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Enhancement of Limb Growth by Non-Thermal Plasma Generated Reactive Species[1] N. SHAINSKY, M. STEINBECK, G. FRIDMAN, A. FRIDMAN, G. FRIEDMAN, Drexel University, T. FREEMAN, Thomas Jefferson University — Introduction: The goal of this investigation was to examine the effect of Dielectric Barrier Discharge plasma on mouse autopod differentiation and growth. In this study we hypothesized that NT-plasma can be used to promote redox dependent changes in differentiation pathways and enhance developmental signaling? Methods: Approximately 1 hour after isolation, NT-plasma or sham plasma treatment was applied to the right or left limb, respectively. The medium was changed daily thereafter for the 4-6 days of culture. NT-plasma treatment: pulsed (1000 Hz) voltage of 17 - 25 kV magnitude (peak to peak), a 1 μs pulse width and a rise time of 5 V/ns between the quartz-insulated high voltage electrode and the sample undergoing treatment. Results: A single 10 second NT-plasma treatment promoted development of mouse autopods as compared to the sham control contralateral limb. NT-plasma accelerated digit growth in both E14.5 and E12.5 autopods. Inhibitors were used to determine the role of ROS and RNS in mediating NT-plasma accelerated autopod development. Treatment with these agents stunted autopod morphogenesis NT-plasma treatment partially rescued development. Discussion: Our findings highlight the capability of NT-plasma to activate ROS-dependent cell signaling cascades within developing autopod tissue. In fact, the effect of NT-plasma may indeed extend beyond ROS sensitive signaling as NT-plasma exposure seems to stimulate some growth even in the presence of antioxidant induced stunting.

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