

Soluble Beta-Glucan

Activates macrophages and the innate immune system



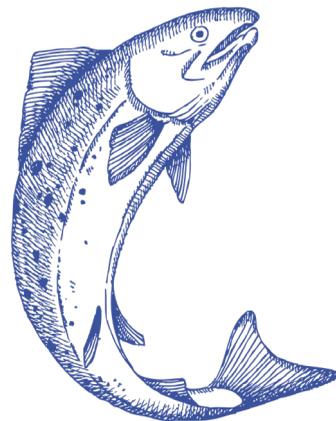
The wonders of nature

Serendipity can be said to be at play when researchers, looking for a solution to a problem, unintentionally uncover the answer to something else.

This is exactly what happened in Tromsø, Norway in 1987. Looking at how to increase the weight of salmon by testing new feed formulations and, at the same time, reduce the mortality rates in Norwegian fish farms, Professor Jan Raa's work focused on how beta-glucans could help.

During the research the fish were affected by a bacterial disease and started dying, however, some of the fish ponds showed a significantly lower death rate than others. These fish ponds had been fed the formulation containing beta-glucan.

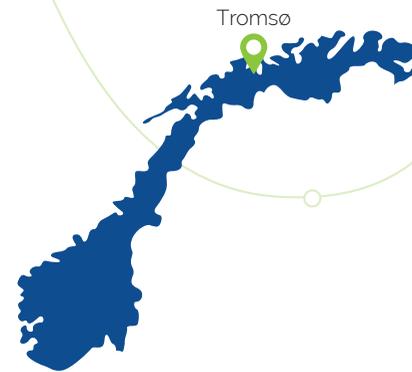
Tromsø University began an investigation, led by researcher Rolf Engstad, to test the theory / hypothesis that beta-glucans strengthened salmon's natural immune system. Their research concluded that natural, yeast-derived beta-glucans had the ability to significantly improve the natural immune system in fish. After confirming the theory this research formed the basis for developing Soluble Beta-Glucan (SBG).



From the fish pond to the world beyond

The potential of these yeast cells seemed infinite, prompting ten years of extensive research and development refining SBG. Prior to the production of SBG in its purest liquid form, the beta-glucan compound was used in numerous health products and cosmetics.

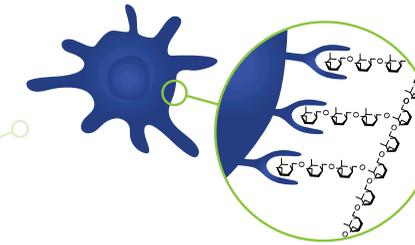
The now patented, pure liquid format proved so effective, it was shown to boost the body's natural immune system by stimulating macrophages, and has since become the key active ingredient in Woulgan, an active therapy for slow healing wounds.



Maximising macrophage-enhancing powers

Macrophages are 'intelligent' white blood cells that act as our bodies' natural immune boosters. The shape of the yeast-derived SBG molecule found in Woulgan, lets it bind efficiently to the macrophages' receptors. This binding activates the macrophages which co-ordinates and stimulates the body's natural defence system to fight microorganisms when it is weak, - naturally and safely.

It is incredible what nature gives us, if we just know where to look.



Mode of Action

SBG is a polysaccharide consisting of a backbone with complex sidechains, which is recognised as a danger signal by the innate immune system. It is the size and the complexity of the sidechains that determine the bioactivity and macrophage enhancing power of the molecule. The length and complexity of the SBG sidechains ensure efficient cross-binding of several receptors called Dectin 1 on the cell surface. This cross-binding activates the cell, potentiates effector mechanisms and induces cell signaling responses.

Therapeutic use of SBG

Macrophages play a central role in several immunological processes throughout the body, and thus compounds that can influence and potentiate effector mechanisms of these cells have a wide therapeutic potential. Currently SBG is used in two areas:

- As an adjuvant in immunotherapy of cancer
- As a medicinal substance in Woulgan, an active therapy for slow healing wounds

To read more about Woulgan visit our website www.woulgan.com

To read more about SBG visit our website solublebetaglucan.com



Soluble Beta-Glucan

Activates macrophages and the innate immune system

With immunomodulatory properties derived from the cell wall of the yeast *Saccharomyces cerevisiae*, SBG is produced by a proprietary and patented method in compliance with Good Manufacturing Practice (GMP) in Biotec BetaGlucans' production unit in Tromsø, Norway.

The production and control of SBG® has been approved by the Norwegian Medicines Agency and is also approved in accordance to ISO-13485 as a medical device ingredient.



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Activate macrophages fast - when healing slows

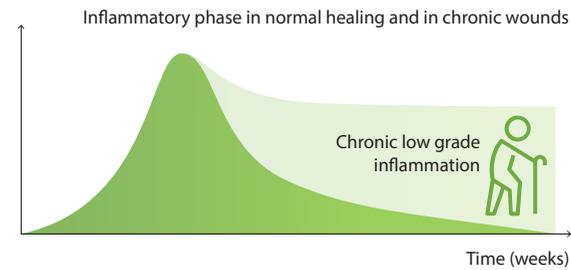


SBG inside!

Chronic wounds

Age, infections and comorbidities such as diabetes may negatively affect the healing process, as the immune cells involved in repair have a reduced ability to function and become senescent. This also applies to macrophages – the key cell type responsible for orchestrating the wound healing cascade¹, which results in chronic inflammation and slower healing.

Poor functionality of macrophages from age, diabetes and infections can be restored by beta-glucan stimulation, which will reset the healing cascade^{2,3}.



How Woulgan works

Woulgan gel supports moist wound healing, and contains soluble beta-glucan (SBG) which binds and activates macrophages, resulting in production of signal molecules, growth factors and increased phagocytosis, which ultimately accelerates the healing process.

Active wound healing

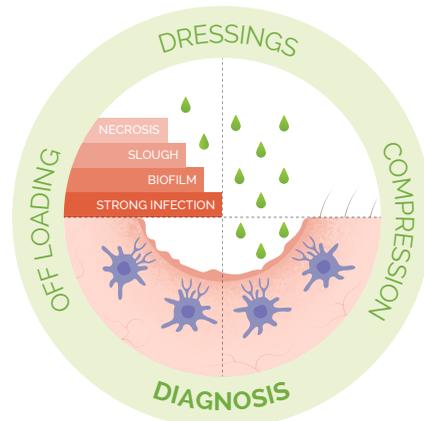
Healthcare professionals, who are able to conduct a full holistic assessment of the patient/wound and decide whether Compression, Offloading and what Therapy to implement, are all essential for healing wounds.

For Woulgan to have maximum effect barriers need to be removed by suitable debridement methods⁴. Examples of barriers are:

- Necrotic tissue
- Slough
- Biofilm
- Inflammation and/or infections

Approximately 25% access to the wound bed is required.

Successful wound bed preparation will give access to the macrophages and when activated will affect the patient's own ability to heal and support the treatment given by nurses, which together will heal wounds faster.



When to initiate WOULGAN

Use the Active Wound healing model above as your guidance.

- 1 DIAGNOSIS**
Conduct full holistic assessment of patient. Ensure comorbidities and nutrition are under control
- 2 STANDARD CARE**
Ensure guidelines around best practice have been applied to ensure removal of devitalised tissue and other barriers to wound healing
- 3 ASSESS**
Assess whether the wound is healing. Less than 40% reduction in 4 weeks indicate a slow healing (chronic) wound. Activate macrophages with Woulgan when healing slows.
- 4 INITIATE WOULGAN[®]**
Start Woulgan twice a week for 4 weeks and re-assess if wound is improving, then continue for a second 4-weeks treatment. If no wound improvement, then discontinue

Acting quickly improves patient welfare and saves costs

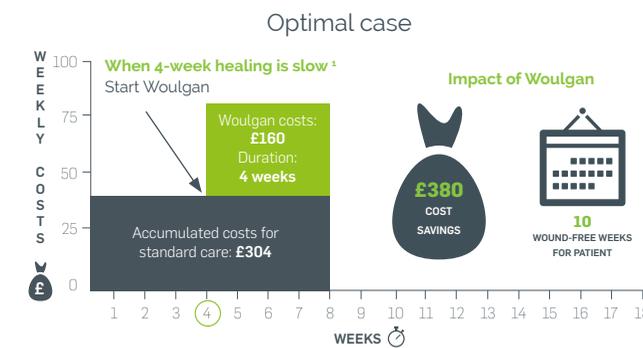
The below case illustrates improved outcomes using Woulgan, the potential cost savings and increased patient quality of life by early intervention of treatment plans.



After 14 weeks with standard of care and compression



After 4 weeks with Woulgan and a foam dressing



Evidence

Woulgan is clinically effective and documented through several studies, including a double-blind placebo-controlled clinical study, showing clear beneficial effect of SBG treatment and complete healing in previously unresponsive diabetic ulcers.

A statistically significant healing effect was apparent as early as 8 weeks from the start of treatment (figure 1).

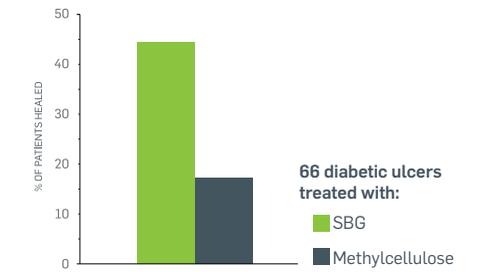


Figure 1: Results from a blinded, randomised clinical trial on 66 slow healing diabetic foot ulcers, showed a statistically significant effect in complete healing for the SBG treatment compared to placebo at week 8.

Ordering details

Item	Pack size	Product code
Woulgan 4 g	4	WGA04EA001-4
Woulgan 4 g	8	WGA04EA001-8

Contact information

Contact Biotec BetaGlucans
www.woulgan.com
www.solublebetaglucan.com

¹ Snyder, R.J., et al., Macrophages: A review of their role in wound healing and their therapeutic use. *Wound Repair and Regeneration*, 2016. 24(4): p. 613-629.
² Leibovich, S.J. and D. Danon. Promotion of wound repair in mice by application of glucan. *J Reticuloendothel Soc.* 1980. 27(1): p. 1-11.
³ Novakovic et al., Beta-Glucan Reverses the Epigenetic State of LPS Induced Immunological Tolerance. *Cell*, 2016. 167: p 1354-1368.
⁴ Strohal et al., EWMA document: Debridement. An updated overview and clarification of the principle role of debridement 2013