Atmospheric Pressure Pulsed Plasma Induces Cell Death in Photosynthetic Organs via Intracellularly Generated ROS.

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The toxicity of atmospheric-pressure pulsed plasma on plant leaf wasstudied. Arabidopsis thaliana leaves were treated by a nanosecond-pulsed plasmajet. Cell death in the leaf was observed from the treatment of only a fewseconds. High level of reactive oxygen species (ROS) accumulation was inducedby the plasma across the tissues within treated area. Plasma also induceddirect physical damage to epidermis tissue of treated area while did merely nodamage to mesophyll. Thus, we propose direct physical damage in epidermis andROS accumulation across the treated area induced cell death by plasmatreatment. Plasma treatment on different organ with same duration did not showplant death in spite of high ROS accumulation. This suggests damage onphotosynthetic organ by oxidative stress might be direct reason of cell death.We also observed similar plasma induced cell death in Solanum esculentum,Petunia axillaris, and Nicotiana benthamiana but the cell death was only limited to the treatedarea. Thus, we propose atmospheric plasma induce oxidative stress inphotosynthetic organ to induce cell death in plants.

This research was supported by the MOTIE (Ministry of Trade, Industry & Energy (10079606)) and Development of materials and core-technology for future display support program.This research was supported by the MOTIE(Ministry of Trade, Industry & Energy) (10049065) and KSRC(Korea Semiconductor Research Consortium) support program which development of future semiconductor device.This research was supported by SAMSUNG.