Biomimetic design will significantly improve growth and regeneration of dural cells and tissue for better repairing effects and fewer complications in repairing the native dura. This study designed a novel composite, biomimetic substitute based on the characteristics of native dura extracellular matrix.

METHODS AND RESULTS: This substitute is expected to rapidly induce cell adhesion, migration, and fast regeneration of neotissue. The material characteristics (contact angle, surface charge, and zeta potential were evaluated), in vitro biological characteristics (cell stretch, connections between cells, cell proliferation) and in vivo tissue regeneration capability of this substitute were evaluated, compared to those of collagen dura substitute, the mostly used dura substitute. The results showed that the surface properties of this composite substitute were more biomimetic to native extracellular matrix than collagen substitute did, together with better cytocompatibility, tissue ingrowth, and neoangiogenesis. This composite substitute further demonstrated in clinical case study its ideal repair effect with no CSF leakage or other adverse reactions.

CONCLUSION: In conclusion, the new biomimetic composite substitute provides alternative substitute for dura repairing ¹⁾.

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