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Non-healing wounds represent a serious problem for the modern medicine. In most cases, infections accompany non-healing wounds and might not only make the wounds worse but result in a generalized disease, amputations and even lethality. Non-thermal plasmas deliver a flow of bioactive components including charged particles, neutral active species and UV photons. Concentration of each component is low enough to be permissive for human tissues. Acting in synergy, these components provide non-specific bactericidal effects against a wide range of bacteria that makes non-thermal plasmas an ideal mean for treatment of mixed wound infections. Indeed, e.g. argon plasma applied to superficial slash wounds with a mixed infection resulted in a statistically significant reduction of bacterial loads on the wound surface and accelerated pathogen elimination. Comparison of *in vitro* and *in vivo* tests demonstrated about a 5-fold increase in a time required for argon microwave plasma to get a similar drop in bacterial loads on Petri dishes and on the wound surface. Meanwhile, shorter wound treatments while were not fully bactericidal still increased rates of wound healing. Comparison of 2D-, 3D- cell and *in vivo* models suggested plasma-stimulated production of signaling molecules by fibroblasts to be responsible for improved connective and epithelial tissue growth. Similar mechanisms seem to be responsible for accelerated angiogenesis. Plasma treatments are stimulating at inflammatory and proliferation stages of wound healing but might have a counter-productive effect at the remodeling stage. Taken together, available results supported the view on non-thermal plasma as a promising agent in healing of both infected and aseptic wounds therapy. Further studies will focus on revealing biological indicators to carry out, or refrain from, plasma treatments in the course of wound healing.

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