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# Plasma-Generated Ultraviolet Radiation and Its Effects on Human Cells

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Low-temperature atmospheric-pressure plasma proved to be highly efficient in surface and water disinfection. Bactericidal factors of plasma irradiation are charged particles, reactive oxygen and nitrogen species, and UV radiation. Even though plasma-generated UV is not the only and often not the main sterilizing agent of plasma irradiation, this factor deserves special attention when designing plasmas for therapeutic purposes such as disinfection of chronic wounds and tissue regeneration.

Biological effects of UV radiation depend strongly on its electromagnetic spectrum. Over millions years of evolution, human body has adapted to solar UV radiation that reaches the Earth's surface. Up to 98% of this radiation is represented by long-wavelength UV (UVA). Short-wavelength UV emitted by the Sun is almost completely absorbed by atmosphere. In addition, the outermost layer of healthy human skin, *stratum corneum*, protects living skin cells against the trace amounts of short-wavelength UV. UVC is the most cytotoxic type of UV radiation. It induces mutagenesis and photochemical oxidation processes in cells. Pro-apoptotic dose of UVC is about 1000 times lower than the corresponding dose of UVA.

In this study, we compared the relative effects of UV radiation generated by the pure argon plasma and mixed-gases plasmas on human skin cells *in vitro*. Electric discharges in gases generate polychromatic UV radiation. Spectral characteristics of plasma-generated UV are determined by the emission spectrum of input gas(es) and their purity. We demonstrate that addition of different gases to the main input gas, argon, changes spectral characteristics of plasma-generated UV. Introduction of emission peaks in the area of short-wavelength UV has negative effect on human skin fibroblasts viability and proliferation.