Plasma with nanotech. for biomedical applications: cancer therapy, sterilization, coagulation, dental whitening

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In our difficult war against cancer, we have emerged out with a drastically novel therapeutic approach with atmospheric pressure plasmas (APP) suitable for biomedical applications\textsuperscript{1,2,3}. A non-thermal air plasma has shown its effectiveness in killing cancer cells. We have used 30 nm gold nanoparticles and antibody conjugation to selectively enhance the therapeutic effects of the plasma. After the FAK-GNP binds to FAK proteins specifically, irradiation of plasma stimulated gold nanoparticles caused deactivation of FAK, thereby drastically increasing the cancer cell death rate to 74%, which is five times enhancement compared with the case of plasma alone without antibody-conjugated nano particles. This research opens the door to a new paradigm where non-thermal plasma and antibody conjugated-gold nanoparticles team up to create a powerful weapon against cancer. Our other APP devices with air, He, or Ar for coagulation, sterilization, and tooth whitening are studied experimentally and theoretically\textsuperscript{4-6}.

\textsuperscript{4} “Antibody nanoparticles : a new weapon against cancer”, Europhysics News, \textbf{40}, 2, 14 (2009); a newsletter circulated to 25,000 physicists in Europe
\textsuperscript{5} G. J. Kim, W. Kim, K. T. Kim, J. K. Lee, “DNA damage and mitochondria dysfunction in cell apoptosis induced by non-thermal air plasma”, submitted (2009)