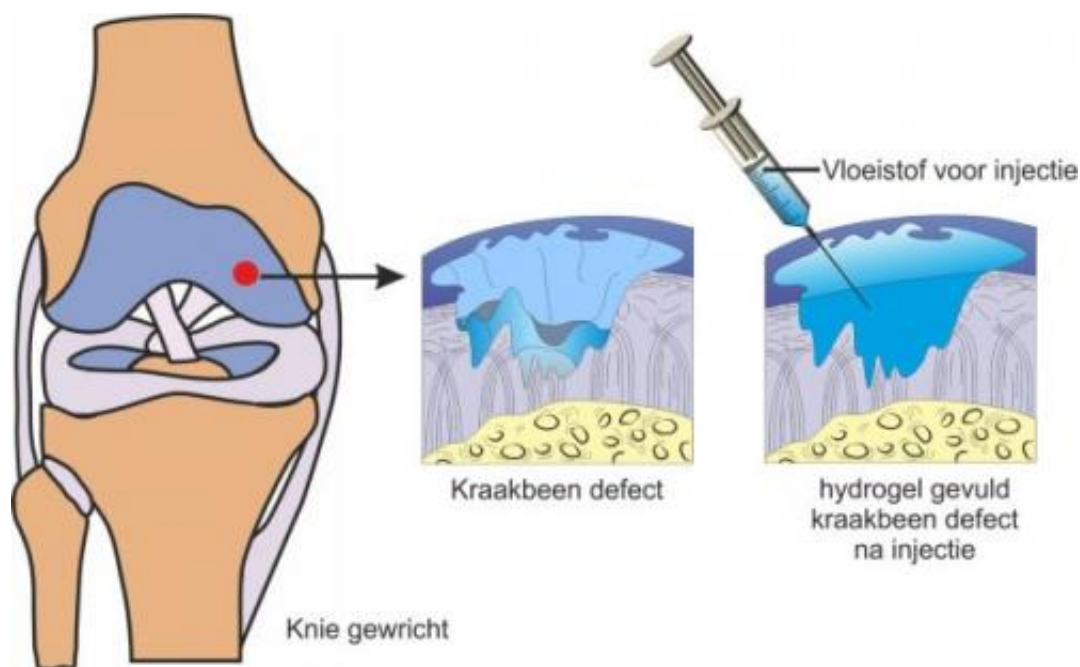


Cartilage restored using imitation human tissue: End of expensive knee implants in sight

April 9 2013



Principle of a minimally invasive procedure using injectable hydrogels.

More than one million people in the Netherlands suffer from painful joints. This is due to the wear and tear of cartilage caused by trauma, aging or diseases such as osteoarthritis. Cartilage is the tissue that protects bones when the body is in motion. Wear and tear makes joints feel stiff and painful during movement. In the course of his PhD research, Jos Wennink of the University of Twente studied ways of

restoring worn cartilage, through the use of new injectable materials.

Therapy to reduce [joint pain](#) and to stimulate the growth and repair of cartilage generally involves the use of medications that have unpleasant side effects. In an attempt to counteract these side effects, such medication can be administered locally, directly into the affected joints. However, [blood vessels](#) quickly carry the medication away from the joint, often before it has had time to take effect. In many cases, the pain is so extreme that a decision is taken to replace the joint with a metal [knee implant](#). Such surgery is expensive and often provides only a temporary solution.

New cartilage tissue created by cartilage cells

Jos Wennink found a way of repairing worn cartilage, through the use of new injectable materials. Outside the body, these materials exist in liquid form. After injection, however, they are converted to hydrogels by [enzymatic reactions](#) or physical interactions. Hydrogels are materials that can hold large amounts of water, thereby mirroring the properties of [human tissue](#). As they are initially liquids while outside the body, these materials can be easily mixed with medications or cartilage cells before being injected. Jos Wennink points out that "These newly developed hydrogels have been shown to stimulate [cartilage cells](#) to produce new cartilage tissue of the type specifically found in joints. As this new cartilage tissue is being synthesised, the hydrogels are gradually eliminated until only [cartilage tissue](#) remains. By forming a gel in the immediate vicinity of the defect, these materials effectively fill in the affected area. This makes it possible to use arthroscopic treatment, which is a minimally invasive technique for inspecting and treating injuries to the inside of the joint".

End of knee implants in sight

In time, therefore, it will become possible to replace metal-knee-implant surgery (which can often be very expensive, and which involves a risk of infection) with closed knee surgery in which material is injected using a syringe. The injected hydrogel initiates the recovery and growth of new cartilage, which is a permanent solution for the patient's problem.

Further details

Jos Wennink of the University of Twente defended his PhD thesis entitled 'Biodegradable hydrogels by physical and enzymatic cross-linking of biomacromolecules' on 27 March 2013. He carried out his research at the MIRA research institute (Department of Developmental BioEngineering). His thesis supervisors were Prof. Jan Feijen and Prof. Pieter Dijkstra. The thesis is available on request.

Provided by University of Twente

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