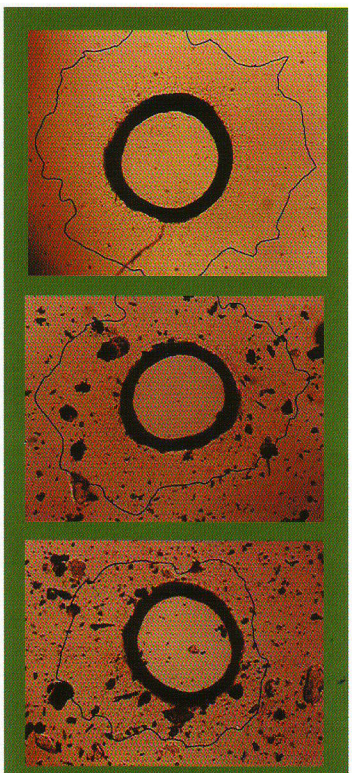
Bio-Active Shark™

A new shark cartilage product with validated biological activity is just about to join the international marketplace

Bio-Active Shark™ is produced by Aroma (NZ) Ltd using a process developed by Industrial Research and the Wellington School of Medicine to maximise its biological activity. Furthermore, each batch of cartilage will be assayed by the School of Medicine to ensure it is biologically active.

Industrial Research and the Wellington School of Medicine have been investigating the biological activity of shark cartilage for the past three years. Shark cartilage has been widely promoted for its potential anti-cancer properties. In particular, the book "Sharks Don't Get Cancer" and its follow up volume "Sharks Still Don't Get Cancer" by William Lane have given shark cartilage an important share of the health food supplement market in the United States and Europe. However, the advertorial tone and intense hype surrounding these and similar books has produced some scepticism from the scientific community and so far clinical trials have been inconclusive.



Bioassay of shark cartilage powders. Blue line shows furthest extent of growth of new microvessels. Top is control, middle is normal shark cartilage and bottom is Bioactive™ Shark.

The proposed mechanism of action of shark cartilage is that it prevents the new blood vessel formation required to feed a growing cancer and allow it to spread. This process of new blood vessel formation is called angiogenesis. Prevention of angiogenesis is an attractive strategy for attacking cancer because there is very little angiogenesis in a healthy adult except during wound healing and menstruation. This means that there is no toxicity from antiangiogenic agents and also resistance should not be a problem. A number of major drug companies are investigating synthetic antiangiogenic agents for fighting cancer.

Since New Zealand exports between 9 and 12 million dollars worth of shark cartilage annually we decided to investigate the antiangiogenic properties of the material under Foundation of Research Science and Technology funding.

One of the major criticisms of shark cartilage has been that if shark cartilage did indeed contain any factors that could prevent angiogenesis, they would be destroyed in the stomach or not absorbed by taking the powder orally. We chose to address this question first. To do this we developed an animal model of angiogenesis. We stimulated new blood vessels to grow in rats and measured the effect of adding powdered shark cartilage to their food on the number of new vessels formed compared to control animals. We found that the number of vessels is significantly reduced in animals that have been fed shark cartilage. This clearly shows that there is a factor in shark cartilage that reduces angiogenesis. More importantly, it shows that the factor can be absorbed in an active form when eaten normally in the diet. This work has been published (Davis, P.F., He, Y., Furneaux, R.H., Johnston, P.S., Rüger, B.M. and Slim, G.C. 1997 "Inhibition of Angiogenesis by Oral Ingestion of Powdered Shark Cartilage in a Rat Model" *Microvascular Res.* 54, 178-182).

The animal model work, while producing excellent scientific results, was too slow and expensive for commercial development so we developed a simple *in vitro* assay for antiangiogenic activity. To do this, sections of mammalian blood vessel, usually rat aorta, are grown in culture. Under the right conditions these spontaneously sprout new microvessels which grow for a week or more. We can test materials for antiangiogenic activity by measuring the extent of new blood vessel growth in sections grown in medium containing the test material compared to control sections grown in medium alone.

Industrial Research has developed a new method for processing shark cartilage and used the *in vitro* assay to show that it can produce material twice as active as cartilage processed in the traditional manner (see Figure). This material is now being produced on a large scale by Aroma (NZ) Ltd at their MAF licensed plant in Christchurch for export to Canada, the USA and Europe.

Most shark cartilage powder on the market has never been tested to show whether it has any biological activity. All shark cartilage is not the same: different methods of processing can influence the biological activity of the final product. Unless each batch of material produced is tested by a scientifically valid method to show that it does indeed prevent angiogenesis, the consumer cannot be sure the material they have bought is active.

We are now using our bioassays to determine the nature of the biologically active components in shark cartilage to develop further new products. We are also hoping to establish animal models of tumour growth to examine the direct effects of shark cartilage on cancer development as funding allows.

For further information contact:

Dr George Slim
Industrial Research
Ph: (04) 569-0000
fax: (04) 569-0132
email: g.slim@irl.cri.nz