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Development of new polymeric systems with potential applications in chronic wound treatment

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Statement of the Problem: Chronic wounds represent an important issue in medical practice taking into account their impact on patient's quality of life, the difficulty of their care and the costs involved. Based on their specific characteristics and biological properties, chitosan and hyaluronic acid have attracted the researchers' interest in developing new systems with medical applications. The purpose of this study was the development of some new polymeric systems, hydrogel type, with potential use in chronic wounds treatment.

Materials & Methods: The developed systems were obtained using chitosan hydrogel 5%, bentonite 5% and hyaluronic acid solution 1%. The proportion of chitosan-bentonite hydrogel and hyaluronic acid solution ranged between 95%-5% and 40%-60%. In these formulations the arginine 2% was included. The obtained hybrid hydrogels were characterized in terms of pH and morphology using Scanning Electron Microscopy (SEM). The presence of arginine in the polymer matrix was proved by Fourier-Transformed Infrared Spectroscopy (FT-IR).

Findings: There were obtained seven new hybrid hydrogels based chitosan-bentonite-hyaluronic acid-arginine, whose pH varied between 4.72 and 5.33. The presence of the active substance was proved by IR spectroscopy and the morphology was analyzed by SEM.

Conclusion & Significance: The systems developed represent a step in the attempt to improve chronic wound management, targeting the tissue regeneration and the risk of local infections.

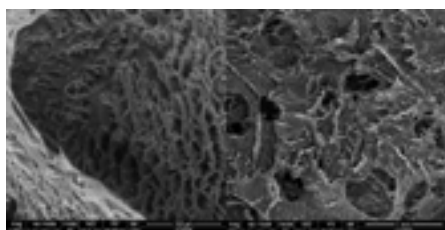


Fig SEM images of hydrogels obtained

Recent Publications

1. Giri T K, Thakur A, Ajazuddin A A, Badwaik H and Tripathi D K (2012) Modified chitosan hydrogels as drug delivery and tissue engineering systems: present status and applications, *Acta Pharmaceutica Sinica B*, 2 (5):439-449.
2. Debats I B J G, Wolfs T G A M, Gotoh T, Cleutjens J P M, Peutz-Kootstra CJ and Van der Hulst R (2009) Role of arginine in superficial wound healing. *Nitric Oxide* 15:147-156.
3. Mogoşanu GD and Grumezescu (2014) AM Natural and synthetic polymers for wounds and burns dressing, *International Journal of Pharmaceutics*, 463 (2):127-136.
4. Stern R and Maibach H I (2008) Hyaluronan in skin: aspects of aging and its pharmacologic modulation, *Clinics in Dermatology*, 26: 106-122.
5. Mayet N, Choonara Y E, Kumar P, Tomar L K, Tyagi C, Du Toit LC and Pillay V (2014) A Comprehensive Review of Advanced Biopolymeric Wound Healing Systems, *Journal of Pharmaceutical Sciences*, 103 (8): 2211-2230.

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Biography

Luminita Confederat is a young researcher and a PhD student at the "Gr. T. Popa" University of Medicine and Pharmacy, Iasi. She has expertise in the field of Pharmaceutical Chemistry, Pharmaceutical Technology and Analytical Techniques. Her research area concerns the use of biopolymers in medicine, targeting the improvement of pharmacokinetic profile of the drugs included in polymeric matrix as well as the benefits represented by the pharmacological properties of some polymers in the management of diseases like diabetes and chronic wounds.

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