logical changes of similar character are observed, but in the case of AC/DBC material, the intensification of changes is minimal in comparison to that observed in the animals exposed to AC/silver dressing.

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## References

- Kałużka J, Jankowska E, Pośniak M, Ławniczak D. Testing the efficiency of the simultaneous air cleaning of dust and gases by fibrous filtering and sorptive structures, *Fibres & Textiles in Eastern Europe* 2010; 18, 4(81): 77-81.
- Yoshii F, Zhanshan Y, Isobe K, Shinozaki, K.; Makuuchi, K. Electron beam crosslinked PEO and PEO/PVA hydrogels for wound dressing, *Radiation Physics and Chemistry* 1999; 55: 133-138.
- Ruiz-Cardona, L.; Sanzgiri, Y.D.; Benedetti, L.M.; Stella, V.J.; Topp, E.M. Application of benzyl hyaluronate membranes as potential wound dressings: evaluation of water vapour and gas permeability, *Biomaterials*, 1996,17, 1639-1643.
- 4.Walker, M.; Hobot, J.A.; Newman, G.R.; Bowler, P.G. Scanning electron microscopic examination of bacterial immobilisation in a carboxymethyl cellulose (AQUACEL<sup>®</sup>) and alginate dressings, *Biomaterials*, 2003, 24, 883-890.
- Hanna, J.R.; Giacopelli, J.A. A review of wound healing and wound dressing products, *The Journal of Foot and Ankle Surgery*, 1997; 1, 2-14.
- Czaja, W.; Krystynowicz, A.; Bielecki, S. Brown Jr RM. Microbial cellulose – the natural power to heal wounds, *Biomaterials*, 2006, 27, 145-151.
- 7.Patent specification PL 198288
- Kucharska, M.; Niekraszewicz, A.; Wiśniewska-Wrona, M., Brzoza-Malczewska, K. Dressing sponges made of chitosan and chitosan-alginate fibrids, *Fibres & Textiles in Eastern Europe*, 2008, 16, 3(68), 109–113.
- 9. Patent specification JP 61253065.

- 10. Patent specification PCT/PL2005/000025.
- Krucińska, I.; Komisarczyk, A.; Chrzanowski, M.; Paluch, D. Producing wound dressing materials from chitin derivatives by forming nonwovens directly from polymer solution, *Fibres & Textiles in Eastern Europe*, 2007, 15, 5-6(64-65), 73-74.
- Wrześniewska-Tosik, K.; Kucharska, M.; Wawro, D. Fibrous keratin-containing composite, *Fibres & Textiles in Eastern Europe*, 2008, 16, 6(71), 113-116.
- Goetzendorf-Grabowska, B.; Królikowska, H.; Bąk, P.; Gadzinowski, M.; Brycki, B.; Szwajca, A. Triclosan encapsulated in poli(L,L-lactide) as a carrier of antibacterial properties of textiles, *Fibres & Textiles in Eastern Europe*, 2008, 16, 3(68), 102-107.
- 14.Rajzer, I.; Grzybowska-Pietras, J.; Janicki, J. Fabrication of bioactive carbon nonwovens for bone tissue regeneration, *Fibres & Textiles in Eastern Europe*, 2011, 19, 1(84), 66-72.
- 15.Kiekens, P.; Szosland, L.; Krucińska, I.; Schoukens, G.; Błasińska, A.; Chilarski, A., Kornobis, E. Novel dibutyrylchitin dressing materials stimulating wound healing, Proceedings of The Autex 2006 Conference, Raleigh, NC State University, USA, June 11-14, 2006.
- Gutarowska, B.; Michalski, A. Antimicrobial activity of filtrating meltblown nonwoven with the addition of silver ions, *Fibres* & *Textiles in Eastern Europe*, 2009, 17, 3(74), 23-28.
- Hamilton-Miller, J.M.T.; Shah, S. A microbiological assessment of silver fusidate, a novel topical antimicrobial agent, *International Journal of Antimicrobial Agents*, 1996, 7, 97-99.
- AshaRani, P.V.; Mun, G.L.K.; Hande, M.P.; Valiyaveettil, S. Cytotoxicity and Genotoxicity of silver nanoparticles in human cells, *Acs Nano*, 2009, 2, 279-290.
- Kik, P. TIME- Modern guidelines for wound management, 4<sup>th</sup> All-Polish Scientific and Training Conference, Forum of Military Pharmacy and Medicine. Progress in pharmaceutical and medical sciences, Celestynów, May 6-8, 2009.
- 20.Witkowski, W. Scientific and clinical accomplishments of the Military Health Service in wound healing under conditions of field medical cover with the use of modern dressing materials, 4th All-Polish Scientific and Training Conference, Forum of Military Pharmacy and Medicine, Progress in pharmaceutical and medical sciences, Celestynów, May 6-8, 2009.
- 21.Chilarski, A.; Szosland, L.; Krucińska, I.; Kiekens, P.; Błasińska, A.; Schoukens, G., Cisło, R.; Szumilewicz, J. Novel dressing materials accelerating wound healing made from dibutyrylchitin, *Fibres* &*Textiles in Eastern Europe*, 2007, 15, 3(63), 77-81.
- 22.Pharmacopoea Polonica, ISBN 978-8388157-53-0, Warsaw, Edition VII:2007 and Edition VIII:2008.
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