FUNDING PROGRAMME: PNCDI III - European and International Cooperation - ERA-NET

SUBPROGRAM: 3.2-HORIZON 2020

PROJECT TITLE/ACRONYM: New textiles for partial defects/ PariTex

CONTRACT NO.: 95/2019

TOTAL PROJECT BUDGET: 406.000 Euro **INCDTP'S BUDGET:** 150.000 Euro

PROJECT STARTING DATA: 20.05.2019 **PROJECT ENDING DATA:** 20.05.2021

PAGINA WEB: www.paritex.ro

PARTNERS:

Coordinator: National Research-Development Institute for textile and Leather, INCDTP, Romania

Partner 1: SC SANIMED Impex International SRL (Romania)

Partner 2: TDU Savunma Sistemleri A.S, Turkey

GENERAL OBJECTIVE:

Development of advanced invasive textile medical devices for cases of abdominal parietal defects.

SPECIFIC OBJECTIVES:

- Use of knowledge generated in fundamental research activities in the field of specific gastroenterological surgical procedures and new generations of designed and developed biomaterials as well as in laboratory experiments to reach a new level of technological maturity - functional model -Demonstrator validated at laboratory level.
- Increase the capacity of the National Research and Development Institute for Textile and leather (INCDTP) to generate, in partnership, validated laboratory-scale solutions for new and significantly improved invasive medical devices, to offer them to economic agents and healthcare networks.
- Increase the capacity of SC Sanimed Impex International SRL to develop new materials for the healing of parietal defects and introduce them into the healthcare network in Romania.

Scientific and technological objectives:

- Development and implementation of the advanced concept of post-surgical prevention of multimodal pain;
- Design and development of the tissue structural support with specific geometry correlated with the particularities of the hernia and eventration;

Types of hernias

- Increasing the biocompatibility of the medical device in order to ensure the development of new tissue, avoid infections and reduce healing time, testing the performance level of the surgical device.

NOVELTY ELEMENTS/ SCIENTIFIC CONCEPT:

The new textile for hernia repair realised in the PariTex project brings added value of the state of the art by:

❖ the realisation of complex structures with directed systems or their holistic layout, from resorbable / non-resorbable biopolymers having: mass (g), thickness (mm), porosity, elasticity (%), shape, and biocompatibility characteristics correlated with the scope of use;

❖ realising of nanofibrous reinforced structures with resorbable / non-resorbable biopolymers having: mass (g), thickness (mm), porosity, elasticity (%), biocompatibility, shape and characteristics correlated to the field of use;

❖ functioning of complex and consolidated nanofibers structures with active agents that contribute to preventing infections and reducing discomfort caused by postoperative pain;

❖ using controlled drug delivery systems based on natural polymers to shorten the healing time.

The project contributes to the initiation and consolidation of a value chain for the realisation of functional textile structures based on partners' competencies, but also by attracting clusters of textiles and medicine for the application of the results.

EXPECTED EXPLOITABLE RESULTS:

- Knited structures with spatial or linear geometry
- Specification obtained by conventional/ non-conventional technologies
- Technological process for finishing and treatment with natural compounds
- Specification of the knitted structures
- Functionalization matrix to reduce infection and discomfort caused by postoperative pain
- Functional model.

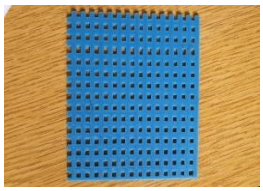
OBTAINED RESULTS :

Functional models:

- Spacer (Sandwich) knitted structures made on a Shima Seiki SIG 123 rectilinear knitting machine;
- 3D preformed structures made on a Shima Mack 2S knitting machine;

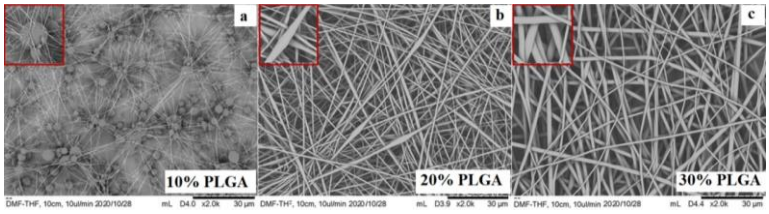
Types of meshes made by knitting

- 3D-Printing structures with well-defined pore structures and shapes made using biodegradable PLA polymer on a FlashForge printer;



Mesh made by 3D printing

- Textile structures made by electrospinning with PLGA content ;



Types of meshes made by electrospinning

- Textile structures functionalized with chitosan and collagen hydrolysate ;
- Functional models of textile structures made of 100% PES and PES/PP blend, with reinforced edges ;
- Evaluation of antimicrobial activity by logarithmic and percentage reduction method.

DISSEMINATION, PATENT APPLICATIONS, AWARDS:

- **SCOPUS published papers:**
  - ✓ **Emilia Visileanu, Laura Chiriac, Maria Memecica, Razvan Scarlat, Alina Vladu,** *Functionalization of textile medical devices for hernia repair,* International Journal of Current Research, ISSN-2231(print), ISSN-0975-833X(on-line), vol.12, issue 11,Noiembrie 2020,
    DOI :http://doi.org/10.24941/ijcr.39959.11.2020. Impact Factor-1,6; Indexat: Scopus, CrossRef, CAS Abstracts, Publons, Cite Factor, Google Scholar, Index Copernicus etc.

- **BDI published papers:**
  - ✓ Gratiela Gradisteanu Pircalabioru, Bianca Tihauan, Ana Ivanof, Madalina Axinie, Stelian Sergiu Maier, **Carmen Mihai, Alina Florentina Vladu**, International Conference TexTeh9- Advanced Textiles for a better world, 24-25.10.2019, Bucuresti, Romania, *Nanofiber meshes for abdominal hernia repair – challenges and opportunities,* Proceedings, ISSN 2068, Vol 9, pag.183-186, DOI:10.35530/TT.2019.4
  - ✓ Madalina Axinie, **Emilia Visileanu**, Bianca Tihauan, Ana Ivnof, Gratiela Gradisteanu Pircalabioru, Samet Aidyn, **Carmen Mihai, Razvan Scarlat, Alina Vladu**, *Development and preliminary characterisation of novel textiles for abdominal hernia repair,* Romanian Biotechnological Letters, issue 6 (Volume 24)-2019.
  - ✓ Gradisteanu Parcalabioru, Dolete Georgiana, Tihuan Bianca, **Visileanu Emilia**, Axinie (Bucos) Madalina, *Development and Characterization of new biocompatible polyester hernia meshes impregnated with chitosan*, International Scientific Conference „Innovative Solution for Sustainble Development of Textiles and Leather Industry", 21–22.05.2020, Oradea, Romania;
  - ✓ **Emilia Visileanu, Razvan Radulescu, Lilioara Surdu, Alexandra Ene, Carmen Mihai, Alina Vladu**, *Plasma treatments for increasing the biocompatibility of textiles medical devices,* 11th International Conference on Applied Human Factors and Ergonomics, 16–20 iulie 2020, Springer Conference Proceedings Books, ID 500269 San Diego, SUA;
  - ✓ **Emilia Visileanu, Laura Chiriac, Alina Vladu, Marian Memecica, Razvan Scarlat**, *Composites for textiles medical devices*, Applied Science, Engineering and Technology SCIFED-Webinar, 28.09.2020, Lisabona, Portugalia;
  - ✓ **Emilia Visileanu**, *New textiles medical devices for parietal defects*, Be Health 2020, International Online Event in Healthcare, 27–29 Octombrie, 2020
  - ✓ Gradisteanu Parcalabioru, Dolete Georgiana, Tihuan Bianca**, Visileanu Emilia**, Axinie (Bucos) Madalina, *Development and Characterization of new biocompatible polyester hernia meshes impregnated with chitosan*, Annals of the University of Oradea, Fascicle of Textiles, Leatherwork (on-line), ISSN 2457-4880, 2020, pag. 133–138;
  - ✓ **Emilia Visileanu, Maria Memecica, Razvan Scarlat, Alina Vladu**, *Spacer-type structures for hernia repair*, International Journal of Advanced in Engineering and Management (IJAEM), ISSN:2395-5252, vol.3, Issue 3, Mar. 2021, pp: 575–582, DOI:10.35629/5252-0303575582, Impact factor value:7,429, ISO 9001:2008 Certified Journal
  - ✓ **Emilia Visileanu, Laura Chiriac, Razvan Scarlat, Alina Vladu,** *Composite textile structures for parietal defects*, 22nd volume of the Journal "Annals of University of Oradea. Fascicle of Textiles, Leatherwork" / Issue 1/ May, 2021
  - ✓ Gradisteanu Pircalabioru Gratiela, Tihauan Bianca, Axinie (Bucos) Madalina, Angheloiu Marin, **Visileanu Emilia**, *Development and characterisation of polypropylene-PLGA electrospun hernia meshes,* 22nd volume of the Journal "Annals of University of Oradea. Fascicle of Textiles, Leatherwork" / Issue 1/ May, 2021
- **Scientific communicationsComunicari stiintifice:**
  - ✓ **Emilia Visileanu, Alexandra Ene, Carmen Mihai, Razvan Scarlat, Alina Vladu,** *Textile Medical devices for parietal defects,* International Congres and Exhibition on Industrial and Manufacture Engineering Conference - ICEIME 2019 *,* Granada, Spania*,* 15-16.08.2019,
  - ✓ **Alina - Florentina Vladu, Emilia Visileanu, Alexandra Ene, Carmen Mihai, Razvan Scarlat**, *Requirements of textile device design for parietal defects*, Textile Engineering Conference 2019, Bangkok, Tailanda, 19-23.10.2019.
  - ✓ Gratiela Gradisteanu Pircalabioru, Bianca Tihauan, Madalina Axinie, Ana Ivanof, Stelian Sergiu Maier, **Carmen Mihai, Alina Florentina Vladu**, *Nanofiber meshes for abdominal hernia repair – challenges and opportunities,* International Conference TexTeh9 - Advanced Textiles for a better world, 24-25.10.2019, Bucuresti, Romania,

- ✓ **Visileanu Emilia, Laura Chiriac, Maria Memecica, Alina Vladu**, *Composites with natural polymers for nets intended to repair parietal defects*, 5th International Conference on Natural Fibres & Materials of the Future, University of Minho, Portugalia 17–19.05.2021
- ✓ **Razvan Scarlat**, Stefan Eduard Ionut, **Grosu Cristina**, Blaga Maria, *Digital catalog of medical devices for hernia repair,* In: International Scientific Conference-eLearning and Software for Education, eLSE, April 22-23.2021, Bucharest, Romania

- **Patent Applications:**
  1. *Functionalized textile composite intended for the repair of parietal defects*, A/00767/23.11.2020.
  2. *3D textile structure for abdominal surgery*, A/00059/17.02.2021

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