Activated charcoal as a carrier of probiotics: A new approach for pathogen elimination in wounds

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INTRODUCTION: Antibiotic resistance is one of the biggest threats to global health, food security and development today [1]. However, development of conventional anti-infective drugs is going slowly, so new innovative strategies and more research are urgently needed in identifying, developing, implementing and evaluating novel therapies for antibiotic-resistant infections. The two-year ProHealingAC project, funded by the Science Fund of the Republic of Serbia, aims to use beneficial properties of AC and probiotic microorganisms in developing a new strategy for prevention and local treatment of antibiotic-resistant infections in wounds. Previously, it has been shown that activated charcoal (AC) in conjunction with different active agents has an efficient antimicrobial activity [2,3]. The aim of this project is to develop biocomposites (BCs) based on AC fabric, as adsorptive component, and probiotics, as bioactive component in order to achieve their synergetic activity for efficient and sustained local delivery of bioactive agents directly into the wound area. Also, special attention has been given to the influence of glucose level (normo- and hyperglycemia) in the microenvironment of the wound.

METHODS: A multidisciplinary team will develop an efficient, simple and cost-effective BCs by combining the principles of engineering and life sciences (microbiology, molecular biology and medicine). Developed BCs will be comprehensively characterized *in vitro* regarding probiotic release profile, antimicrobial and antibiofilm activity, and modulation of macrophage, fibroblast and keratinocyte activity. Based on the obtained results, the best candidate will be selected for *in vivo* studies in wound model in diabetic and non-diabetic animals.

RESULTS: As a primary result, a consortium of five scientific research organizations has been constituted and detailed research plan has been set. Expertize in the area of biotechnology, microbiology, molecular biology and histopathology of the partners involved in the project will constitute the solid background of the whole activity.

CONCLUSIONS: The main goal of the ProHealingAC project is to develop novel non-conventional anti-infective BCs with sustained release of probiotics for prevention and local treatment of resistant infections with special attention to the influence of glucose level in the microenvironment of the wound. In addition, through efficient dissemination and communication of the results, ProHealingAC project will help raise people's awareness of the importance of the rational use of antibiotics in human and veterinary medicine as well as.

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