Abstract

Plasmonic photothermal therapy (PPTT) is an innovative method of cancer treatment using nanomaterials, especially gold nanoparticles. Unlike clinically used cancer therapies, it promises minimisation the invasiveness and side effects as well as high specificity. Exposure of cancer cells to the near-infrared light leads to local hyperthermia, which is generated by gold nanoparticles. Nevertheless, the mechanism of induced cell death does not proceed each time in the same manner. This work aims to compare to date known mechanisms governing the different cellular responses to PPTT-induced hyperthermia and highlights its potential for clinical cancer therapy. It compares the mechanisms of cell death observed and identified during PPTT, including apoptosis, necrosis, necroptosis, lysosome-dependent cell death, autophagy-dependent cell death and NETosis, which differ at the molecular level. Understanding the molecular basis of the cell death pathways is crucial for optimizing the efficacy of PPTT and its future testing both *in vivo* and in clinical trials.

Keywords: plasmonic photothermal therapy, gold nanoparticles, cell death