

# IN-VITRO-ASSESSMENT OF FLUID MANAGEMENT BY PU FOAM DRESSINGS UNDER COMPRESSION USING A VERTICAL MACERATION MODEL



C. Wiegand<sup>1</sup>, K. Reddersen<sup>1</sup>, M. Abel<sup>2</sup>, P. Ruth<sup>2</sup>, J. Muldoon<sup>3</sup>, U.-C. Hipler<sup>1</sup>

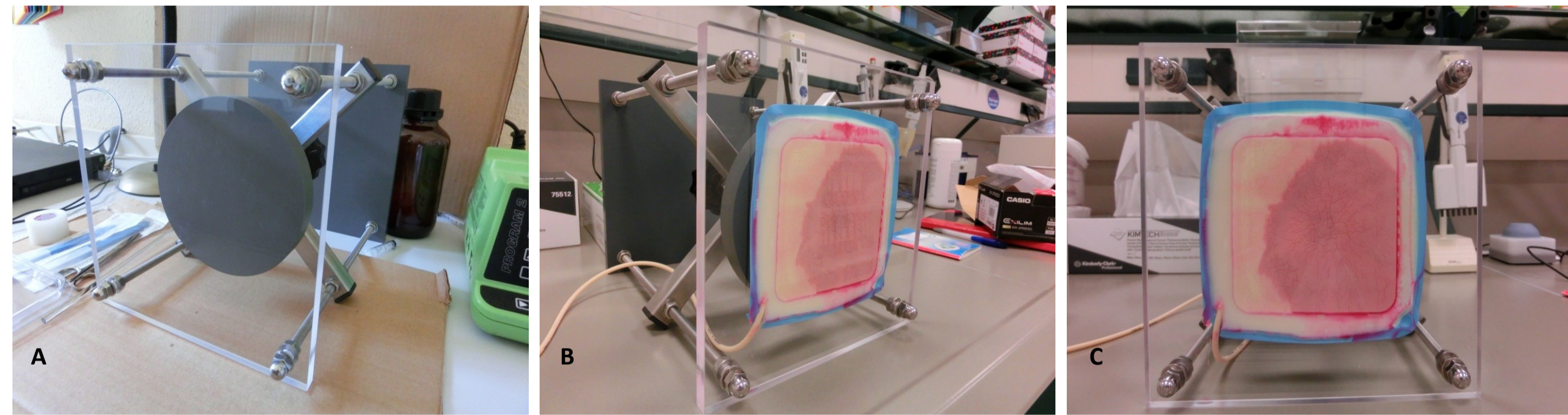
<sup>1</sup>Department of Dermatology, University Medical Center Jena, Germany

<sup>2</sup>Lohmann & Rauscher GmbH & Co. KG, Rengsdorf, Germany

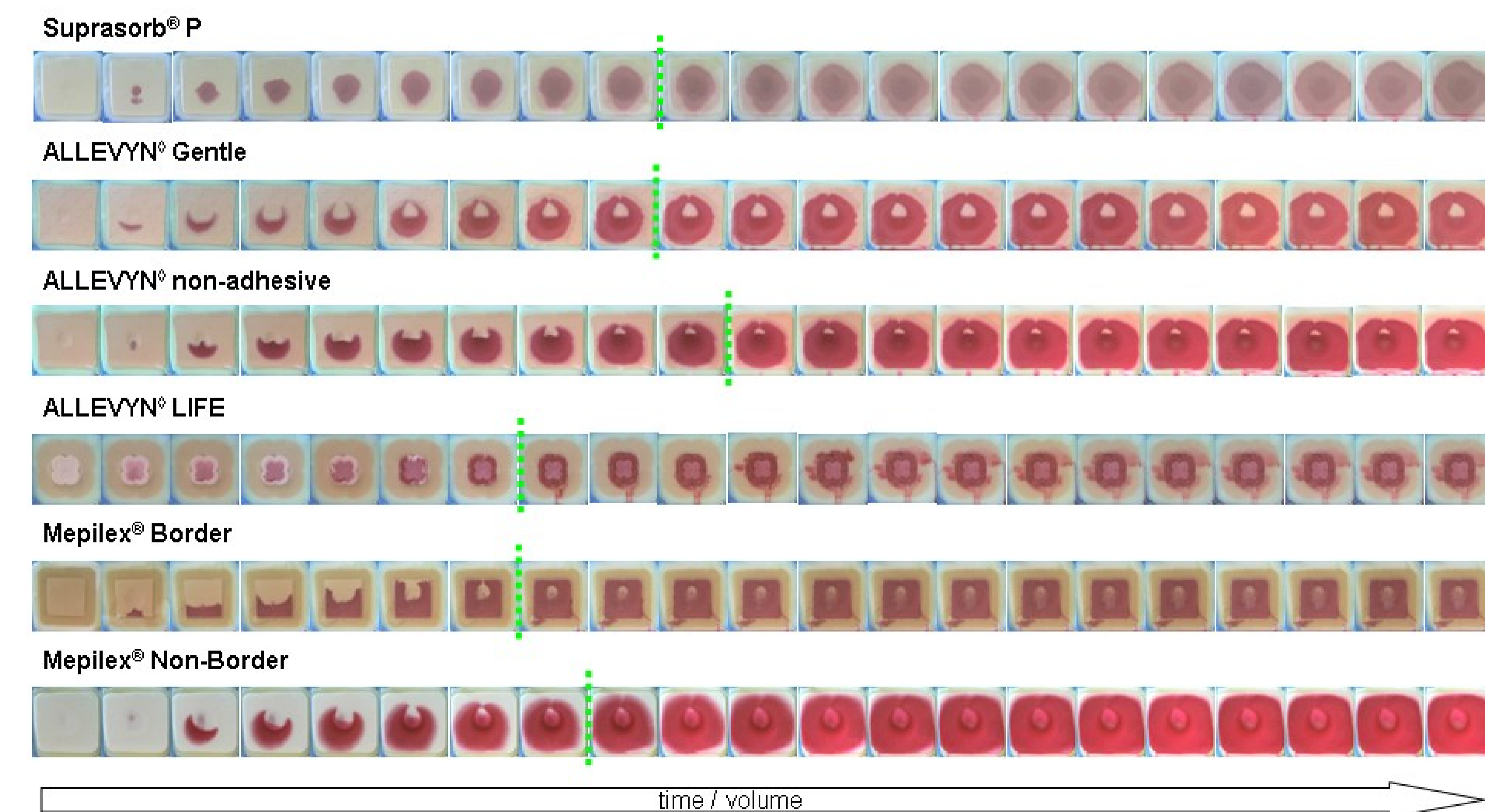
<sup>3</sup>Activa Healthcare, Burton upon Trent, UK

## Introduction

Maceration is the elixation of the skin by prolonged exposure to moisture that impedes healing due to failure of the skin protection and possible microbial infections. Modern wound dressings are expected to maintain a humid wound milieu without allowing exposure of the peri-wound skin to exudate and subsequent damage of the skin by maceration. Hence, it is of interest to analyze and compare the fluid management of PU-foam dressings under standardized conditions as close as possible to a real life situation. Therefore, a vertical maceration model (figure 1) using 40 mmHg compression was developed



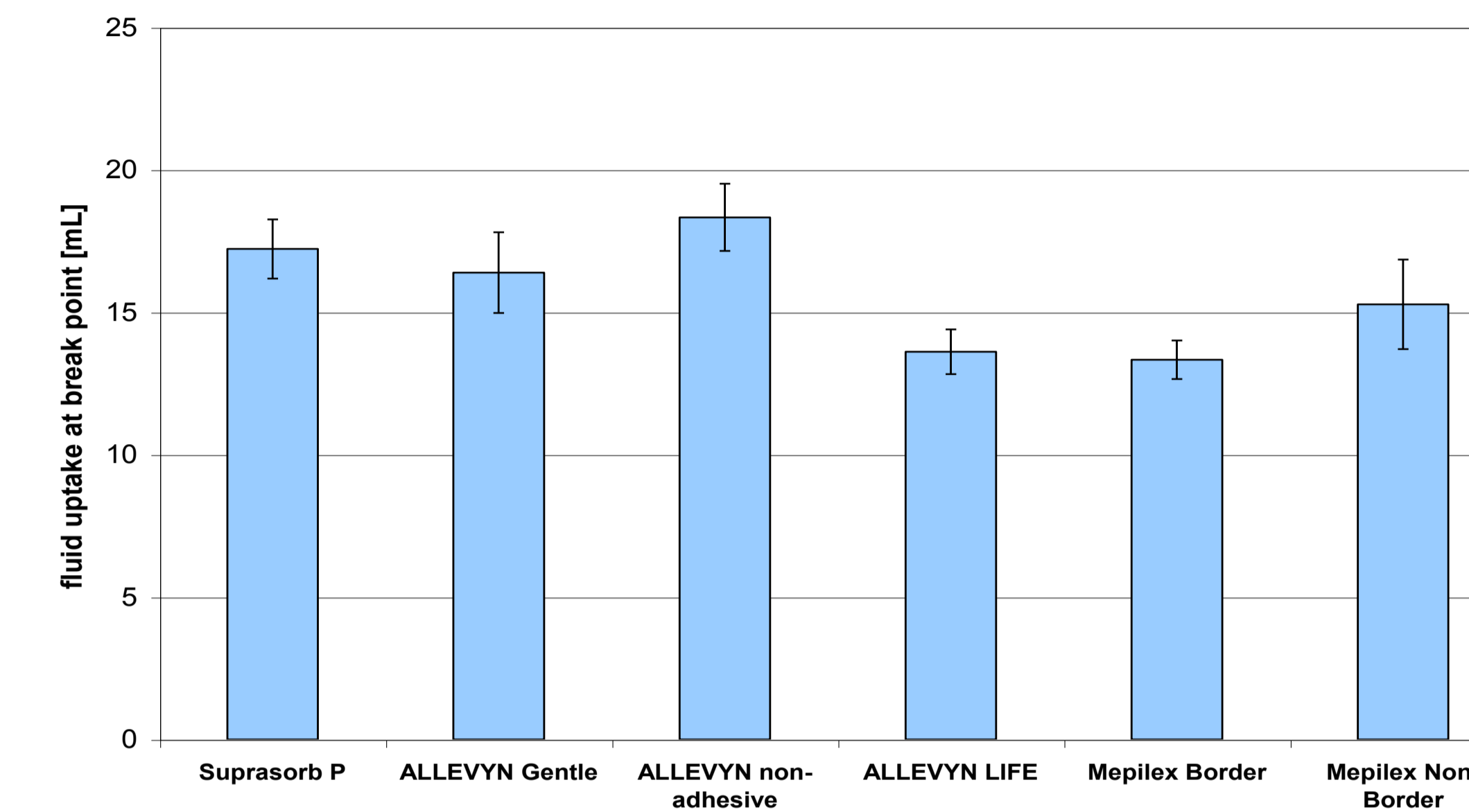
**Figure 1:** The tissue substitute is placed into the holding device (A) for testing in the vertical maceration model (B). The respective compression of the issue substitute is adjusted by positioning the movable table (B). Through the plexiglass front the distribution of the liquid in the wound dressing can be monitored (C).



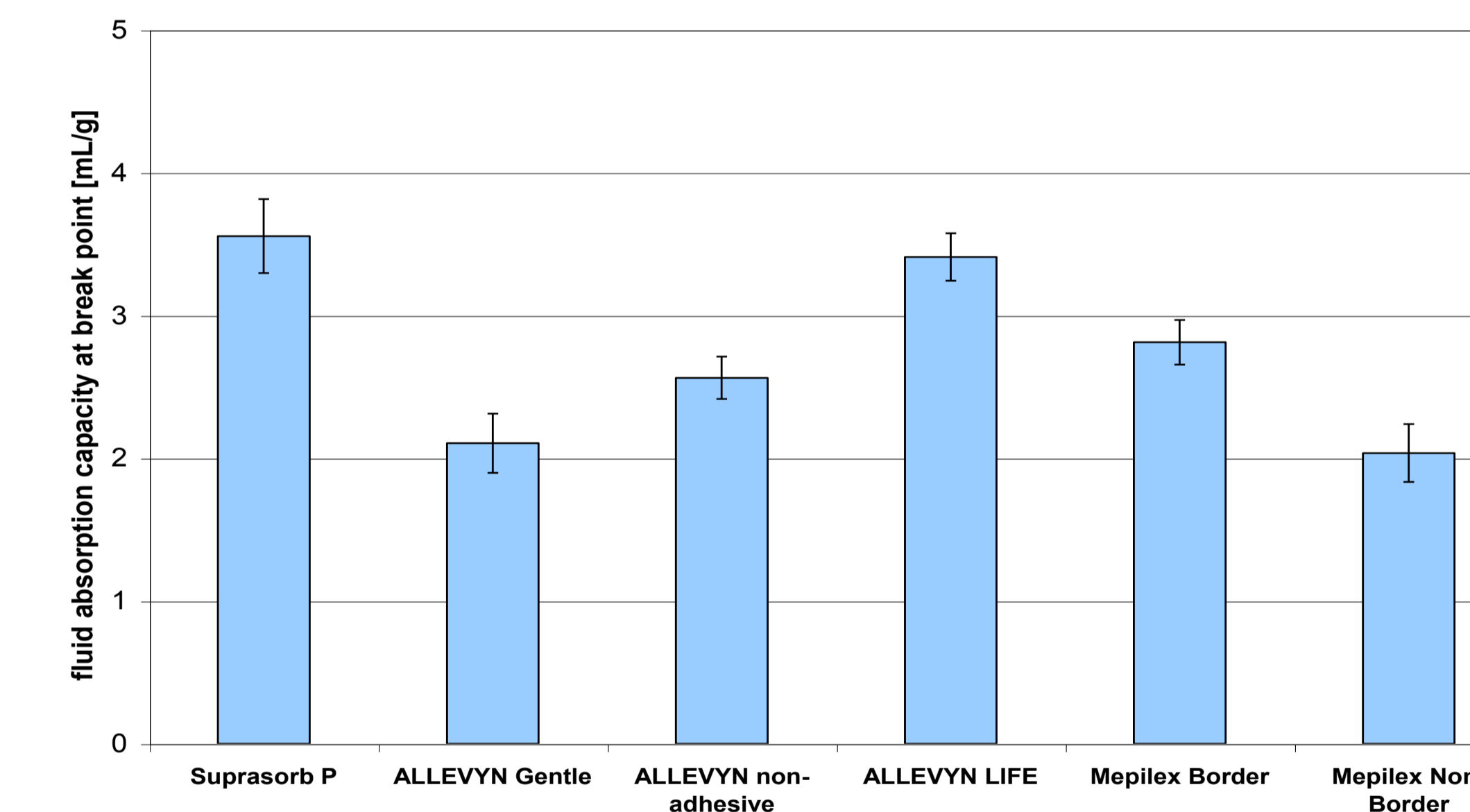
## Material & Methods

The PU foam dressings Suprasorb<sup>®</sup> P 7.5x7.5cm (Lohmann & Rauscher); ALLEVYN<sup>◇</sup> Gentle 10x10cm (Smith & Nephew), ALLEVYN<sup>◇</sup> non-adhesive 9x11cm (Smith & Nephew), ALLEVYN<sup>◇</sup> LIFE 10.3x10.3 cm (Smith & Nephew), Mepilex<sup>®</sup> Border 10x10cm (Mölnlycke Health Care), and Mepilex<sup>®</sup> Non-Border 10x12cm (Mölnlycke Health Care) were investigated. They were applied to an artificial wound in a gelatine-based tissue substitute for the vertical maceration test under 400 mmHg compression. Evaluation of fluid uptake and distribution in the dressings was performed by video recording. In addition, shape loss of the dressings, maximal fluid uptake and time to maceration was determined.

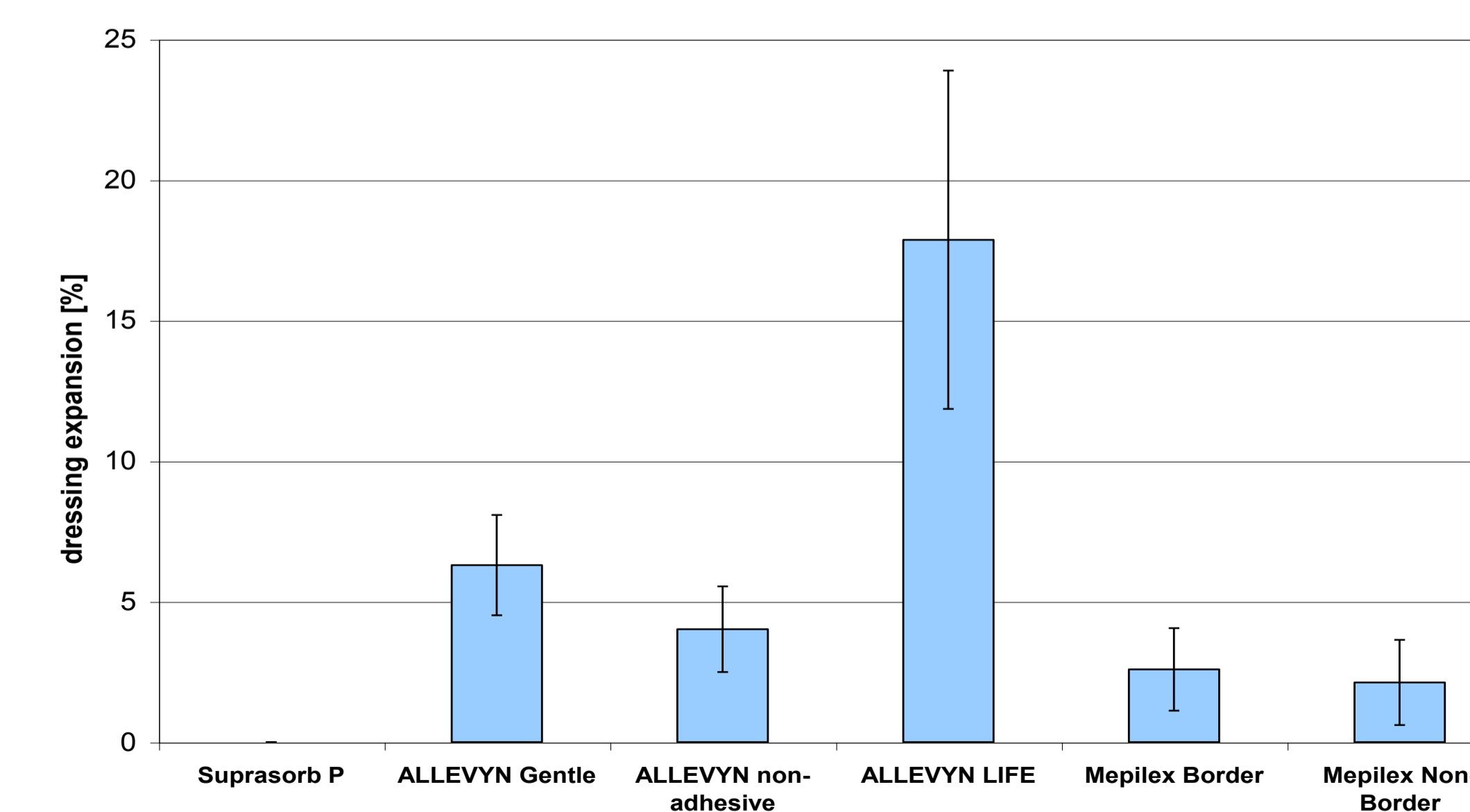
**Figure 2:** Determination of the fluid management by the PU foam dressings over time using video documentation (VF0700, Creative Labs, U.S.). The spread of the colored solution allows the measurement of the break point of maceration (green dotted line) at which the dressings stop to take up fluid and start to leak.



**Figure 3:** Determination of the fluid absorption capacity at maceration breakpoint in [mL] for the different hydroactive dressings. Results shown as mean  $\pm$  SE (n = 3).



**Figure 4:** Determination of the fluid absorption capacity at maceration breakpoint in [mL/g] for the different hydroactive dressings. Results shown as mean  $\pm$  SE (n = 3).



**Figure 5:** Evaluation of the reduction of the covered area by determination of the dressing shrinkage in [%]. Results shown as mean  $\pm$  SE (n = 3).

## Results

The dressings Mepilex<sup>®</sup> Non-Border, ALLEVYN<sup>◇</sup> Gentle, Suprasorb<sup>®</sup> P and ALLEVYN<sup>◇</sup> non-adhesive displayed a distinctly higher fluid absorption capacity (FAC) compared to Mepilex<sup>®</sup> Border and ALLEVYN<sup>◇</sup> LIFE (figures 2 and 3). It could be shown that Suprasorb<sup>®</sup> P and ALLEVYN<sup>◇</sup> LIFE demonstrated a similar FAC per [g] before maceration occurred that was significantly higher compared to the remaining PU-foam dressings (figure 4). Furthermore, Suprasorb<sup>®</sup> P displayed the best form stability in the tests (figure 5). In contrast, ALLEVYN<sup>◇</sup> LIFE exhibited a significant expansion while only slight changes were observed for ALLEVYN<sup>◇</sup> Gentle, ALLEVYN<sup>◇</sup> non-adhesive, ALLEVYN<sup>◇</sup> LIFE, Mepilex<sup>®</sup> Border, and while Mepilex<sup>®</sup> Non-Border *in vitro*.

## Conclusion

In conclusion, the *in vitro* maceration model was successfully applied in a vertical position to quantify and evaluate differences between PU-foam wound dressings with regard to fluid management under simulated compression.