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EVALUATION OF HEMOSTATIC BEHAVIOR OF GELATIN-SILICA NANOHYBRID BY CHANGING THE PH OF INJURY IN SEVERE BLEEDING

S Moradi¹, M Chenani¹ and S A Ahmaditabatabaei²

¹Islamic Azad University, Tehran, Iran

²Imperial College London, UK

After trauma, fast hemostasis is an essential strategy in extensive bleeding, in this decade, much effort has been made to develop the hemostatic agents, but the existent options have ample restrictions, including failure to maintain the structure of the stypctic in the face severe bleeding and rapid changes in pH. Since the changes in pH of injury site is an important factor in the failure of stypctic and their structural damage, in this study gelatin-silica nanohybrid behavior in severe bleeding was evaluated under different pH. Experiments including blood absorption, zeta potential measurements, and poly disparity index by GPC tests were studied. By changing the pH of environment, structural integrity and there upon nanohybrid hemostatic behavior changed dramatically. So that nanohybrid showed the most blood absorption (440%) and acceded to a coherent structure with tendentious to alpha helix and beta-sheets (the secondary structure of a protein), that also provide ability to maintain integrity of structure in severe bleeding. These results obtained, in alkaline or acidic environment nanohybrid hemostatic behavior was limited, so that in the acidic pH, the blood absorption was reduced to 110% and 1.6 times the normal clotting time delayed. Based on the results of this study, it was found that changes in nanohybrid behavior in acidic pH were much more than in alkaline pH and nanohybrid can also maintain the structural integrity with rapid hemostasis. According to the desire of injury site to change the pH to alkaline side, the resulting nanohybrid has an ideal ability to control excessive bleeding and can be proposed for further studies *in vivo* as a novel stypctic.



Figure 1: APTT chart, plasma and nanohybrid interaction in different pH

pH	1	5	8	7	9	9
M _w	9.53	6.32	3.36	9.51	3.88	7.14
M _n	10 ⁷	10 ⁷	10 ⁴	10 ⁷	10 ⁴	10 ⁴
M _w	9.56	7.48	4.48	1.46	2.27	8.15
M _n	10 ⁷	10 ⁷	10 ⁴	10 ⁴	10 ⁴	10 ⁴
PDI	0.31	1.18	0.33	1.54	0.35	1.13

Figure 2: M_w, M_n, and PDI changes for nanohybrid samples

Recent Publications

1. Chenani M and Ahmadinejad M (2016) Preparation and characterization of novel gelatin/silica nanohybrid as a stypctic for massive bleeding. *Journal of Nanomaterials and Biostructures* 4:1277- 1288.

soodehmoradi@gmail.com