

# USE OF A CELLULAR MATRIX IN THE TREATMENT OF ULCERS: A CASE REPORT

## Introduction

Chronic wounds including venous leg ulcers (VLU), diabetic foot ulcers (DFU), ischemic foot and pressure ulcers (PU) have various pathologic causes [1]; the most prevalent being ankle and DFU. The majority of ulcers have a long healing process and often do not heal at all.

VLU are frequently associated with a reduced quality of life (QoL) and directly higher healthcare costs<sup>[1]</sup> (Fig.1). Conventional treatment of VLU is the use of compression therapy as well as antibacterial, absorbent dressings and usually the resulting management is cumbersome (Fig. 2).

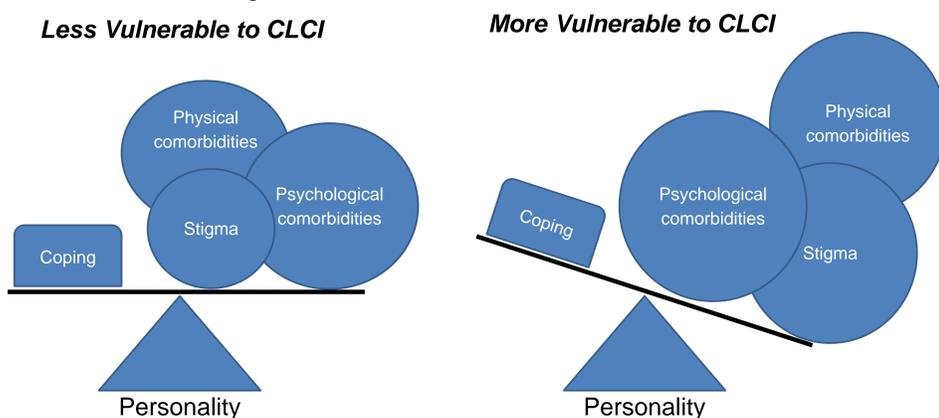


Fig 1. Adapted to Augustin, M. Cumulative life course impairment in chronic wounds. Curr. Probl. Dermatol., 2013. 44: p. 125-9. Abbreviations: CLCI: Cumulative Life Course Impairment

There are many aspects of discomfort that must be taken into account in a patient with leg ulcers. The effects cumulate negatively on the QoL of patient with chronic wounds; bringing instability or failure of potential qualities in some patients. This concept is defined as cumulative life course impairment (CLCI)<sup>[2]</sup> (Fig.1).

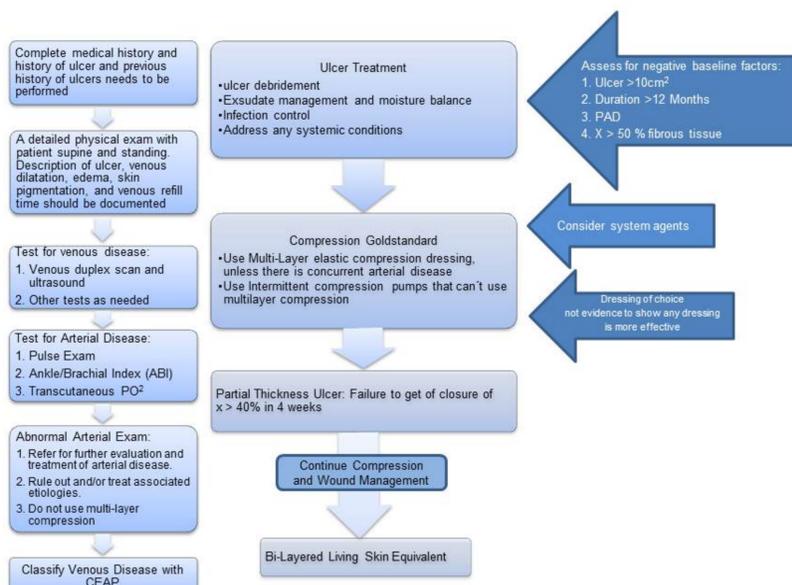


Fig. 2. adapted to Kimmel, H.M.R., Robin, A. L. An Evidence-Based Algorithm for treating venous leg ulcers utilizing the Cochrane Database of Systematic Reviews. Wounds, 2013. 25(9): p. 242-250. Abbreviations: PO<sup>2</sup>: Percutaneous Oxygen measurement; CEAP: Clinical Class, Etiology, Anatomical and Pathophysiological classification

The economic burden of chronic wounds can be explained by different factors: a) delayed management of treatment, b) treatment complexity and available modality, c) higher rate of comorbidity and complications<sup>[3]</sup>. The use of new biomaterials and technologies may reduce this burden for the patient and healthcare systems<sup>[3]</sup>.

One of the new biomaterials available as a treatment option, a bilayered living human skin equivalent (BLHSE) promises a revitalisation in the physiological process of healing chronic wounds<sup>[4]</sup>. This is constructed by culturing human fibroblast in a bovine type I collagen matrix over which human epidermal keratinocytes are cultured and allowed to stratify; the BLHSE provides both cells and a matrix for the non-healing wound. The construct is temporary and promotes regeneration of healthy tissue into the wound by modifying the physiology of cells at the site of healing and providing new matrix material, cytokines and growth factors. Rather than filling a defect or acting as a scaffold for tissue growth, the role of the bio-engineered tissue technology product is to induce an improved healing response<sup>[5]</sup> [6].

This BLHSE is particularly effective in difficult-to-heal wounds with long durations, such as VLU and DFU<sup>[7]</sup>.

## Background

Our wound clinic has been using BLHSE successfully, on selected patients, for many years. This is a representative case study report concerning treatment with BLHSE of a patient at our outpatient clinic with a chronic ulcer in the lower extremities.

## Methods

After clarifying the etiology of the wound, a debridement was performed. A proper wound bed preparation, included cleaning the wound bed with NaCl or Ringer-Solution. The BLHSE has to be fenestrated prior to application to the wound. To prevent the construct from moving, it is necessary to fix it with a silicone mesh. A secondary dressing, according to the patient needs, should be applied to the silicone mesh. After a minimum of 7 days the wound and the secondary dressing requires an assessment, but the BLHSE should not be changed before day 14; if necessary subsequent applications can be applied<sup>[8]</sup> (Fig.2, [4]). Thereafter, weekly controls should be performed until the wound has completely healed.

## Results

In this representative case (Fig.3), the wound healed in a period of 8 weeks after three applications of the BLHSE. After the first application the patient reported a significant reduction of pain and discomfort. This improvement also led to an increase in treatment adherence, since the patient was able to witness the progress in the wound healing.

## Discussion

Within a multidisciplinary team it is important to ensure that all staff, specialised in wounds, are trained and able to utilise new techniques and advanced treatment modalities demonstrating value to their patients. In addition, a clear communication mechanism to foster exchange is essential to allow dialogue and the possibility to highlight such advanced treatment to the team. More studies are necessary to confirm the healing and cost effectiveness in different wound Centres and with different chronic wounds.

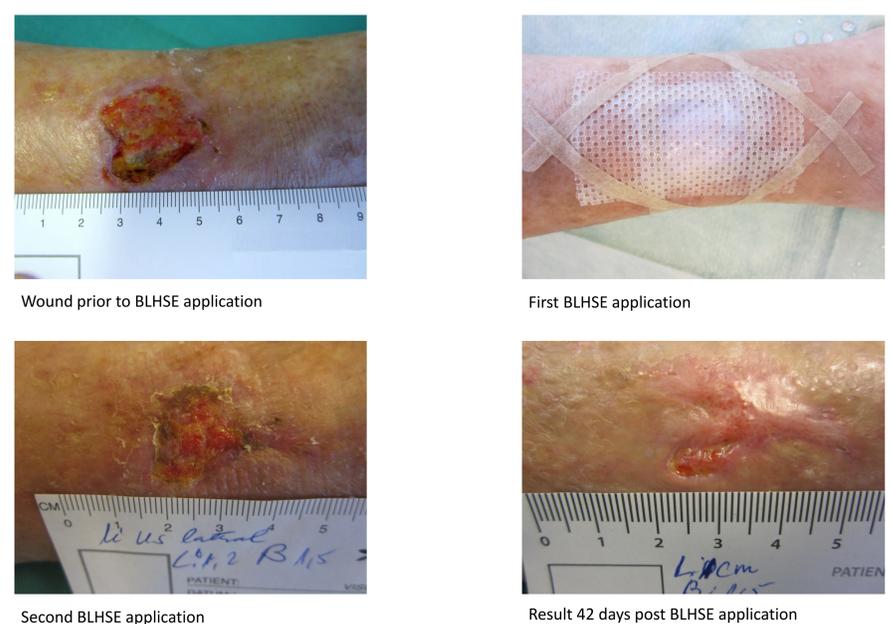


Fig. 3: A 65 year old woman, presented with a leg ulcer, which had persisted over a period of 8 months prior to application of BLSHE; the wound condition composed of a thick layer of fibrin and granulation. The patient is mobile and her nutritional status is normal. Follow up weekly consultations in our clinic, for dressing change and infection control over a period of four months. The wound healed completely after three applications in 8 weeks.