

Hameldent

Innovative technology for assessing the periodontal disease

As part of the European Manunet programme, a partnership of several regions dedicated to promoting smart manufacturing, UNIVERSITY POLITEHNICA OF BUCHAREST (Romania), S.C. CONCORDIA DENT SRL (Romania) and MEDISEN Medical Technology Research and Development Company Limited Industry Trade (Turkey) have developed an innovative technology for assessing and treating periodontitis. The new treatment is based on hyaluronic acid and melatonin. Eugenia Eftimie Totu, the project leader of the consortium and affiliated with the University Politehnica of Bucharest: "Two objectives were in fact central to the project. Firstly, we wanted to develop new material for the topical treatment of periodontitis. In addition, we focused on realizing a medical device that can determine the level of inorganic ions directly from the periodontal pockets. The great advantage of this medical device is that it can be used as a rapid assessment instrument for early diagnosis and treatment's efficacy in periodontal disease."



“A better assessment instrument for early diagnosis and treatment’s efficacy in periodontal disease”



Ca-sensing membrane
used for microsensors

Better perspective for patients

“Periodontitis is a very unpleasant disease, ultimately leading to tooth loss,” explains Eftimie Totu. “That is why we started this Manunet project with the idea that we can improve the patient’s quality of life with better topical treatment and an easier and more precise diagnostic tool. A disease such as periodontitis deserves our full attention. It was our mission to offer patients a certain perspective on getting better. With the development of the innovative material and the medical device for early diagnosis, we ultimately expect to be able to make a significant contribution to the effective treatment of patients. In addition, we want to be less dependent on the use of systemic antibiotics for treatment.”

Periodontitis as a growing societal problem

Before the start of the project, statistical data reported an ascending trendline among the worldwide population, which was, according to

Eftimie Totu, the direct reason for the project. “For example, severe periodontal disease is nowadays found in about 15-20% of middle-aged adults and is also increasingly common among young people. The average age at which periodontitis manifests itself is therefore gradually decreasing.” Periodontal disease is a chronic inflammatory with a mechanism of installation and progression based on bacterial biofilm formation and greatly influenced by the host immune response. Several systemic diseases such as diabetes or genetic factors, environmental and lifestyle factors such as tobacco smoking, poor nutrition, alcohol and stress significantly influence the progression of the disease. Periodontal disease without treatment progresses to the destruction of teeth supporting apparatus and alveolar bone, consequently leading to teeth loss. Moreover, serious systemic effects, going beyond the oral cavity and affecting general health could be determined by the haematogenous dissemination of both



Better Monitoring

bacteria and bacterial products originating in the oral biofilms and inflammatory mediators originating in the inflamed periodontium. "It is therefore important to develop effective medical instruments to diagnose and treat periodontitis at an early stage," Eftimie Totu summarizes.

Better monitoring of periodontal disease

The level of inorganic ions such as sodium, potassium, and magnesium in the saliva of patients could be used as an indication for periodontitis. These ions are formed by so-called electrolytes, electrically charged particles, which play an essential role in many functions. However, the determination of periodontal disease on the basis of inorganic ions is not always reliable. "The medical device that we have developed on the basis of sensor technology is able to determine the level of electrolytes directly in the periodontal pockets. With our innovation, we can better determine

the level of the ions and a further correlation with the occurrence of acute phases of chronic periodontitis. This makes it possible to use more effective methods for the treatment and prevention of periodontitis," so Eftimie Totu.

Commercialization as next step

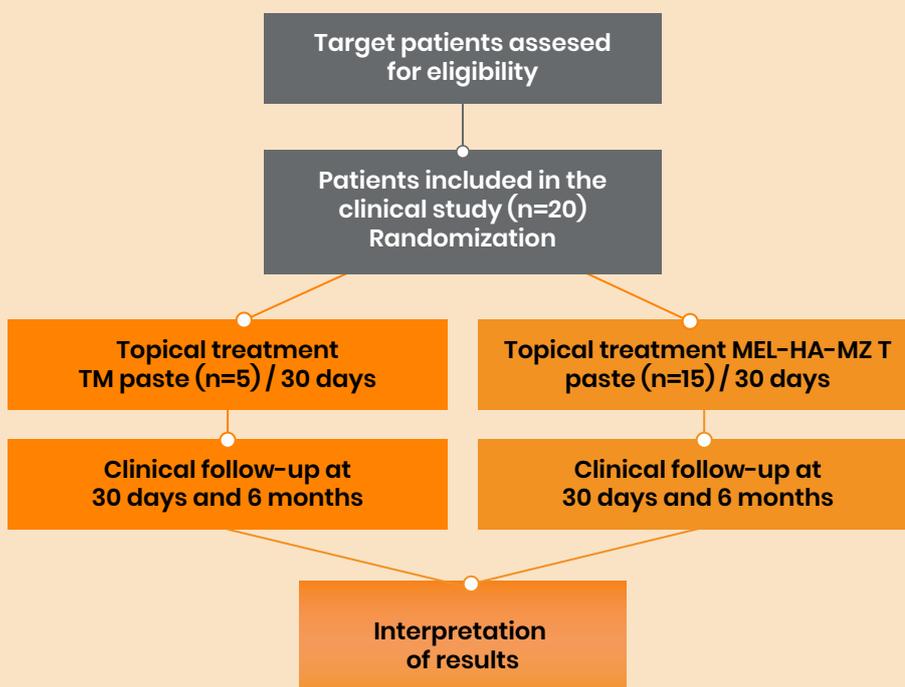
"We intend to bring the innovation realized by the consortium to the market. For example, once the patent application has been successful, our Turkish partner will consider further commercialization. After all, our prototype offers the great advantage that it allows the level of inorganic ions to be determined directly in the patient's periodontal pockets. Currently, the prototype has been developed specifically for measuring calcium. In the short term, however, we will be able to measure not only calcium but also, for example, the levels of magnesium and ammonia. That will be a significant advantage. The most important advantage of the medical device is that it allows us to measure inside the periodontal pocket. So you no longer need to take samples from patients, when the genuine biological matrix changes and then using a measuring device. Ultimately, the miniaturized medical device developed by our

team provides valuable information about the local progression of periodontal disease and the efficacy of the topical treatment applied."

Fruitful framework for innovation

"The advantage of the Manunet network is that it has offered us the essential framework for realizing innovations. In the meantime, the complete assistance received from the local representatives of the Manunet network made possible a smooth implementation of our project. The project has also enabled us to build up an excellent relationship with professionals within the field of dentistry. We have received full support from them throughout the project. Manunet leads to the creation of sustainable transnational connections. As a scientist, I cannot complain that I do not have the necessary contacts. In a scientific context, you get to know a lot of professionals at conferences. But, when it comes to doing something practical and realizing something physical, as a scientist, you are also looking for a particular framework to work in. Manunet eventually offered us this. So we are pleased to have discovered Manunet as a useful and fruitful tool."

Clinical trial scheme



Cross-border corporation

"The collaboration in our project was very successful. Among other things, we did a biological assessment of the material, and our Romanian partner carried out clinical research. Our Turkish partner then mapped out the biological behaviour of the material. For the material, we use melatonin as one of the most important compounds. A technical challenge here was that melatonin had to be added to the final material with great care. For the other part of the project, the development of the detection device, we created a specific membrane within the university and MEDISEN company designed, developed and implemented the sensing microdevice."

Eugenia Eftimie TOTU



Acronym

HAMELDENT

Call

Call 2017

Coordinating Funding Agency

UEFISCDI

Participating partners

UNIVERSITY POLITEHNICA OF BUCHAREST (Romania)

S.C. CONCORDIA DENT SRL (Romania)

MEDISEN Medical Technology Research and Development Company Limited Industry

Trade (MEDISEN Tic.Ltd.Sti.) (Turkey)

Project duration

24 months

Total project cost

€ 388.750



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“As Romania’s leading funding agency, we strive to create opportunities for innovation. Therefore, we are delighted to have been able to contribute to the Hameldent project and we are confident that the innovative prototype developed and the new international connections will contribute even further to the acceleration of technological progress.”

Nicoleta Dumitrache - UEFISCDI

