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Extracellular matrix derived hydrogel from decellularised uterine tissue: A synthesis and analysis

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Aims

Female infertility is estimated to affect 72.4 million or 9% of women of reproductive age. There are multiple causes, such as Asherman syndrome — or symptomatic intrauterine adhesions, which result from inappropriate tissue healing after damage to the endometrium's basalis layer (ie from surgery, infection or abortion). These adhesions can obstruct sperm passage or embryo implantation, leading to infertility. A modern approach to tissue healing is thus warranted. Extracellular matrix (ECM) derived hydrogel is a novel scaffold that mimics microenvironment of native tissues. Recently, numerous studies have illustrated its wide-ranging applications in regenerative medicine with one ongoing phase I clinical trial on patients with post-ST elevation myocardial infarction. However, its application in uterine tissues has not been explored or characterised.

Methods

Uterine tissues were harvested from female Sprague Dawley rats and decellurised using high hydrostatic pressure of 980 MPa. Histological analysis and dsDNA assay were performed to assess decellurisation. Samples were then lyophilised, digested and used to form hydrogel as per modified Freytes protocol. Cytotoxicity was examined by culturing rat endometrial stromal cells on the hydrogel for 2, 4 or 7 days followed by live/dead double staining assay.

Results

After 7 days, the hydrogel surface was almost entirely covered with living cells with few dead cells detected.

Conclusion

We demonstrated that ECM-derived hydrogel could be successfully synthesised from decellularised uterine tissues. Its capability to host living cells hints at its potential to facilitate wound healing in the uterus. More research is needed to analyse its characteristics and utilities in clinical medicine. ■

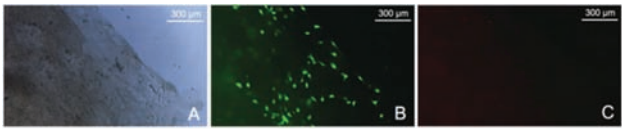

Fig 1. Images taken after 7 days of (A) hydrogel (B, C) live/dead double staining with green and red indicating live and dead cells, respectively.

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