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ABSTRACT:

Bactericidal and antitumoral effects of plasma activated liquids

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Antimicrobial resistance (AR), mostly caused by indiscriminate use of antibiotics, is an extremely worrying issue. In 2019, AR was associated to nearly 5 million deaths worldwide and it is estimated it could kill 10 million people per year in 2050. The reversion of such scenario, considered “terrible” by the World Health Organization in 2014, demands significant effort on multiple fronts, ranging from the establishment of proper antibiotics usage practices to the development of new antimicrobial agents. In this context, atmospheric pressure cold plasmas (APP) can be a very useful tool. With this technique, a myriad of reactive species is produced. Among the components generated in this type of plasma are a variety of reactive oxygen species (ROS) and nitrogen (RNS) formed by the reaction with molecules present in the air that come into contact with the plasma, such as oxygen, nitrogen, and water. Such species can be incorporated in a liquid placed near or in contact with the plasma, endowing it new chemical and physical characteristics. In this work, it has been evaluated bactericidal and antitumoral effects of plasma activated water, Ringer lactacte and saline solutions. The treatments have been performed using dielectric barrier discharges (DBD) and plasma jets. The DBD discharges have bemm produced applying 15 kV, 9

kHz-pulses to two cilindrycal metallic meshes separed by a flange-sealed glass tube fed with compressed air.The plasmas jet have been generated with a kINPen system. It has been observed that the density of murine malanome cells was reduced in 12 times after 60 minutes in contact with activated saline solutions. Furthermore, the exposure for 5 minutes to species generated by DBD discharges completely erradicate up to 106 bacteria CFU.

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