



## INNOVATION IN (BIO)ACTIVE WOUND MANAGEMENT



Safe Solutions in Wound Healing and Infection Control

BiologiQ Newsletter October 2022

### English Summary

#### Total concept in (bio)active wound management

BiologiQ is an independent Dutch company, basing its operations on the view that the future of wound care lies in innovative, (bio)active and sustainable wound care products.

These must be geared to stimulating the body's own regenerative powers and be based on the latest insights into the biology of the (complex) wound. Leading criteria in the development of the BiologiQ product range are proven effectiveness, sustainability, cost-efficiency, improved time-to-heal and a better quality of life for the patient.

## New roles for existing drugs in fight against diabetes and obesity



From October 18 to 22 last the *International Congress on Obesity* was held in Melbourne (Australia). At the conference scientists revealed a number of widely used medicines that could be repurposed to combat diabetes and obesity. Repurposing existing drugs to treat conditions not originally targeted offers many advantages. Over the last decade the search for such drugs has become ever more systematic, involving the use of advanced and dedicated computer software.

### Faster and cheaper

If a drug can be effectively repurposed to treat conditions it was not intended for when launched, there may be considerable savings. The cost of developing and testing new medicines prior to approval and market release is prohibitive. Also the safety of existing drugs has already been established through testing and often years of practical use. Further savings may come about when patent restrictions no longer apply to older drugs and cheaper generic alternatives become available to both prescribing therapists and patients. Yet another benefit of repurposing existing drugs is that these can be deployed with a minimum of delay, as approval by the relevant health authorities is already in place. This is more than welcome, as Professor Murray Cairns of the University of Newcastle, New South Wales, Australia, explains: "New treatments with high activity and specificity are urgently needed to tackle a pandemic of chronic illness associated with type 2 diabetes and obesity." Cairns and colleagues studied data on the genetic pathways involved in the onset of diabetes and obesity, using special software to compare these to the pathways existing drugs take through the body. This enabled them to identify and list a range of drugs as potential candidates for repurposing and tackling these conditions.

### Unintentionally effective

Among other medicines the list contains treatments for stomach ulcers and heart rhythm disorders. As potential new diabetes treatments Cairns' team identified *palbociclib*, used to treat breast cancer, and *cardiac glycosides*, drugs for the treatment of heart failure and heart rhythm disorders. Suitable candidates for the treatment of obesity include *baclofen* (a muscle relaxant) and *carfilzomib*, a cytostatic used e.g. to treat multiple myeloma. Some of the drugs on the list have the potential to treat diabetes as well as obesity, like *sucralfate*, developed for the treatment of stomach ulcers and *regorafenib*, a cancer drug. The phenomenon of existing drugs acquiring a second life as a treatment of conditions they were not originally intended for is not new. Nor are drugs failing to achieve their original aim, but unexpectedly given a second chance by proving effective for a totally different condition. The most striking example dates back more than ten years, when scientists at one of Pfizer's laboratories developed *sildenafil*, a compound intended for the treatment of angina. It failed miserably in that respect, but during testing an interesting –and totally unintended– side effect was observed. The Viagra success story was born.

Source: [theguardian.com](http://theguardian.com)

## Snail venom research may lead to faster working insulin



A team of scientists at the university of Copenhagen led by biologist Helena Safavi-Hemami have been looking to improve insulin for use by people with diabetes, by analysing the venom of cone snails. The venom of the *Conus kinoshitai* contains an insulin that in prey animals causes an almost immediate drop in blood sugar, acting much quicker than human insulin.

### Clumping

Diabetes in humans is caused by a failure of the 'islets of Langerhans' in the pancreas to produce sufficient insulin, making patients dependant on periodic administration of synthetic insulin. This used to be obtained from the pancreas of slaughtered pigs

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and cows, but nowadays is produced through a biotechnological process using the recombined cells of the bacterium *Escherichia coli*. Both naturally and synthetically produced human insulin need to form clumps to facilitate storage in the body. These have to dissolve first before they can become active. Depending on how long the injected insulin has to stay active in the body it can take up to two hours before taking effect. In comparison, the insulin in the venom of *Conus kinoshitai* takes direct effect upon insertion, resulting in an immediate lowering of blood sugar levels.

### Promising

Based on these insights – and encouraged by previous experiments involving another poisonous cone snail *Conus geographus* – the team incorporated unique regions of the insulin from *Conus kinoshitai* into human insulin, creating a new insulin lacking the human version’s tendency to clump. The new hybrid insulin helps cells metabolize blood glucose directly upon injecting, thus working much faster than existing synthetic insulin. Using state of the art imaging technology the team were able to visualise how the new hybrid attaches itself to cells’ insulin receptors, changing their shapes. In this respect the new hybrid insulin differs from previous synthetic insulins. Biochemist Mike Strauss (McGill University), not involved in the project, reacts: “These findings can help better illuminate how insulins work in general. This opens up possibilities for synthetic insulins.” The team is now researching their insulin’s stability and safety. The venom of other cone snails, often highly complex cocktails of promising molecules, also remain objects of interest and further study.

Sources: [eoswetenschap.eu](http://eoswetenschap.eu), [nature.com](http://nature.com), [research.ku.dk](http://research.ku.dk), [scientificamerican.com](http://scientificamerican.com). Article: Xiong X et al, *Symmetric and asymmetric receptor conformation continuum induced by a new insulin*, *Nature Chemical Biology*, 2022.



State of the Art  
Wound Healing

## Fire-bellied newt study model for scarless wound healing



For over two years researchers at the university of Tsukuba (Japan) have been studying skin regeneration in various body parts of the adult Japanese fire-bellied newt (*Cynops pyrrhogaster*). Because wounds in newts heal very fast, with full skin regeneration, the healing process doesn’t leave scars. This makes newts promising model systems for studying and preventing scar formation in human skin.

### Re-epithelialisation

Scarring occurs in humans and other mammals because of incomplete regeneration following a skin injury. Though the epidermis may grow back to close the wound during re-epithelialisation, afterwards the skin tone and/or tissue structure may differ from their original appearance, which is manifested as a scar. Granulation and dermal fibrosis are key processes involved in scar formation, which is why they are focused upon by scientists looking for ways to prevent or minimize scarring caused by clinical procedures. Scars can not only lead to psychological problems, but may also impair functionality. Because many amphibians can regenerate their skin without scarring, they have been studied avidly to find out why this is the case. Lead study author Dr. Tatsuyuki Ishii explains why his team chose the fire-bellied newt as a study model: “[This] is a type of salamander that is well understood on the genetic level. We know adult newts are capable of complicated tissue, organ and limb regeneration. Despite that, their ability to regenerate skin has not been scientifically demonstrated.”

### Fast wound healing prevents fibrosis

The researchers removed small pieces of skin through an excision from multiple body parts of adult newts, including from the head, limbs, abdomen and trunk. For up to two years they observed skin healing and regeneration progress with regular intervals, carefully registering signs of re-epithelialisation, dermal fibrosis, texture recovery and colour. Co-author

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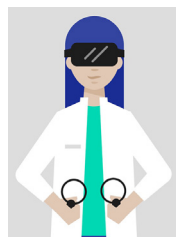
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Chikafumi Chiba: "Re-epithelialisation occurred at all locations, while no dermal fibrosis was observed at all." The only deviation the team observed was a failure to restore the striking colour pattern on the back and belly of the newt. However, this was considered irrelevant, as such colour patterns are lacking in human skin. Therefore the fire-bellied newt presents a perfect model for studying skin regeneration and scar formation in humans. On the morphological and molecular level the researchers noted that the inflicted wounds healed within a matter of days, but that full skin regeneration could take up to two years. During wound healing inflammatory gene markers were only briefly expressed. Dr. Ishii: "Dermal fibrosis is often characterised by prolonged inflammation at the wound site. Scarfree skin occurred in the newts through rapid re-epithelialisation and skipping of granulation and dermal fibrosis."

Sources: [eurekalert.org](http://eurekalert.org), [sciencedaily.com](http://sciencedaily.com). Article: *Ishii T et al, Skin Wound Healing of the Adult Newt, *Cynops pyrrhogaster*: A Unique Re-Epithelialization and Scarless Model. Biomedicines, 2021.*

## Virtual Reality gives new impetus to wound care education



At the **World Union of Wound Healing Societies Congress 2022 (Abu Dhabi, March 1 - 5)** a new VR based teaching and training method based for wound care professionals was presented. Reason enough for *Wounds International* to publish an article on *Hartmann Virtual Reality Wound Care Simulation Training*, hailed as groundbreaking in wound care education.

### Significantly better learning results

The VR training programme has been developed by the wound care division of Hartmann Medical, part of a globally active German group of companies. Like all VR software it is based on the computer-generated simulation of three-dimensional images of the reality to be interacted with, in this case wounds and wound management. The virtual reality is accessed by means of

electronic equipment, such as a helmet, vizor or headset with a screen fitted inside and/or gloves fitted with sensors. Modern VR headsets offer the wearer a super-realistic, immersive experience and are highly effective as an aid to teaching practical skills and other learning processes. In a random (small scale) test the learning results of a group taught certain orthopaedic surgical techniques by VR were compared to those of a group of equal size, that had used standard ('passive') learning tools. For the VR group aggregate global assessment scores were significantly higher than for the control group (17.5 versus 7.5,  $p < 0.001$ ). The VR group also scored significantly better when the percentages of 'steps completed correctly' were compared: 63% versus 25%,  $p < 0.002$ .

### Risk-free learning

The VR training method provides various benefits. Students can familiarise themselves with realistically experienced situations and wound problems from everyday practice, without having to inconvenience patients or, worse, putting them at risk. A risk-free learning environment means students feel less inhibited to make bolder choices: what is learned through trial and error is better retained. VR education can offer considerable cost savings, as busy healthcare professionals need to spend less time on supervision, while the demand on other resources (e.g. presence in/use of clinic space) is also reduced. In part due to the use of gaming techniques, students feel more involved in the learning process, which results in structurally better retention. VR also helps those in a teaching role to evaluate and assess student progress in a more focussed and effective way. No wonder the authors of the *Wounds International* article conclude: "This pioneering new approach to HCP education will increase clinician's skills and confidence and ultimately improve experiences and outcomes for patients. HCPs will be better equipped to assess, identify, diagnose and manage wounds based on the patient's history and described symptoms, selecting treatment options and tracking outcomes."

Sources: [hartmann.info](http://hartmann.info), [wcs.nl](http://wcs.nl), [woundsinternational.com](http://woundsinternational.com). Article: *Banasiewicz T et al, The role of VR technology in wound management and education, Wounds International, 2022.*

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### The BiologiQ Knowledge Centre

The 'Kenniscentrum' (Knowledge centre) on the BiologiQ website contains product documentation, scientific and case studies, research reports and other relevant information on BiologiQ products and therapies. The Kenniscentrum is continuously being expanded and brought up to date.

## Conference agenda

In the months to come BiologiQ will be involved in or represented at the following wound care event:

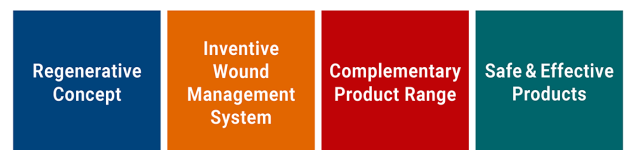
November 4, 2022

### Wound practicum, Mark Two Academy

An event dedicated to practicing and improving wound care skills. BiologiQ will be represented with a stand, while also supporting an LDT Larval Therapy workshop.

Venue: Postillion Hotel Bunnik.

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Innovating Wound Healing