

NEW NANO-BASED ANTIMICROBIAL PRODUCTS FOR WOUND CARE

Nanordica Medical is a company that develops safe and environmentally friendly antibacterial products for wound care applications.

Problem and the market

Due to the increasing prevalence of bacterial infections, resistance of bacteria to traditional antibiotics and population aging, there is a great world-wide need for the new antibacterial agents. The global market for antibacterial agents used in the wound care products was 15.5 billion USD in 2016, and it is expected to expand twice by 2027.

Traditionally, silver is the main antibacterial agent that is used in antibacterial wound-care products such as plasters, sprays and wound dressings. However, recent scientific publications showed that silver and especially silver-based nanoparticles can be harmful to the environment and to the human cells, and some silver-containing products were banned from the market.

Company and the product

Nanordica Medical was established by three scientists from the National Institute of Chemical Physics and Biophysics (*Estonia*), who discovered novel antibacterial nanoparticles that are more safe to the environment and to human cells compared to silver nanoparticles. Nanordica Medical aims to patent the function of these antibacterial nanoparticles. Nanoparticles were already thoroughly characterized by us using various physico-chemical and biological methods, including toxicity tests with bacterial and human cells. Currently, our technology readiness levels (*TRL*) is on the stage 4, and we aim to proceed with the Patent Cooperation Treaty (*PCT*) filing and initial prototype (*TRL 5-7*).

Team

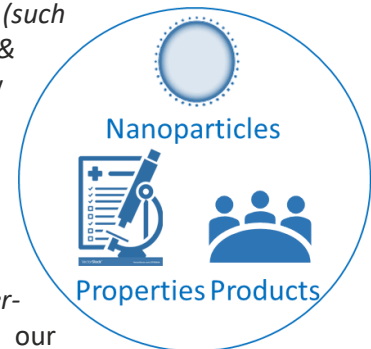
Anna-Liisa Kubo, MSc, Chief Executive Officer (*CEO*) of the company
Olesja Bondarenko, PhD, Chief Technology Officer (*CTO*) of the company
Grigory Vasiliev, MD, Chief Medical Officer (*CMO*) of the company

We have strong scientific competencies in microbiology, nanotoxicology, nanomedicine, collaboration with the hospitals (*G. Vasiliev is a medical doctor and a specialist in infectious diseases*) and some experience with the product development (*A-L Kubo participated in the establishment of HansaBioMed branch in Estonia and was a member of a team that developed the first product of HansaBioMed (EXOTEST)*). Our team was selected for the Tehnopol Startup Incubator program that provides us juridical, patenting and marketing assistance, and we plan to apply for additional funding from Enterprise Estonia and Smart Specialization programs. We have collaboration with the Laboratory of Environmental Toxicology at the National Institute of Chemical Physics and Biophysics in Tallinn, University of Tartu and University of Helsinki. We have very experienced Advisory Board comprising of business advisor Villem Aruoja, PhD (*Managing Director of Baltic Medcom OÜ, Estonia*) and science advisor Professor Helder Santos, PhD (*nano-engineer and chemist, University of Helsinki*) and strong network of science collaborators world-wide.

Planned business model

- 1) Selling non-exclusive licenses to the biomedical companies that manufacture wound care products.
- 2) Direct selling of the products (*antibacterial spray and plaster*) for the veterinary purposes and for human wound care.

We plan to licence the patent rights to the major biomedical companies (*such as Beiersdorf AG, B. Braun Melsungen AG, 3M, Baxter, Ethicon Inc., Smith & Nephew, ConvaTec, Kinetic Concepts, Inc.*). We also have the preliminary agreements with the veterinaries, who are interested in testing of our antibacterial nanoparticles. The end-users of the novel antibacterial products will be the customers, who value sustainable and environmentally friendly products. Remarkably, we are currently in a very good position to start our business, because the governmental regulations for the silver-containing products are tightening (*for example, silver-containing food packages are already banned from the market*) and our nanoparticles could be a versatile and timely replacement for silver. The raw material of our nanoparticle (*metal*) is also 50 times cheaper than silver.



Plans and milestones (MS):

May —August 2019 –Write and file PCT (*MS1, August 2019*)

May —July 2019 –Prototype for the first product ready: antibacterial nanoparticles-based spray (*MS2, July 2019*)

June —August 2019 –Prototype for the second wound-care product ready: antibacterial nanoparticles-containing films attached to the plaster (*MS3, August 2019*)

August —October 2019 –Tests of the prototypes (*testing of antibacterial properties of nanoparticles on film and in the spray according to ISO standards*) (*MS4, October 2019*)

August —November 2019 –documentation (*ethical permissions*) for the project with the veterinaries to start *in vivo* testing of antibacterial spray (*MS5, November 2019*)

October 2019 –January 2020 Communication and negotiations with licensing partners

Funding:

We are raising money to make two first prototypes of our nanoparticle-containing products (*antibacterial spray and plaster*) and test them as indicated in the section “Plans and milestones”. The products will be characterized for antibacterial properties and stability with different physico-chemical and biological methods. Nanordica Medical OÜ nanoparticles are environmentally friendly and can be used in wound care products belonging to the risk class IIa-IIb (*no necessity to conduct clinical studies*).

In order to implement the idea, we need funding of ca 10000-15000 EUR for the stages I and II (*requested from Prototron*), and ca 30 000 eur funding for the stage III (*will be requested from another sources*).

I stage

- Filing of the PCT (*5000 EUR*)
- Materials for the manufacturing of the prototypes (*1000 EUR*)

II stage

- *In vitro* testing of nanoparticles and prototypes with bacterial cultures and mammalian cells *in vitro* (*6500 EUR*)
- Services from the University of Tartu on physico-chemical characterization of prototypes (*stability, attachment, dissolution etc*) (*2000 EUR*)
- Logo, design and set-up of the web-page and other graphical promotion materials (*500 EUR*)

III stage

- Filing of the final patent covering European Union, US and Japan (*ca 30 000 EUR*)