

# Non-thermal impact by ultrashort super high power electromagnetic pulses on cell structures of the living body

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A new efficient and safe approach to remote nonthermal activation of nanostructured capsules by external ultrashort electromagnetic influences of ultrahigh power for solving problems of targeted drug delivery is presented. This approach is especially relevant and in demand due to the fact that active research is underway in the field of targeted drug delivery. Capsules of different composition and structure are being tested, different ways of controlling the movement of the capsule in the bloodstream are being considered, but the problem of decapsulation control remains open. The destruction of the liposomal capsule membrane under pulsed electrical action was studied using a pulse generator system at a voltage of 150 kV/cm and a pulse duration of up to 5 ns. The effect of lowering the threshold value of the external electric field due to the presence of nanoparticles in the membrane of the liposomal capsule has been experimentally confirmed. This effect determines the selectivity of the external impulse action, in which only nanostructured liposomal capsules are activated, while the surrounding cells (not containing nanoparticles) are not damaged. This selectivity of the impact is very significant for practical applications related to controlled drug delivery in the human body, since it allows avoiding the damage of the body cellular membranes, providing structural changes only in the membranes of nanostructured liposomal capsules. This approach could also be used to damage biological microstructures, such as viruses or bacteria. Thus, it is possible to develop a new energy-saving physical method for the disinfection of biologically contaminated objects.