derma
Wound Care by Design

Technological Innovation

Interreg
2 Seas Mers Zeeën
EUROPEAN UNION

DERMA

Design of Enabling Regenerative Materials

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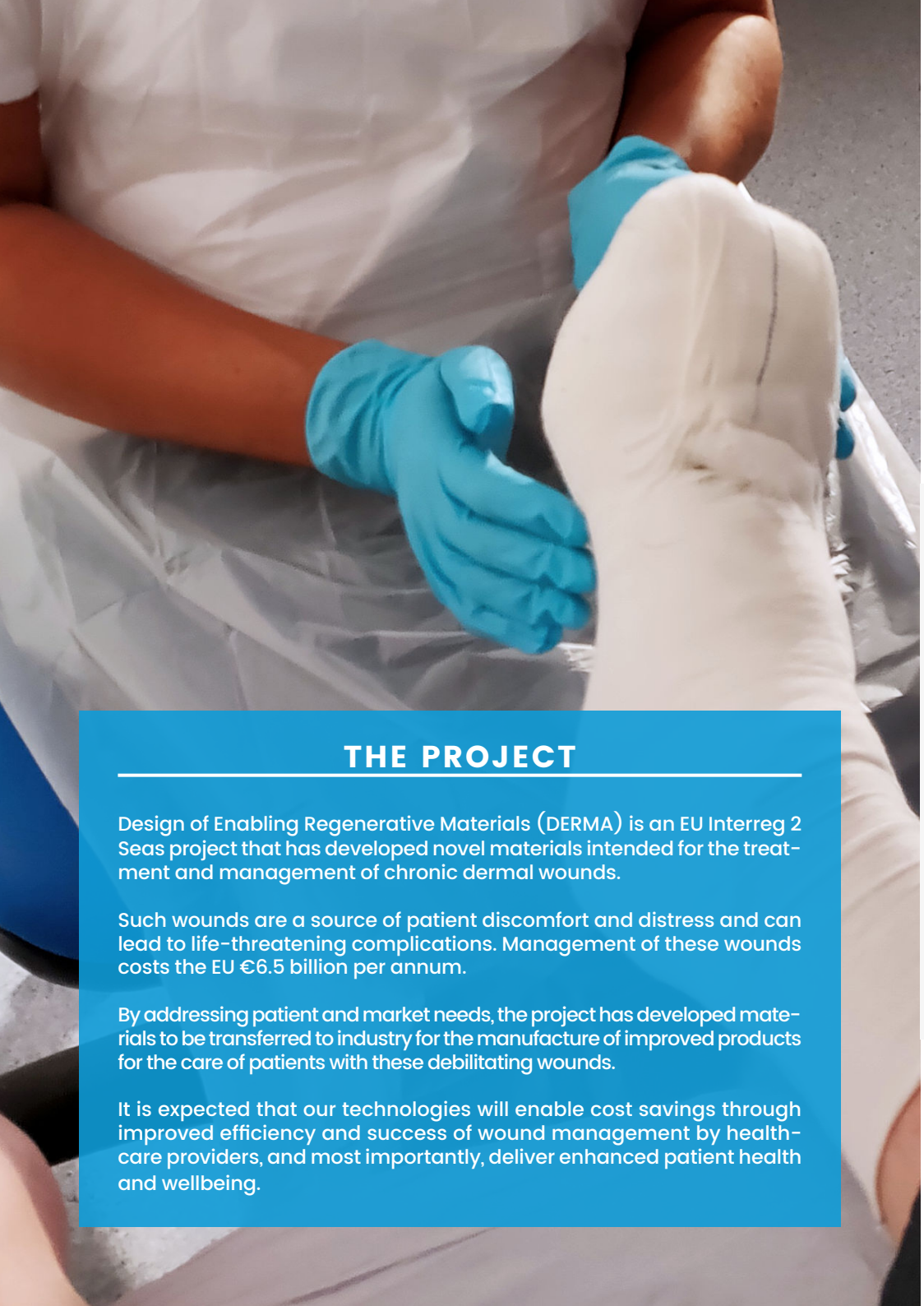
WITH THE SUPPORT OF THE EUROPEAN REGIONAL DEVELOPMENT FUND



THE PROJECT

Design of Enabling Regenerative Materials (DERMA) is an EU Interreg 2 Seas project that has developed novel materials intended for the treatment and management of chronic dermal wounds.

Such wounds are a source of patient discomfort and distress and can lead to life-threatening complications. Management of these wounds costs the EU €6.5 billion per annum.

By addressing patient and market needs, the project has developed materials to be transferred to industry for the manufacture of improved products for the care of patients with these debilitating wounds.

It is expected that our technologies will enable cost savings through improved efficiency and success of wound management by healthcare providers, and most importantly, deliver enhanced patient health and wellbeing.

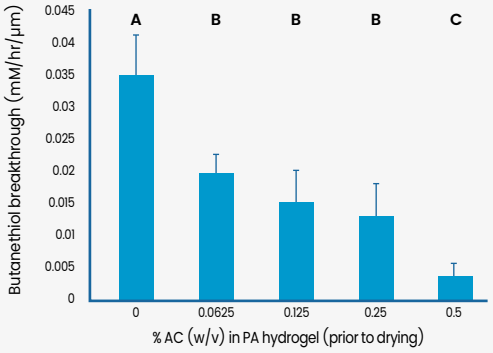
ODOUR ADSORBING MATERIALS

Dermal ulcers are a source of physical discomfort that often lead to further medical complications. These, and other wounds containing necrotic tissue, can release offensive odours that are distressing to the patient and may lead to social isolation and depression.

DERMA has developed materials designed to capture malodours as they exit the wound. These include swellable films and electrospun fibres containing activated carbon particulates to adsorb malodorous molecules. These are also to take up moisture such as would be present in sloughy wounds, which might otherwise cause tissue maceration if a conventional dressing was applied.

A material that can control odour, moisture and bacteria within a wound over an extended period, will mean fewer dressing changes, thus reducing treatment costs and patient distress.

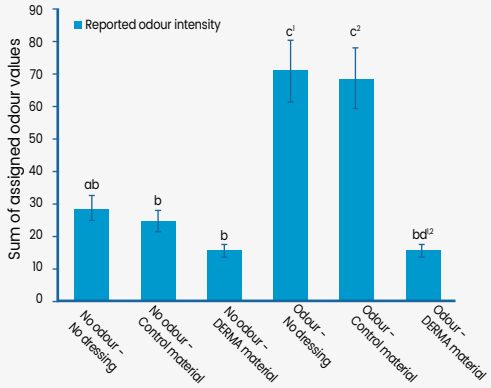
Transfer of volatile butanethiol through the AC-PA films



Transfer of volatile butanethiol through the AC-PA films (0% - 0.5% pre-drying gel weight) adjusted for time and thickness of the films, therefore mM/µm/h. Error bars = SD, n=5. Thiol transmission without films was 75 mM/h. Means that do not share a letter are significantly different, p<0.05.

Akhmetova, A., Illsley, M., Mikhalovsky, S., Nurgozhin, T., Zhumadilov, Z., & Allan, I. (2014). Preparation of agarose and activated carbon cryogel for the adsorption of malodorous molecules. *Journal of Tissue Engineering and Regenerative Medecine, 8, 346-346.*

Effect of DERMA material on human nose sensing of 2-aminoacetophenone



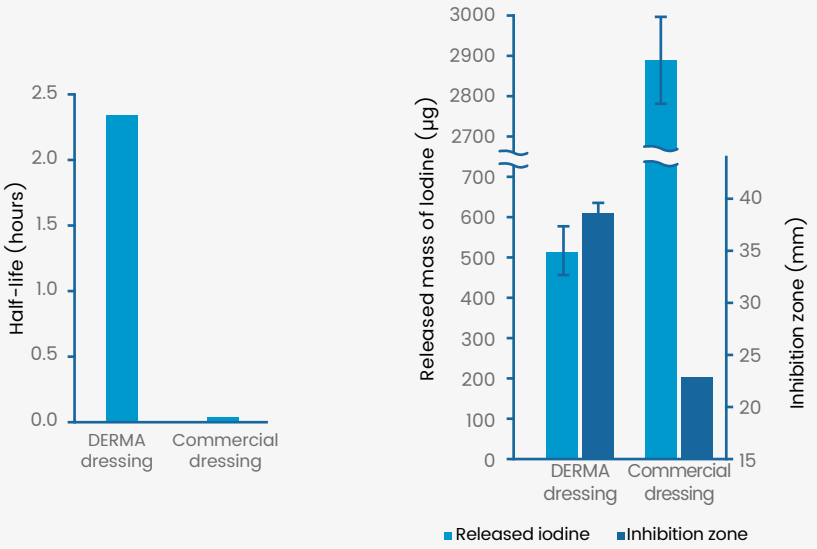
Bars with same letters denote no significant difference; bars with different letters denote a statistically significant difference at the < 0.05 level. Comparisons between bars with different numbers additionally denote statistical significance at the <0.001 level i.e. strongly significant (Logistic regression, deviance = 103.71, df=5, P «0.001).

Development of moisture-absorbent films

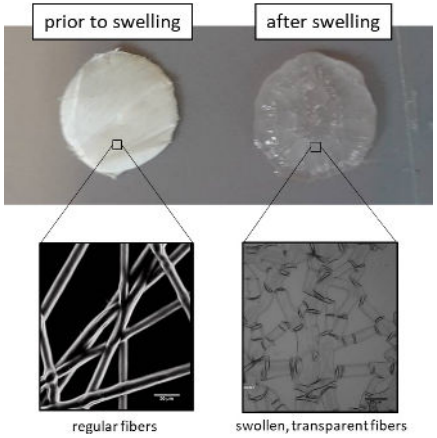
A light microscopy image of electron spun AUP fibres with integrated activated carbon particulates (highlighted in blue).

EXTENDED RELEASE ANTIMICROBIAL MATERIALS

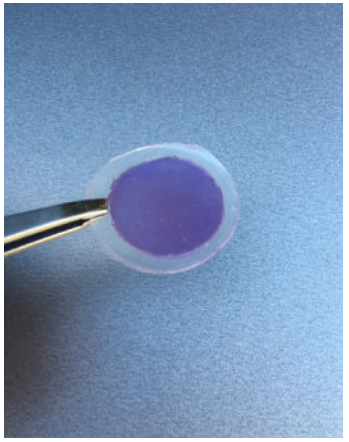
Chronic dermal wounds can be susceptible to intermittent periods of bacterial infection, which can worsen prognosis and cause increased patient morbidity. Infected wounds are routinely treated with antibiotics. However, a useful adjunct is the application of dressings containing pre-loaded antimicrobial agents. Currently these tend to provide a burst-release profile of the antimicrobial, meaning that the dressing is quickly depleted and will require to be changed. Therefore, the DERMA objective was to develop a dressing material with a sustained release profile over an extended period.



Electrospun fibres were loaded with the antimicrobial, povidone iodine, and this was found to be released from the fibres *in vitro* over an extended period compared with a commercial alternative. This demonstrated the potential of the DERMA material to tackle a wound infection with increased efficiency.

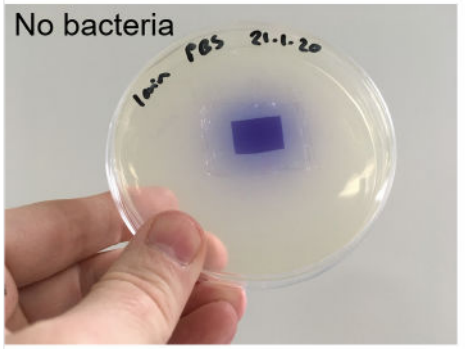


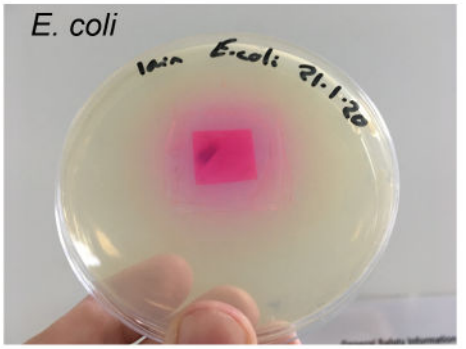
DIAGNOSTIC MATERIAL



Dye-loaded matrix enveloped within platicised agarose composite

The early stages of a wound infection are not always easy to detect. A material is required that gives an easy-to-understand signal that an infection is starting to develop within a wound – indicating that intervention is needed to prevent the condition of the wound from deteriorating.



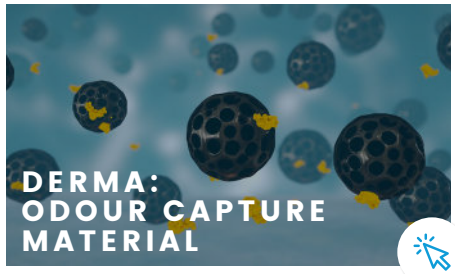


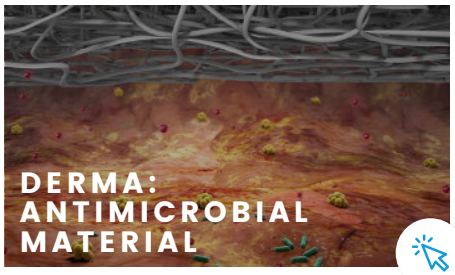
DERMA has produced a material that will produce a stark colour change when in the presence of growing bacteria. Notably, the material retains colour intensity without appreciable leakage of the diagnostic agent in a simulated wound environment. This offers potential for the indicator material to be present on the wound for extended periods whilst maintaining a durable diagnostic functionality, enabling timely clinical intervention in response to a colour change.

CONCLUSION

The DERMA project was ambitious in scope and ultimately productive. Promising materials with the potential to deliver advancements and benefits in wound care have been developed. Some of the technologies are the subject of patent applications, while selected materials will continue to be developed with the aim of delivering new dressing materials to clinic, to help improve patient health and wellbeing.

LEARN MORE :





ABOUT THE DERMA CONSORTIUM

The DERMA consortium was multidisciplinary in nature – it included polymer chemists, microbiologists, material and digital designers, tech transfer specialists and clinicians.

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