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The influence of octenidine on human skin cells and wound healing

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Introduction & Study Aim

Prevention of infections by using antiseptics is a key element in professional wound management. Ideal agents for the topical treatment of skin wounds should have antimicrobial efficacy without negative influence on wound healing. Compared to other antiseptics (e.g. polihexanide, chlorhexidine, PVP-Iodine), octenidine dihydrochloride (OCT) shows high antimicrobial efficacy already within a short contact time even at low concentrations and remains active locally for more than 48 hours ("remanence effect").

To date, OCT has become a widely used antiseptic in modern wound care, but little is known about its effects on skin physiology. Results from animal studies and recent clinical observations lead to the hypothesis that besides its high antimicrobial effects, OCT could further have a positive influence on wound healing. Thus, we have tested its impact on immune and non-immune skin cells upon topical application on *ex vivo* normal and wounded human skin explants.

Materials & Methods

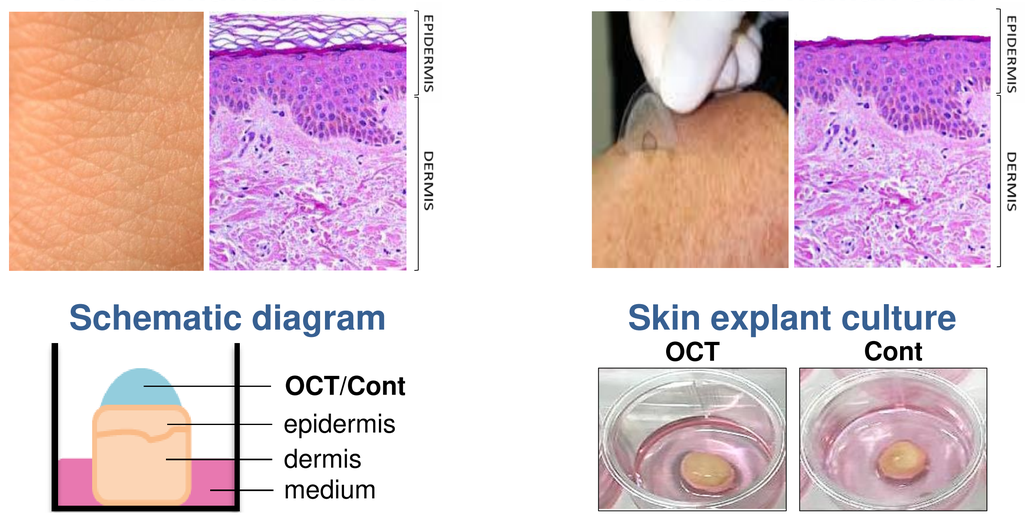

Fig 1. Depicted is normal and wounded skin from healthy human donors obtained during plastic surgery procedures, a schematic diagram and a photograph of the skin explant culture setup. OCT (=octenilin® gel, hydrogel containing 0.05% octenidine; Schülke & Mayr GmbH, GER) and control gel (=Normlgel®, Cont, hydrogel containing 0.9% w/w sodium chloride; Mölnlycke Health Care, SWE) were pipetted onto the epidermis of normal and wounded (tape-stripping, 50x) skin biopsies (Ø=8 mm) and cultured at defined time points (24, 48 and 72 h).

Results

OCT neither alters anatomy nor enhances apoptosis in skin cells upon wounding

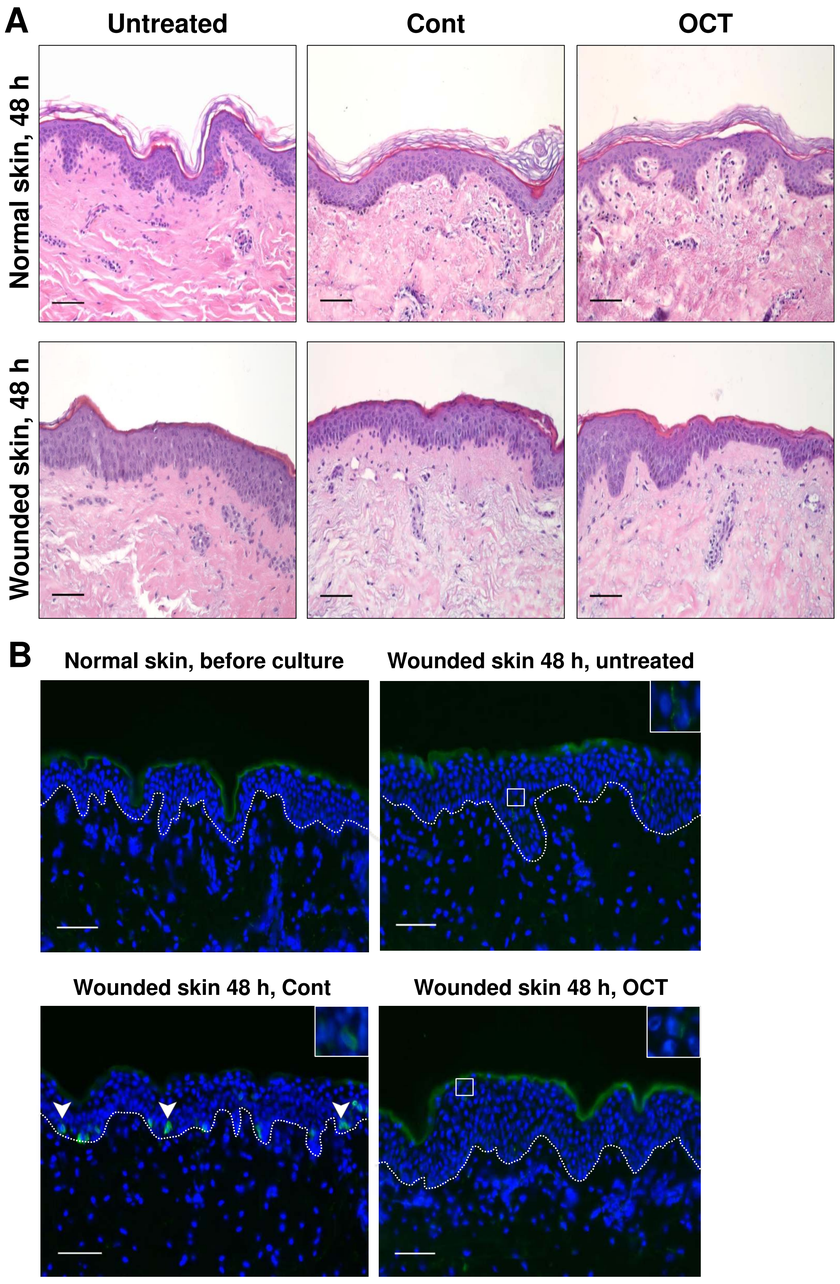

Fig 2. H&E-stained paraffin sections **(A)**, and active caspase 3 (green)-stained cryosections (DAPI, nuclear stain, blue) **(B)**, of normal and wounded skin upon topical application of OCT/control gel and 48 h of culture. One representative donor is shown (n=7). Scale bar=200 µm.

OCT does not change LC morphology but prevents LC emigration and inhibits CD83 upregulation upon wounding

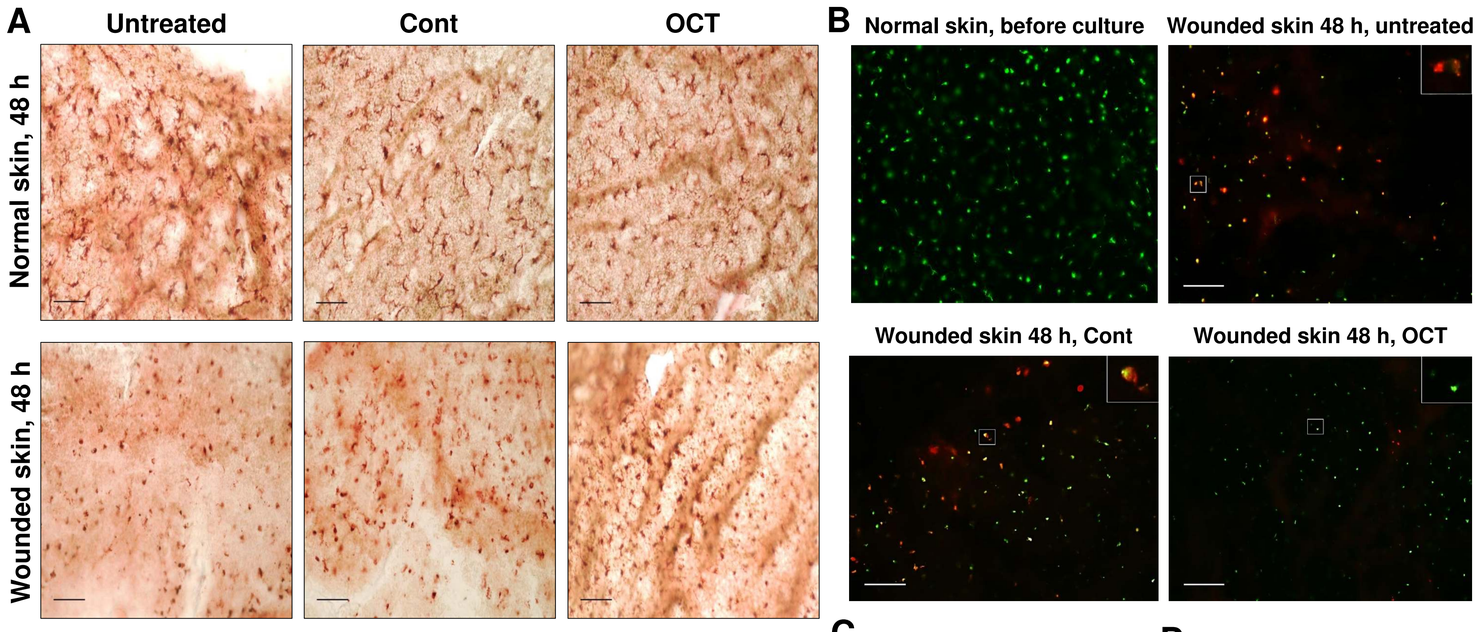

Fig 3. *En face* images of CD207⁺ (brown) LCs **(A)**, and CD207⁺ (green) CD83⁺ (red) LCs **(B)**, in epidermal sheets isolated from 48 h cultured normal and wounded skin with indicated treatments. One representative donor is shown (n=7). Scale bar=200 µm. Numbers of emigrated CD207⁺ LCs **(C)**, and CD207⁺CD83⁺ LCs **(D)** in wounded skin upon 48 h of culture are indicated. Unpaired t-test, *P≤0.05.

OCT significantly inhibits the secretion of IL-8 and IL-33 but not VEGF

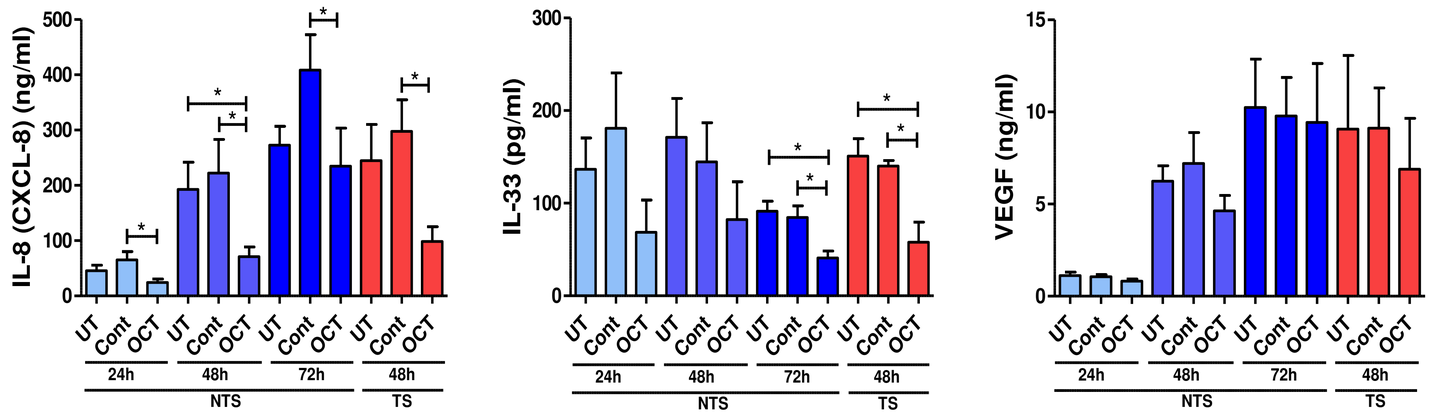

Fig 4. Secretion levels of the indicated cytokines were quantitatively determined by analyzing biopsy supernatants with ELISA. Data presented are mean±SD (n=6) performed in triplicates. Unpaired t-test, *P≤0.05. NTS=normal skin, TS=wounded skin, UT=untreated skin, Cont=control gel, OCT=octenilin® gel.

Conclusion

Our data provide novel insights into the host response to OCT in the biologically relevant environment of viable human (wounded) skin, suggesting, in addition to its known antimicrobial activity, also an anti-inflammatory action that might contribute to its observed positive wound healing influence resulting in better scar quality.

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