ABSTRACT

**Introduction**
Chronic wounds can have elevated protease activity (EPA) which creates a hostile environment that has a negative impact on wound healing. Therapies such as Collagen/ORC have therefore been designed to reduce the levels of protease activity in order to rebalance the wound environment and promote wound healing.

**Method**

In vitro assays
Samples of collagen/oxidised regenerated cellulose (ORC), collagen/ORC/silver and other dressings which claim to affect protease activity were incubated at 37°C in solutions containing clinically relevant levels of active proteases. Fluorometric assays were then used to measure the levels of neutrophil-derived elastase and matrix metalloproteinases (MMPs) to assess the ability of the dressings to reduce the protease activity over time.

Ex Vivo assays
To provide a more clinically relevant model, these dressings were also tested in wound fluid samples containing EPA.

**Case study**
A patient with a diabetic foot ulcer was treated with Collagen/ORC/silver for 14 weeks; the wound was measured and wound fluid samples taken to allow the levels of elastase and MMP activity to be measured.

**Results**
The results confirm that there are differences between the dressings in their ability to reduce both elastase and MMP activity. Collagen/ORC and collagen/ORC/silver showed the greatest reduction in protease activity when compared to the other dressings tested. In protease solution, collagen/ORC/silver reduced the protease activity significantly more than any other dressing. This significant difference was also seen in the more clinically relevant ex vivo model, using wound fluids from a wound with EPA. The case study of the collagen/ORC/silver treated wound also showed a reduction in the levels of elastase and MMP-9 activity which was followed by a concurrenth reduction in wound size.

**Discussion**

The data in these studies provide evidence to support that a combination of collagen and ORC with or without silver is most effective at reducing elastase and MMP activity. This work has also demonstrated that while many absorbent dressings can have some effect on reducing protease activity they are not capable of reducing the levels of protease activity associated with a wound with EPA. Only Collagen/ORC was found to be effective at reducing protease activity in wound fluid with EPA, making it an EPA modulating therapy. Testing the effect of the dressings in wound fluid has provided a more clinically relevant model to assess their ability as a protease modulating dressing. In addition, a reduction in the activity of these specific proteases helps rebalance the proteolytic environment of the wound and which has correlated with wound healing.

**Conclusion**
Collagen/ORC and Collagen/ORC/silver significantly reduces protease activity which can help rebalance the wound environment and therefore facilitate healing.

**OBJECTIVES**
- To demonstrate the ability of Collagen/ORC/Silver to rebalance the wound environment
- To compare the ability of Collagen/ORC/Silver with other collagen & Collagen/Silver products to reduce inflammatory proteases
- To show whether this model is clinically relevant by testing the dressings in wound fluid taken from chronic wounds with elevated protease activity (EPA)

**CASE STUDY – Clinical and Biochemical effect of PROMOGRAN PRISMA® treatment on a Diabetic foot ulcer**

A 74 year old male with type 2 diabetes presented with a diabetic foot ulcer on the right foot. The patient had previously undergone transmetatarsal amputation on this foot. At baseline the duration of the wound was 7 months with an area of 2.5 cm² and a maximum depth of 0.4 cm. Over 34 weeks treatment with Promogran Prisma® there was a reduction in protease activity which was coupled with a reduction in wound area.

**CONCLUSIONS**
- The results show that Collagen/ORC/Silver has properties which are beneficial to wound healing
- The results indicate differences between each dressing type in their ability to reduce the level of inflammatory proteases
- The unique combination of Collagen/ORC/Silver provides the greatest reduction of inflammatory protease activity over collagen/silver containing dressings both in vitro and in wound fluid
- Reducing inflammatory protease activity will rebalance the biochemical environment of the wound facilitating healing
- PROMOGRAN® and PROMOGRAN PRISMA® are the only Collagen/ORC dressings available