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**Plasmas for Biomedical Applications: Interaction Pathways of Low Temperature Plasmas with Biological Cells**

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To date, most research on the interaction of low temperature plasmas with biological cells has concentrated on germicidal effects in the case of bacteria and on toxicity in the case of eukaryotic cells. However, little attention has been given to the physical and chemical mechanisms whereby cells are impacted by their exposure to plasmas. Understanding these processes at the molecular and cellular levels not only will allow optimization of existing technology, e.g., plasma-based decontamination, but also will open new research avenues, for example, plasma-based wound healing. In non-equilibrium plasma discharges, reactive species are generated through various collisional pathways, such as electron impact excitation and dissociation. Air plasmas (and  $N_2/O_2$  plasmas), for example, are excellent sources of reactive oxygen-based and nitrogen-based species, such as O,  $O_2^*$ ,  $O_3$ , NO,  $NO_2$ , etc. The presence of some level of humidity leads to the generation of hydroxyl radicals, OH. Gas mixtures consisting of a noble gas (such as helium) mixed with oxygen also produce atomic oxygen and ozone. Oxygen-based and nitrogen-based reactive species have strong oxidative effects on the outer structures of cells. Cell membranes are made of lipid bilayers, an important component of which is unsaturated fatty acids, which are susceptible to attacks by hydroxyl radical (OH). The presence of this radical can therefore compromise the function of the membrane lipids whose role is to act as a barrier against the transport of ions and polar compounds in and out of the cells. Protein molecules are basically linear chains of amino acids, and therefore susceptible to oxidation by atomic oxygen or metastable oxygen molecules. In this presentation the potential role of various plasma-produced agents, including UV radiation and charged particles, in the interaction of plasma with biological cells will be discussed. Also, promising applications of plasma in medicine, such as wound healing, will be briefly covered.