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Hypochlorous Acid Improves Venous Leg Ulcer Healing: circulating epithelial cell precursor recruitment and control of biofilm bacteria fosters healing by enhancing epithelial daughter cell division

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Clinical Problem

Hypochlorous acid (HOCl) is synthesized in white blood cells from hydrogen peroxide by the enzyme myeloperoxidase. HOCl is a small neutral molecule, easily diffuses into biofilms and across bacterial cell walls, oxidizing important bacterial organelles rapidly killing the bacteria.(1) Fundamental pharmacology advances since the salt of HOCl, hypochlorite was first used for cleaning wounds on the battle fields of World War 1 have improved purity, efficacy, and shelf life of HOCl topical wound solutions.

At concentrations not toxic to cultured mouse lung epithelial cells HOCl* was the most rapidly bactericidal in vitro, compared to 19 current wound "cleansing preparations", achieving a 4 log kill of MRSA in less than one minute.(2)

We reported dramatic healing of venous leg ulcers (VLUs) with weekly topical HOCl therapy prior to mechanical wound debridement.(3) Animal research shows that VLUs are healed by multiple generations of daughter cells derived from bone marrow epithelial precursor cells. Reactive oxygen species are an integral first step in signaling bone marrow to recruit circulating epithelial cell precursor migration to the wound bed.(4) Control of biofilm bacteria enables rapid daughter cell division.(5)

Current Clinical Approach

Four patients with chronic and refractory VLUs were treated with topical HOCl* and fuzzy wale elastic compression**.

Patient Outcomes

All VLUs healed. Photos document details of treatment and healing.

Conclusions

Topical hypochlorous acid kills wound biofilm bacteria and appears to be highly salubrious for VLU healing. Reactive oxygen, from HOCl appears to be involved in recruiting epithelial precursors from the bone marrow and to foster effective daughter cell division in wound free of excessive biofilm bacteria.

References

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* NeutroPhase®, NovaBay Pharmaceuticals, Inc., Emeryville, CA

**EdemaWear®, Compression Dynamics, LLC, Omaha, NE