A NEW APPROACH FOR STERILIZATION OF HYDROGELS USING AN OZONE GAS METHOD: TOWARDS SAFER AND GREENER TECHNOLOGIES

Galante, R.(1); Gisleni, D.(1); Paradiso, P.(2); Pinto, T.J.(1); Colaço, R.(2); Serro, A.P.(3);
(1) FCF-USP; (2) IST-UL; (3) ISCSEM;

Palavra chave: hydrogel, phema, silicone, gamma irradiation, ozone, autoclave

Resumo:
Introduction: Medical devices related infections contribute greatly to the increasing costs on health care systems around the world. Continued improvements in low-temperature sterilization systems, capable of demising the risk of infection and inflammation are needed. Ozone gas sterilization is emerging as an effective, low cost, safe and environmentally friendly technology, compared with standard technologies such as gamma irradiation and steam heat. Main Goal: Our work aimed to investigate the possible applicability and effectiveness of ozone sterilization methods for hydrogels, intended for biomedical applications. Experimental: Two model hydrogel formulations were prepared by thermopolymerization (one poly-2-hydroxyethylmethacrylate (pHEMA) based and one [Tris(trimethylsiloxy)silyl]propyl methacrylate (TRIS) based). The effect of sterilizing the materials through a novel ozone gas method was compared with that of two conventional sterilization techniques (gamma irradiation and steam heat). A complete characterization protocol was carried out, before and after each sterilization method regarding: swelling capacity, surface topography and morphology, physicochemical properties, hydrophilicity, transparency and friction coefficient alterations. The methods effectiveness and safety were assured by performing controlled contaminations followed by sterility tests along with preliminary in vitro cytotoxicity assays. Results: The main changes observed were in wettability and friction coefficient of both hydrogels after gamma irradiation and autoclave. Ozone was effective for low bioburden values, but toxic for long exposure times.