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NEW APPROACHES AND PROCEDURES IN CANCER TREATMENT. CURRENT PERSPECTIVES ON THERMAL ABLATION

The basic cancer treatment modalities include surgery, radiation therapy, chemotherapy, and targeted therapy, which can further include gene expression modulators, immunotherapy, angiogenesis inhibitors, hormone therapy, and so on [9]. However, there are more recent methods that have emerged not long ago, and the aim of this paper is to discuss some of them.

Ablation is a treatment technique that destroys tumors without removing them. It is mostly indicated for small-size tumors (less than 3 cm) and the surgical option is contraindicated. Ablation is also used with embolization for larger tumors. However, this technique might not be indicated for treating tumors near major blood vessels, the diaphragm, or major bile ducts due to destroying some of the normal tissue around the tumor [3].

The technique of thermal ablation involves extreme hyperthermia or hypothermia to destroy tumor tissue concentrating on a focal zone in and around the tumor. Similar to surgery, thermal ablation removes the tumor and a 5–10 mm thick margin of seemingly normal tissue but the tissue is killed in situ and then absorbed by the body later. The procedure is similar to surgery using an open, laparoscopic, or endoscopic approach but is commonly applied using a percutaneous or non-invasive approach. The type of tumor, site, physician's choice, and health status of the patient determine the approach to treatment [8].

Radiofrequency ablation (RFA), microwave ablation, high-intensity focused ultrasound, and cryoablation are currently being used in the clinical setting. Cryoablation

uses a hypothermic modality to induce tissue damage by a freeze-thaw process against others. All these treatments operate on the principle of hyperthermia except cryoablation. Of all the ablation techniques, cryoablation demonstrated the highest potential to elicit a post-ablative immunogenic response [10].

Recent studies showed that in addition to tissue disruption RFA and cryoablation can modulate the immune system that they were applied as therapy on TM and in systematic circulation. Evidence has shown that ablation procedures affect carcinogenesis due to its local inflammatory response leading to an immunogenic gene signature [6]. The advantage of this procedure over surgery is that it provides a minimal (e.g. percutaneously or laparoscopically) or non-invasive approach to cancer therapy and gets attention as an alternative to standard surgical therapies [2].

Cryoablation is one of the ablation techniques which ablates the extensive tissue by freezing to lethal temperatures followed by liquid formation, influencing the extensive tissue. Benign and malignant primary tumors are mostly treated by this therapy [4]. James Arnott reported that freezing temperatures can impair cancer cell viability after he attempted the usage of cold temperatures by salt and ice solutions for the generation of local numbness before surgical operations in the nineteenth century. He suggested cryoablation as an attractive therapeutic option and increased a patient's survival [5].

RFA therapy is a minimally invasive procedure and an image-guided technique using hyperthermic (high-frequency electrical currents) conditions to destroy cancer cells. Imaging techniques, such as ultrasound, computed tomography (CT), or magnetic resonance imaging (MRI), guide needle electrodes into a tumor cell. Generally, RFA is the most effective approach for treating small-size tumors of less than 3 cm in diameter. RFA can be used in combination with other conventional cancer treatment options [7]. After starting the use of deployable devices or multiple-electrode systems, RFA can treat medium tumors (up to 5 cm in diameter) [1].

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TECHNOLOGY OF PROBIOTICS PRODUCTION

Probiotics is a term for living microorganisms that if consumed in adequate quantities, are beneficial to human health. The term "probiotics" includes probiotic medicines, probiotic foods (dietary and food supplements) and genetically modified probiotics. Since 2001, according to the recommendations of the World Health Organization, when using probiotics, the genus and family name of the strain with the definition of its genotypic and phenotypic characteristics, as well as data on the mechanism of action obtained in vitro, justification of clinical efficacy based on the results of studies in the human population, should be indicated. Besides, the aspects of antibacterial resistance, metabolic activity, side effects, toxin-producing and hemolytic activity, and lack of invasiveness in animal testing should be determined.

Today, we know the mechanisms of action of probiotics that protect the human body from infectious diseases. Among them: strengthening the epithelial barrier, inhibition of adhesion of pathogenic microorganisms, competitive inhibition of growth of pathogenic microorganisms, production of antibacterial substances and modulation of the immune response.

According to the classification established in 1996, drugs that normalize intestinal microflora are divided into 4 generations: I – classical monocomponent preparations containing one strain of bacteria; II – self-limiting antagonists; III – combined preparations that consist of several strains of bacteria or include additives that enhance their effect; IV – live bacteria that are immobilized on the preparation, the representatives of normal flora.