



(REVIEW ARTICLE)



## Allergy-assisted cancer therapy

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### Abstract

Cancer is a disease that overwhelms the body with harmful and excessive cellular growth. There is a deadly accessory of stage IV cancer; *Staphylococcus aureus* is a disease-serving bacterium that can infiltrate the tumor microenvironment to support malignancy. Furthermore, immune tolerance is acquired as the bacteria-infested cancerous mass forms a collagen-reinforced extracellular matrix. The review discusses allergy-assisted cancer therapy wherein hyper-allergenic skin creams may impede bacterial contributions and disrupt the extracellular matrix, complicit with immune tolerance.

**Keywords:** Allergies; Bacteria; Cancer; Extracellular Matrix; Immune Tolerance

### 1. Introduction

Stage IV (i.e., advanced, metastatic cancer) means that the cancer has spread to distant parts of the body [1]. As cancer spreads throughout the body, it becomes difficult to treat. Metastases that have spread to diverse regions/organs grow in variable microenvironments, causing them to respond differently to treatment [2]. A cell-based understanding of cancer microenvironments may help with treatments and improve patient outcomes with even more benefits than are being afforded by our current knowledge of genes [3].

Medical science continues to expand the breadth and scope of cancer therapeutics. Treatments include monoclonal antibodies [4], immune checkpoint inhibitors [5], virus therapy [6], bacteria therapy [7], cancer vaccines [8], and T-cell transfer therapy [9].

A “cold” tumor typically lacks significant immune cell infiltration, meaning the immune system is not effectively recognizing or attacking the tumor; tumors are often less responsive to immunotherapy and may require additional interventions to activate the immune response [10]. Cold tumors tend to be surrounded by an extracellular matrix that acts as a barrier to suppress the immune response and keep immune cells from attacking the tumor cells [11].

Allergy-assisted cancer treatment is in its infancy. Attributes of the allergy cascade may include its antimicrobial effect and disruption of the extracellular matrix.

### 2. Discussion

Can allergies inhibit cancer? Allergies can affect anyone, regardless of age, gender, race, or socioeconomic status [12]. Harnessing the power and benefits of allergic inflammation is a new frontier in cancer treatment [13]. Allergy-assisted cancer therapy may disrupt the tumor microenvironment through a mechanism of action that encompasses cross-reactivity [14], immune metabolic interference [15], and targeted degranulation [16]. Furthermore, exploiting the allergy cascade may be part of an effective cancer treatment that combines immunotherapy and targeted therapy [17].

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With any cancer treatment, there are side effects [18]. Allergic inflammation is a relative contraindication; the risks of complications from allergy symptoms [19] do not outweigh the serious medical condition of a malignant tumor growing out of control and metastasizing.

Drug-resistant infections are growing in number and cost and significantly threaten our ability to care for patients with cancer [20]. Can understanding the interaction of cancer, bacteria, and allergies provide insight into effective cancer treatments? *Staphylococcus aureus* is a bacterium known to promote cancer [21,22,23]. A study indicates that allergies inhibit *Staphylococcus aureus*. Researchers have found that a module of the immune system, which is best known for causing allergic reactions, plays a role in acquiring host defense against infections triggered by *Staphylococcus aureus*. This "allergy module," constituted by mast cells and Immunoglobulin-E (IgE), can grant protection and increased resistance against secondary bacterial infections in the body [24]. Furthermore, a medically induced allergy to heat-inactivated *Staphylococcus aureus* [25], using a hyper-allergenic skin cream [26] as the delivery system, may provide specific IgE antibody protection, affecting the morbidity and mortality of bacteria-assisted cancer.

A natural medicine approach to *Staphylococcus aureus* eradication in cancer patients may be adjuvant therapy. The vegan-product apple cider vinegar has effective antimicrobial properties when applied to the skin [27].

Can allergy-assisted cancer therapy disrupt immune tolerance associated with metastatic cancer? The extracellular matrix is a non-cellular meshwork of crosslinked macromolecules of collagen. It provides clues to the physical and chemical nature of metastatic cancer [28]. A medically induced gelatin allergy (i.e., collagen allergy [29],  $\alpha$ -gal syndrome [30]), using a hyper-allergenic skin cream as the delivery system, may disrupt the formation and integrity of the extracellular matrix to affect immune tolerance through IgE antibody cross-reactivity [31].

A functional medicine approach to allergy-assisted cancer therapy may improve patient outcomes. Functional medicine takes a multi-faceted approach to cancer, first understanding the underlying causes that may be involved. It involves doctors understanding as much as possible about the individual patient, including biological markers. For example, monitoring IgE antibody specificity and levels are two biological determinants important to allergy-assisted cancer therapy. Furthermore, a functional medicine approach supports dietary intervention during the allergy cascade [32].

### 3. Conclusion

Research efforts continue to explore cancer therapies that obstruct the architecture of malignant solid tumors. The dynamic interaction of cancerous cells, bacteria, and allergies can influence the etiology and progression of stage IV cancer. Allergy-assisted cancer therapy may improve patient outcomes by stimulating natural immunity, increasing resistance to secondary infection, and decreasing immune tolerance.

### Compliance with ethical standards

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#### *Disclosure of conflict of interest*

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