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COATED CHITOSAN ONTO GAUZE TO EFFICIENT CONDITIONS FOR MAINTENANCE OF THE WOUND MICROENVIRONMENT

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ABSTRACT

The aim of this work was to evaluate the thermo-physiological comfort and moisture properties of surgical cotton gauze coated with chitosan (CH). Gauze was coated with CH at mass fractions of 0.50, 0.25, 0.125, 0.10, 0.063 wt%. Results indicate that the functionalized medical gauze induces low capilarity, allowing a good degree of moisture and absorption capacity of wound exudates. This biofunctional medical gauze coated with CH0,125 wt% demonstrates to deliver an efficient coating and promote the best conditions for maintenance of the wound microenvironment.

INTRODUCTION

Skin injured is often caused by wounding or physical trauma. Skin damages initiate a series of complicated events and repair processes ending with complete reestablishment of the tissue integrity and restoration of the skin barrier (Yates *et al*, 2007). Beside wound healing efficiency dressing selection should also comprise patient comfort and drainage control (Powers, Laurel, Tania, 2013). Retention of heat is an important wound dressing properties because help to maintain a moist environment and facilitate healing (Guptaa, Agarwal and Alan, 2010). The application of chitosan, a polysaccharide with homeostatic and antimicrobial properties, onto cotton has been widely reported to provide wound infection control and at the same time manteining the inherent textile characteristics (Zemljic et al, 2013).

RESULTS AND CONCLUSIONS

Table 1 shows that coated chitosan fabrics provide high thermal performance, thermal response as thermally insulators and water uptake values. Samples CH0.063 wt%, CH 0.100 wt% and CH 0.125 wt% show the best wound conformability results. However, the gauze CH 0.125 wt% provide the best balance between thermal insulation to the wound in virtue of its thickness and comfort properties. Thus, it is expected that this gauze could maintain an optimum temperature and moisture content for cell proliferation. Moreover, gauze CH 0.100 wt% displays the highest water uptake values suggesting good water retention capability. Water transport capability of cotton gauze increased 19.5% and 17.7 % in warp and weft directions, respectively. On the other hand, gauze 0.500 wt% shows the lowest water uptake values. Higher chitosan concentrations significantly reduce the capillarity capacity of cotton gauze (77.2 % in warp direction and 78.5% in weft direction).

Table 1 Thermal and water uptake Properties

Properties	Materials					
	Gauze Control	Gauze CH0,063	Gauze CH0,100	Gauze CH0,125	Gauze CH0,250	Gauze CH0,500
Thermal Conductivity (W/mK)	32.8±0.5	31.8±0.4	31.4±0.6	30.6±0.4	30.2±0.2	29.2±0.9
Thermal Resistance (m^2 K/ W])	16.2±0.1	16.8±0.0	17.2±0.5	17.9±0.2	18.2±0.7	19.0±0.1
Air Permeability (l/m^2/s)	76±1.7	71.5±1.9	71.0±0.6	69.2±1	67.9±0.4	62.6±0.9
Vertical wicking (g) - Warp	0.08±0.1	0.09±0.1	0.10±0.1	0.09±0.0	0.07±0.1	0.02±0.1
Vertical wicking (g) - Weft	0.16±0.2	0.16±0.1	0.19±0.2	0.17±0.1	0.12±0.1	0.03±0.2

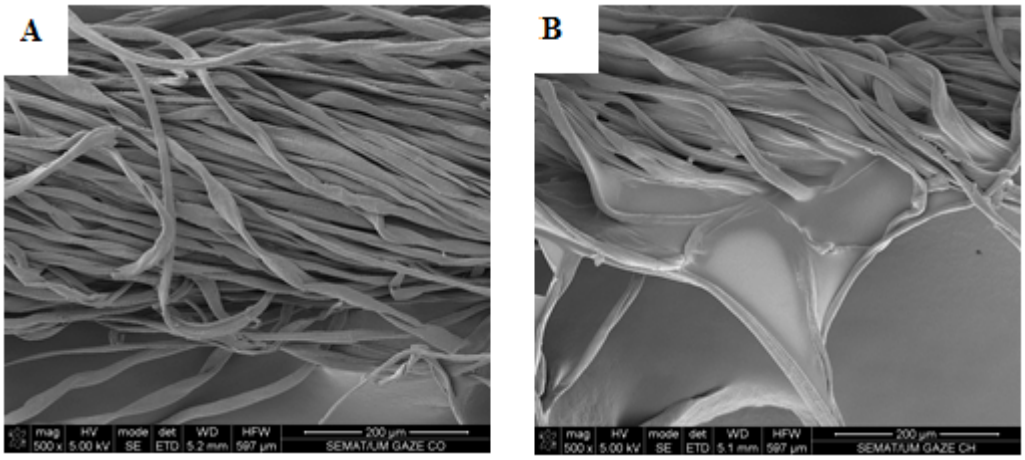

Fig.1 Coated chitosan: **A** – Control and **B**- CH0.125

The overall characterization of the different functionalized cotton properties such as the moisture control and dressing comfort properties allow to conclude that through the application of 0.125 wt% of chitosan onto cotton gauze, a material with enhanced flexibility, thermal properties, air permeability, moist management and low adherence properties was obtained.

ACKNOWLEDGMENTS

Jefferson M. Souza acknowledge CAPES Foundation, Ministry of Education of Brazil, Proc. nº 8976/13-9. A. Zille acknowledges funding from FCT within the scope of the project POCI-01-0145-FEDER-007136 and UID/CTM/00264.

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