

# K. Ott, U. Diener: Treatment of therapeutical resistant wounds with hyaluronan combined with bactericidal agent (Hyaluronan Iodine Complex) First time experience in Switzerland

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## OBJECTIVE

The treatment of chronic wounds is often difficult.  
Hyaluronan combined with an antibacterial agent is a new treatment which shows promising results.

### CASE 1



♂; 56 a; October 2009: presentation of a diabetic foot with infection of the big toe. Infection present in the 2nd toe. The infection extended rapidly to the distal part of the plantar fascia and the opposed toes. Amputation of the forefoot in 05-05-2010, beginning with Negative Pressure Therapy. Due to reduced circulation we changed to Hyiodine® after 5 days.



Amputation of the metatarsals and extraction of exudate using Negative Pressure Therapy. Development of superficial necrosis due to deteriorated perfusion. Picture shows wound post-debridement.



After 18 days treatment with Hyiodine®



After 64 days of treatment



16 weeks after operation. Scar tissue is stable. Orthopaedic shoe fitted.

## METHODS

Treatment of 15 patients May to November 2010 with Hyaluronan-Iodine Complex (Hyiodine®). The kind of wounds were diabetic or venous ulcers and infections after traumatic lesions. Mainly hydroactive dressings were replaced with Hyiodine® dressings. On average every 3 days the dressings were changed. We applied hyiodine- soaked gauze, alginate or hydrofibre.

## RESULTS

In 6 patients the wounds were almost closed within 2 weeks of the first application of Hyiodine®, in 2 patients after 8 weeks and in one case in 16 weeks.

In 6 patients the procedure had to be changed. (2 Nonresponder; 4 organisational problems)

In 2 cases a major amputation and in 1 case a minor amputation were prevented.

The effect was not only the formation of granulation tissue in addition there was rapid and good quality skin growth.

NB: Best results were achieved with application of Hyiodine® soaked cotton gauze and also in ischaemic wounds.

## SIDE EFFECT

We saw a better perfusion and significantly reduced pain.

No toxic reactions to the iodine were noted.

## LITERATURE

Benes R.A. et al. Initial Experience using a Hyaluronan-iodine Complex for wound healing. *Am. Surg.* 2011 77(3): 355-9

Chen WY, Abatangelo G. Functions of hyaluronan in wound repair. *Wound Repair Regen.* 1999 7(2): 79-89

Hart M. et al. Genotypic and phenotypic assessment of hyaluronidase among type strains of a select group of staphylococcal species. *Int. J. Microbiol.* 2009 1: 7

Reed R.K. et al. Hyaluronan on peritendal lymph from skin: changes with lymph flow. *Lymphology* 1998 31(4): 173-8

Wild T. et al. New galenic: antiseptic substance containing iodine (KI complex) and hyaluronic acid for treatment of chronic, hardly healing wounds. *J wound technol.* 2010 63(7): 63-5

### CASE 2



10-02-11 State after intramedullary nail of an open tibia fracture 09-4. Persistent wound and stagnated healing. Initial local abscess. Development of a fistula. Picture after removal of the nail on 03-02-10.



11-02-10 After local debridement. Initial treatment with antiseptic gauze, followed by alginate.

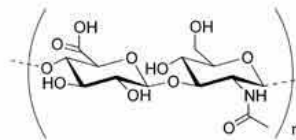


05-03-10 Beginning with Hyiodine® because of lasting positive probe to bone and stagnation of wound healing.



16-03-10 The wound is completely closed after 11 days of treatment.

## Hyaluronan



## Characteristics of Hyaluronan

- ▶ Important for connective tissue
- ▶ High capacity of water accumulation relative to its mass
- ▶ Important factor in proliferation and migration of the cells (granulation tissue)
- ▶ High viscosity: Barrier for microorganisms
- ▶ Bond of radicals: Protection against UV-radiation
- ▶ Support of remodeling new vessels (regulation of cytokines) (3)

## Role of Hyaluronan in process of wound healing

PHASE OF WOUNDHEALING	FEATURES	EFFECT
Inflammatory stage		bond of radicals
stage of granulation	cell-proliferation	support of cell division
	cell-migration	support of migration and proliferation
	angiogenic activity	with low molecular Hyaluronan
Re-epithelisation	Function of keratinocytes	induction of keratinocytes-migration
Re-modeling	cicatratization	regulation of accumulation of collagen

Source: Modified from Chen and Abatangelo

## Features of KI3

- ▶ Penetration in cell wall
- ▶ Interruption of protein synthesis
- ▶ Induction of TNF-α → activation of macrophages and T-helper cells (1)
- ▶ Inactivation of bacterial forming hyaluronidase (Staph. aureus a.o. Species) (2)

### CASE 3

♀; 86 a  
Recurrent erysipelas of the right lower leg in association with venous insufficiency and peripheral arterial occlusion. Hospitalisation followed 7th episode of erysipelas. Ulcer had persisted for many years and was very painful. Therapy with modern dressings was not effective and sloughy surface persisted after surgical debridement and antiseptic dressings. Initial fever (39.5°C), CRP 190 mg/L, leukocytes 17 G/L



20-06-10 after 5 days of therapy with penicillin



30-06-10 5 days after commencing with Hyiodine®-treatment (applied with cotton gauze)



20-07-10 After 1 week of Hyiodine® distal epithelization was observed. After 3 weeks there was a dramatic reduction in wound size. Pain rapidly resolved.

## CONCLUSION

Hyaluronan-Iodine Complex is a very promising alternative in the treatment of static chronic wounds, especially when ischaemic tissue is contaminated. Even imminent amputations were prevented.

In most cases it was not necessary to perform an autograft.