

Healthcare industry BW

More effective prevention and treatment of diabetic feet

Dr. med. dent. Hans-Helmut Schmidt has developed a device that enables the effective and hygienic treatment of patients with diabetic foot syndrome (DFS). The new device, known as DIAPEDES®, enables diabetic feet to be treated in a closed foot-shaped container under definite clinical conditions. Diabetic feet can smell and look quite unpleasant, and the preventive care that this device will offer for many users has been developed with this problem in mind. The device can be filled with different drugs, which also makes it suitable for use in oxygen therapy and immunosuppression. In addition, it also helps save time and material. Schmidt hopes to be able to commercialise the patented device in the not-too-distant future.



Dr. med. dent. Hans-Helmut Schmidt has developed a device for the hygienic treatment of patients with diabetic foot syndrome.

Around six million people in Germany have been diagnosed with diabetes. In addition, it is assumed that many more adults unknowingly suffer from diabetes. Current estimates indicate that well in excess of 10 million people in Germany have diabetes.

Diabetic foot syndrome (DFS) or diabetic foot is a major complication of diabetes mellitus that represents in different degrees. For example, foot injuries in diabetes mellitus patients can lead to severe complications that can result in the amputation of the affected foot. Major complications are diabetic neuropathies (damage to foot nerves), reduced sensibility, pain, decubitus, circulatory disorders and the closure of arterial vessels. Delayed wound healing and infection can lead to foot ulcers, complications that might become so serious that the foot needs to be amputated. Around 70 per cent of all amputations in Germany - up to 40,000 per year - occur due to DFS.

DFS sufferers need to pay special attention to the care and treatment of their feet. However, many people find it very difficult to keep wounds clean and apply wound dressings. This can be due to adiposity and mobility difficulties. Without preventive care and hygiene measures, the decaying skin is an excellent breeding ground for fungi (mycosis) and bacteria (which leads to bacterial superinfections), something that is often associated with a slightly sweet odour. This is particularly unpleasant for the people attending the wounds.

No simple solution to reliably seal off the foot and enable the hygienic treatment of the wounds has previously been available. However, Dr. Hans-Helmut Schmidt has now developed DIAPEDES®, a patented device that applies medical compounds to the foot designed to eradicate fungi and bacteria, as well as provides care and other soothing substances at the same time as enabling the easy removal of liquids that accumulate.

Saving time and material

"Particularly in cases where DFS patients depend on nursing personnel or have to be admitted to hospital, DIAPEDES® will offer relief and also reduce the risk of further complications occurring," said Schmidt. First and foremost, the device leads to material and time savings. "The device does away with cost-intensive therapies involving specifically trained care personnel who treat patients at frequent intervals, for example when wound dressings need changing. In addition, the number of visits required to change bandages and dressings can also be reduced." The device therefore helps save a lot of time and material as far as care personnel are concerned. In addition, DIAPEDES® also improves the hygiene, both for nurses and for the patients themselves, as it seals off bad odours whilst at the same time exposing the foot to medical substances.

Prototype consisting of a sheet cover, siccation inlay and cushions containing drugs



Several therapy-neutral coloured indicators enable the treatment and its effect to be monitored.
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The word DIAPEDES® is derived from the combination of “diabetes” and “per pedes” (Latin: by foot). The shoe-like device consists of a silicon sheet that encloses the foot. Cushions attached to the inside of the silicon sheet can be filled with medical substances such as fungicides, bactericides and salicylates. A rough sponge takes up the substances mechanically and a gelling agent contained in a siccation inlay does so chemically. An adhesive lock and beading above the ankle prevent substances and liquid leaking from the DIAPEDES device. The substances contained in the cushions can be activated when pressure is applied. “The concentrations of therapeutic substances can be adapted to any treatment duration,” said Dr. Schmidt. Several colour indicators on the device enable the treatment effect to be monitored. The shoe is disposable and is changed after each treatment. Hyperbaric oxygen therapy and suppression therapies (destructive peptides) are also feasible with DIAPEDES.

Looking for commercial partners to exploit the patent

Dr. Hans Schmidt is a dentist with a fondness for working on and finding solutions for general subject-specific issues, and he sees himself as a “problem solver”. The idea of developing a device for the hygienic and medical treatment of DFS arose from discussions with colleagues, DFS sufferers and healthcare personnel. “I then read books and articles and realized that there were no simple solutions in the care of DFS that saved time and material as well as improving the possibilities for effective treatment,” said Schmidt. DIAPEDES® has already undergone podological and medical

testing by the Steinbeis Institute and the Centre for Clinical Studies in Villingen. In addition, the Fraunhofer Institute for Industrial Engineering IAO (Fraunhofer Institut für Arbeitswirtschaft und Organisation) has carried out a financial evaluation of the device.

Schmidt is also in contact with CenTrial GmbH, which acts as a patent interface agent between the University of Tübingen and industry, and with licensing offices such as DIMDI. Dr. Hans Schmidt is looking for cooperation partners to help him commercialise his invention. "The next steps will focus on the commercial exploitation of the device, the development of a prototype and clinical trials," said Schmidt who already has some experience of exploiting innovative ideas. In cooperation with the company Roncholine, the creative inventor has already developed an oral device for the prevention of snoring and obstructive sleep apnoea (Ronchex®). His scientific interests focus on elucidating the connection between snoring and alcohol consumption.

Further information:

Dr. Hans H. Schmidt

Dental appliances for the treatment of sleep apnoe, apnoe diagnostics, diabetic foot syndrome

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Article

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Diabetes, a danger that is still underestimated