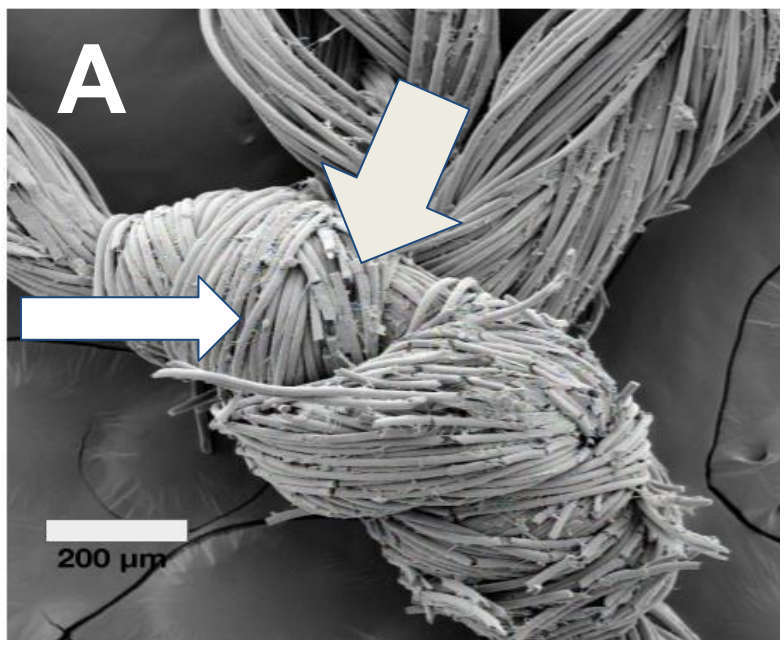
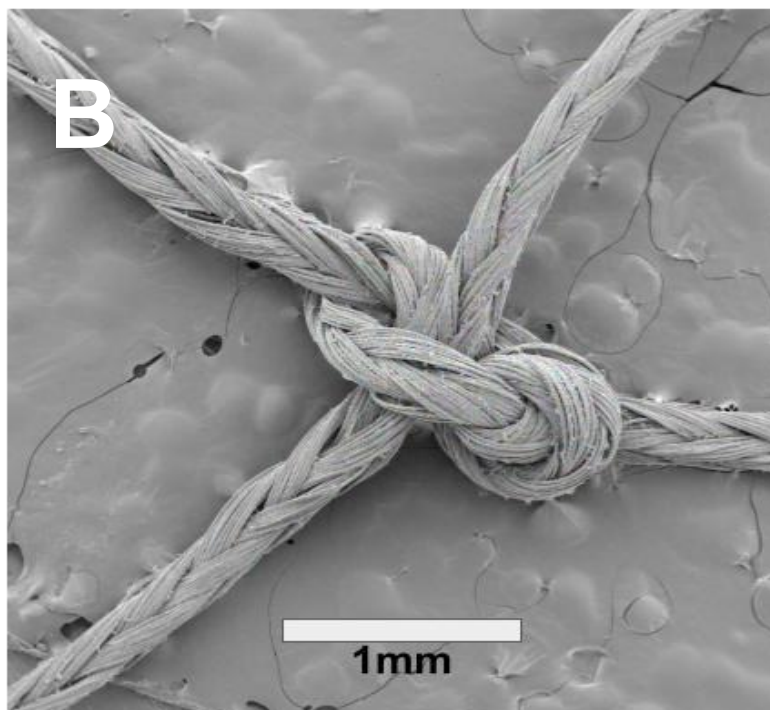


Figure 1a. Scanning Electron Microscopy (SEM) of PGA suture surface after 28 days of degradation in 600 mg/dL glucose. Extensive surface deterioration and fiber fraying are visible. (Scale bar: 200 µm).



Conclusion: PGLA 910 offers superior resistance to hydrolytic degradation under hyperglycemic conditions compared to PGA.

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