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Hyaluronic acid, an important factor in the wound healing properties of amniotic fluid: in vitro studies of re-epithelialisation in human skin wounds.

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Abstract

Foetal wounds are unique in their ability to heal rapidly without forming scars. The amniotic fluid, rich in nutrients, growth factors, and hyaluronic acid, surrounds the foetus and is essential to foetal wound healing. The wound healing properties of foetal wounds may be the result of high concentrations of hyaluronic acid. This study aimed to verify that amniotic fluid induces re-epithelialisation in human skin wounds in vitro and to study whether this ability is dependent on hyaluronic acid. Standard deep dermal wounds were produced in vitro in human skin. The skin samples, with a central wound, were incubated in different culture media. Varying concentrations of amniotic fluid and amniotic fluid with added hyaluronidase were tested, and re-epithelialisation was assessed at 3, 7, and 12 days using light microscopy, after staining with haematoxylin and eosin. Amniotic fluid 50% resulted in a significantly higher ($p < 0.05$) grade of re-epithelialisation than Dulbecco's modified Eagle's medium and 10% amniotic fluid at all time points. When 50% amniotic fluid was compared with 10% foetal calf serum, no significant difference was found in grades of re-epithelialisation on days 3 and 12 and significantly higher grades of re-epithelialisation on day 7 ($p < 0.05$). Degradation of hyaluronic acid in the medium that contained 50% amniotic fluid gave significantly impaired re-epithelialisation ($p < 0.05$) on culture days 3 and 7. In conclusion, amniotic fluid promotes accelerated re-epithelialisation and hyaluronic acid is an important ingredient.