



## ***In-vitro* Biological Activities of Healtheries' Biolane™**

### **STUDY AIM**

The aim of this study was to undertake *in vitro* laboratory studies to determine selected biological activities of Healtheries' Biolane™ Green Lipped Mussel Extract (GLME), an ingredient manufactured by Healtheries of New Zealand and used in products available to the public such as Seatone in New Zealand and Musseltone in Australia.

### **SAMPLE PREPARATION**

The samples were subjected to two enzyme digestions to simulate *in vivo* digestive processes.

Various components of gastrointestinal secretions may have an impact on potential actives within a product. In this study we used a two stage *in vitro* model based on gastric and duodenal secretions. The digests prepared from the samples were a pepsin digest containing the prominent gastric enzyme pepsin and a complete digest where the sample was exposed to pepsin followed by pancreatic enzymes.

### **ASSAYS**

Assays assessed:

- anti oxidant capacity

Inhibition of the following components of the inflammatory pathways

- tissue necrosis factor alpha (TNF- $\alpha$ )
- Cox-2 expression
- prostaglandin E<sub>2</sub> (PGE<sub>2</sub>)
- phospholipase A<sub>2</sub> (PLA<sub>2</sub>) – also associated with platelet aggregability
- platelet aggregation inhibitory activity – a measure of pro-coagulant tendency
- fibrinolytic activity – determines ability to remove blood clots in a timely manner

## SYNOPSIS OF RESULTS

Test	Activity Level
anti oxidant capacity	mild
tissue necrosis factor alpha (TNF- $\alpha$ ) inhibition	moderate
Cox-2 inhibition	low
prostaglandin E <sub>2</sub> (PGE <sub>2</sub> ) inhibition	moderate/high
phospholipase A <sub>2</sub> (PLA <sub>2</sub> ) inhibition – also associated with inhibition of platelet aggregability	moderate
platelet aggregation inhibitory activity	moderate
fibrinolytic activity	mild

### Relevance of the in vitro Biolane green lipped mussel extract (GLME) findings to putative Osteoarthritis pathomechanisms

The vascular theory of osteoarthritis causation is based on epidemiological, laboratory, experimental and clinical findings that support the concept that compromised microcirculation in affected joints initiated through a combination of inflammation and imbalance between coagulation and fibrinolysis can initiate and perpetuate the disease. One implication of this theory is that in order to treat more than just painful symptoms (ie to slow or halt the disease process) a range of biochemical activities is required to effectively break the web of pathology. It has been proposed that these should include a number of key activities such as anti-inflammatory, anticoagulant, fibrinolytic and lipolytic activities. If these are realised then chondroprotection is likely to ensue.

The use of highly potent anti-inflammatory agents, particularly the Cox-2 inhibitors would appear to be at odds with the known data showing that patients with osteoarthritis are at greater risk of thrombotic episodes than those without the disease. Cox-2 inhibitors could pose a theoretical risk of increased thrombotic complications in many patients with osteoarthritis. The recent removal of Vioxx from the market and restrictions governing the use of Celebrex – the Cox-2 market leaders, based on these concerns would appear to support this proposition.

A successful anti-arthritic agent should have multiple low level activities that address a range of disease drivers while avoiding the serious side effects that frequently accompany massive disruption of major biochemical pathways such as major Cox-2 inhibition.

The current in vitro study has shown that GLME has a range of activities that the vascular theory of osteoarthritis causation predicts as desirable for disease treatment. These include anti-inflammatory activity through its inhibition of TNF $\alpha$ , PGE<sub>2</sub>, Cox-2 and PLA<sub>2</sub> in addition to its anti-oxidant activity. It is not critical for these activities to be at extremely high levels. In fact it is advantageous from the perspective of a low side effect profile that they should not be so.

The multiplicity of relatively low level activities is of greater importance. GLME has in vitro activity that can reduce thrombotic risk (decreased PLA<sub>2</sub>), dampen platelet aggregation and enhance the removal of blood clots (mild fibrinolytic activity).

The results obtained in this study indicate that GLME has in vitro activity in key areas associated with arthritis pathophysiology.

## Additional Information

While ACCMER does not endorse specific products as a matter of principle, further information can be obtained at [www.biolane.co.nz](http://www.biolane.co.nz)



Click here for background to Vascular Theory of OA causation