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Variability of an Atmospheric Pressure Plasma Jet for Tissue Surface-Treatment[1] GUY PARSEY, JULIUSZ KRUSZELNICKI, AMANDA M. LIETZ, MARK J. KUSHNER, Univ of Michigan - Ann Arbor — Medical surface-treatment using non-thermal atmospheric pressure plasma jets (APPJs) relies on the production of reactive oxygen and nitrogen species (RONS) in the aqueous medium surrounding the tissue. Reactive species in the liquid are maintained by solvation from the gas-phase and produced in situ. Using an APPJ operating in a He and O_2-admixture, hydrogen containing reactive oxygen species (ROS) rely on humidity in the ambient and evaporation of H_2O. Reactive nitrogen species (RNS) depend on entrainment and dissociation of N_2 from the air environment. Aside from operational parameters (e.g., pulsing characteristics), many uses of APPJs involve hand-held procedures which introduce variation in electric field and gas flow fields; which may in turn alter RONS production. A computational investigation was conducted to characterize RONS production and transport for a He/O_2 APPJ operating in humid air interacting with a liquid layer. An initial study of pulse repetition frequency and flow rate demonstrated the consequences of convection during the inter-pulse period on RONS production. APPJ characteristics and activation of the liquid will be discussed as a function of the angle of application, which affects both plume dynamics and environmental entrainment. The production of ROS and RNS scale differently, perhaps enabling some ability to tune their relative contributions.

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