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# WOUND CARE, TISSUE REPAIR AND REGENERATIVE MEDICINE

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### Innovative medical techniques, instruments and approaches for restorative wound surgery

The employment of single-use technologies is a bright example of the progress in modern medicine. The Age of AIDS and hepatitis C dictates its terms on the treatment strategy and tactics in different surgery directions. The idea of the single-use principle application of a sophisticated high-tech instrument on a stage of surgical treatment of injuries, generally, seemed to be a “crazy idea”, according to many experts. The path to the practical implementation of the project called “Electrodermatome – D Ds- 717” was quite long and complex. The idea of a single dermatome was patented in 2007 (patent UA32875). The first prototype of the invention was improved and modified after trials. The author of the invention faced with the complex task of changing the metal elements of the cutting part of the instrument into polymeric ones and developing an absolutely new instrument design. Because only on this condition mass production of single -use cutting heads becomes possible. For this purpose, multicomponent high-precision mold (weighing 200kg), used for the production of polymeric parts of the mechanism, had been developed for 3 years. Thus, the details are formed in the die-casting mold through the use of casting machine, called thermoplastautomat. Tool buildings are held in the specialized production laboratory (in Ternopil). Yet, the system of analog mechanisms is used, and the calibration of instruments is held under guidance of binocular stereomicroscope. A single-use head consists of polycarbonate parts and metal elements that

eliminates complex technological stages, milling of products, and, consequently, ensures tool cost reduction in 10 times. The cutting head of the dermatome is accurately calibrated and provides high quality of the tool, and once it is a single-use one, it helps to avoid the bit wear. The design of the electric dermatome disc (a tool used for surgical cure of burn patients) proved to be interesting. The innovation of the tool lies in invention of a single-use blade of annular (ring) shape. High precision metal laser-beam cutting technology, which eliminates stages of hard and costly handling, is used in the blades manufacturing. It should be noted, that in this time of dermatome, reusable blades were used. After sterilization blades quickly wore out and then the tools broke down. New design solutions are proposed towards skin transforator and linear dermatome, they are equipped with reusable cutting heads. Dynamic drive system that drives the cutting mechanism of different models of dermatomes also has innovative features. The system is equipped with an electronic charging indication display. Long operating cycle and high ergonomics of the tool are provided by a modern lithium-polymer battery. The operation, charge indication and charging process are controlled by electronic unit. The drive system is tight and may be sterilized through gas sterilization, if necessary. The reliability of the instrument provides modern commutatorless motor with high power and low energy consumption.

### Biography

Andrey Kovalchuk is combustiologist and PhD in Medicine. He is Head of Burning Injury and Reparative Surgery Department in Ternopil Emergency Hospital. He is an associate professor (Docent) of Department of General Surgery in Ternopil I.Ya. Horbachevskyi State Medical University. He is author of 8 patents and 48 scientific publications. The author of “ELECTRODERMATOME – D Ds-717”. He is the founder of the enterprise manufacturing the series of unique innovation equipment for skin-grafting.

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