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Abstract: Together with surgery and chemotherapy, ionizing irradiation is one of the key therapeutic approaches to treat cancer. More than 50 percent of all cancer patients will receive radiotherapeutic intervention at some stage of their disease. The more precise instrumentation for delivery of radiotherapy and the emphasis on hypofractionation technologies have drastically improved loco-regional tumor control within the last decades. However, the appearance of distant metastases often requires additional systemic treatment modalities such as chemotherapy. High dose chemotherapy is generally considered as immunosuppressive and can cause severe adverse effects. Therefore, we want to elucidate the effects of ionizing irradiation on the immune system and provide immunological treatment strategies which are induced by the host's stress response. Similar to other stressors, ionizing irradiation is known to enhance the synthesis of a variety of immune-stimulatory and -modulating molecules such as heat shock proteins (HSP), high mobility group box 1 (HMGB1) and survivin. Herein, we focus on HSP that exhibit an unusual cell membrane localization and release mechanism in tumor cells. These tumor-specific characteristics render HSP as ideal targets for therapeutic interventions. Depending on their intra/membrane and extracellular localization HSP have the ability to protect tumor cells from stress-induced lethal damage by interfering with antiapoptotic pathways.
or to elicit anti-cancer immunity.