The biomedical devices are composed of different biomaterials however over 60% of infections acquired in medical centers are due to the presence of biofilms (1). Although bacterial biofilms are clearly observed by scanning electron microscopy (SEM) and appear as "dead parts of microorganisms", laser confocal microscopy show that a biofilm is a three dimensional structure covered by exo-polysaccharides with feed channels for bacterial nourishment and proliferation (2). This cover prevents the arrival and effective action of biocides and antibiotics and allows acquire resistance to them over the time. Thus, the biofilm becomes a strategy for survival in a harsh environment. Common strains in biofilms in dialysis devices are Staphylococcus aureus, S. epidermidis, Pseudomonas, Escherichia coli. In this work we analyze the response of biofilms to different biocide treatments: ozone, peracetic acid and UV. Peracetic acid is a mixture of acetic acid and hydrogen peroxide. The compound eliminates microorganisms by oxidation and subsequent rupture of the cell membrane, by the hydroxyl radical (HO). Peracetic acid was used cold, in a 0.09% solution of water during 15 minutes approximately. Ozone is an allotrope of oxygen formed by three atoms of it. Its role as a disinfectant is recognized by its high oxidant potential. Due to its instability, it has to be produced in the site of application through especial generators that produce O3 gas in water circulating by the system of dialysis. Concentrations used were from 0.08 to 0.4 ppm with a time of application that varied between 4 to 6 hours. The last kind of tubes analyzed was those that are part of the osmosis system disinfected by UV-C. Tubes of PVC, PPT and PE of a great variety of marks were used as negative controls (Fig. 1). All tubes analyzed in this work were treated with O3, peracetic acid, both treatments and also we assessed tubes that were under the action of UV in the osmosis equipment. The concentrations and times were those indicated above. In all cases, we found biofilms of different morphologies, showing that the concentrations, times of applications and procedures did not work efficiently to eliminate biofilms of the systems (Fig.2). New approaches to avoid the colonization of biomedical devices by bacteria are necessary to ensure an appropriate protocol of dialysis.


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Fig. 1: (SEM) Tubes of polyvinylchloride (PVC) and polyethylene PE of a great variety of marks were used as negative controls, with a thin layer of pure gold (120 seconds).

Fig. 2: (SEM) Tubes of polyvinylchloride (PVC) and polyethylene (PE) treated with O3, peracetic acid, and UVC. All tubes show contamination with biofilms. These biomaterials were metallized with a thin layer of pure gold (120 seconds).